

210511_NN_v3

May 31, 2021

1 Titanic dataset Neural Network

1.1 Introduction

The purpose of this work is to apply a basic neural network (NN) to the Titanic dataset that is part of the popular Kaggle machine learning competition (<https://www.kaggle.com/c/titanic/>). This dataset consists of a set of two separate csv files 'train' and 'test' that contain 891 and 418 instances of 11 independent variables respectively. These variables describe properties about passengers on that fateful and iconic voyage across the Atlantic. In addition to the 11 independent variables, the train file contains a dependent variable 'Survived' that refers to whether a passenger on the titanic voyage survived (denoted by a 1) or not (denoted by a 0). The test file does not contain the dependent variable 'survived'. Each instance for both files represents a single passenger on the ship. The purpose of this exercise is to develop and train a machine learning model on the 'train' data, and then use this model (a Neural Network in this case) to predict whether the passengers described by the 'test' data 'survive' or not. This is then submitted to the Kaggle website for assessment.

```
[1]: # First step is to import all relevant packages used in this work

import tensorflow as tf
from tensorflow import keras

import numpy as np
import pandas as pd

from sklearn.preprocessing import StandardScaler
from numpy.random import seed
from keras.models import Sequential # initialize the ANN
from keras.layers import Dense     # Used to create 'Dense' layers into the NN
from keras.layers import Dropout   # Dropouts allow for node dropout as part
    ↪ of the model
from keras.utils.vis_utils import plot_model

from keras.wrappers.scikit_learn import KerasClassifier
from sklearn.model_selection import GridSearchCV
```

```
[2]:
```

```
# The data was downloaded from the Kaggle website. To run this project, you
  ↳ will need to have these two csv
# available.
# Import the data and store as dataframes
train = pd.read_csv('train.csv')
test = pd.read_csv('test.csv')
```

```
[3]: # Making copies of each to modify for the NN while maintaining original
  ↳ versions.
train1 = train.copy()
test1 = test.copy()
```

1.2 Data wrangling

```
[4]: # Neural Networks are only able to operate with numerical values. Looking at
  ↳ the data types for the train dataset,
# some of the variables are objects.
train.dtypes
```

```
[4]: PassengerId      int64
Survived             int64
Pclass              int64
Name                 object
Sex                  object
Age                 float64
SibSp               int64
Parch               int64
Ticket              object
Fare                float64
Cabin               object
Embarked            object
dtype: object
```

1.2.1 First looking at Sex

```
[5]: # In order to be compatible with a NN, the data must be processed into the
  ↳ correct format.
# Setting Sex as a category
train1['Sex'] = train1['Sex'].astype('category')

# Now converting the categories to coded values (either a 1 for male or a 0 for
  ↳ female)
train1['Sex'] = train1['Sex'].cat.codes
```

1.2.2 Extracting title information from the 'Name' descriptor

The 'Name' variable contains a potentially useful value. While the name itself of the passenger is too random and unlikely to contribute to the survival of the passenger, their title may.

```
[6]: # Looking to extract title information from the Name descriptors
train1['Title'] = train1.Name.map( lambda x: x.split(',')[1].split( '.' )[0].
    ↳strip())

# Now to get an over all count for all types of titles in the 'train' dataframe.
train1['Title'].value_counts()
```

```
[6]: Mr          517
Miss        182
Mrs         125
Master       40
Dr           7
Rev          6
Mlle         2
Major        2
Col          2
Jonkheer     1
Capt        1
the Countess 1
Don          1
Sir          1
Mme          1
Lady         1
Ms           1
Name: Title, dtype: int64
```

```
[7]: # Clearly there are a number of titles for which there are single examples.↳
    ↳Many of these are somewhat
# Similar/redundant with other more populated examples.
# Looking to replace all equivalent titles with more common versions
# Replace Mlle with Miss.
train1['Title'] = train1['Title'].replace('Mlle', 'Miss')
# Replace Mme, Lady and Ms with Mrs.
train1['Title'] = train1['Title'].replace(['Mme','Lady','Ms'], 'Mrs')
# Generate a list of counts for all remaining titles.
title_counts = train1['Title'].value_counts()
```

```
[8]: # Now to bundle all rare titles into 'others'
# Creating a dataframe of titles and their counts to manipulate in a moment.
counts = pd.DataFrame({'Title':title_counts.index, 'Count':title_counts.values})
# A subset of counts that has titles with less than or equal to 20 instances.
rare_title = counts.loc[counts['Count'] <= 20]
# Getting a list of all rare titles.
```

```

rare_title_list = rare_title['Title'].tolist()

# Using the rare_title_list to replace rare titles with 'Others' in the train1_
→dataframe.
train1['Title'] = train1['Title'].replace(rare_title_list, 'Others')
# Now to get a final count of modified title variable.
train1['Title'].value_counts()

```

```

[8]: Mr      517
     Miss    184
     Mrs     128
     Master   40
     Others   22
     Name: Title, dtype: int64

```

1.2.3 Binarisation of ‘Embarked’ and ‘Title’

Here I apply a one-hot encoding (or binarisation) of the Embarked and Title data. This is ultimately a process where for each of these two independent variables, a new variable is created for each category within either Embarked or Title. For example, for Embarked, there are three categories, C, Q, and S. So now there will be three new independent variables, Embarked_C, Embarked_Q, and Embarked_S, and the original Embarked is removed. Now each new variable is a list of 1's and 0's (hence binarized), and any instance for which a passenger belonged to this category of Embarked receives a 1. Otherwise it gets a 0. This more numerical representation of the same data is compatible with a Neural Network.

```

[9]: # Again in an effort to make all independent variables numerics, here I will
     # subset all other categorical variables that need to be encoded (binarised).
     categorical = ['Embarked', 'Title']

     for var in categorical:
         train1 = pd.concat([train1, pd.get_dummies(train1[var], prefix=var)], axis_
→= 1)
         del train1[var]

     # Now to remove not only the original Embarked and Title, but all unused_
→variables in this NN.
     train1.drop(['PassengerId', 'Name', 'Ticket', 'Cabin'], axis=1, inplace=True)

```

1.2.4 Scaling continuous data

A quick survey of the data will reveal that while some parameters are binary, others vary as floats with much larger values ranges. This can be problematic for a NN to maintain sensitivity across the nodes. So we apply a scaling procedure to all variables.

```

[10]: # Now I need to scale all the continuous variables
     continuous = ['Age', 'Fare', 'Parch', 'Pclass', 'SibSp']

```

```

for var in continuous:
    train1[var] = train1[var].astype('float64')
    train1[var] = StandardScaler().fit_transform(train1[var].values.reshape(-1,1))

# This makes all of these 'continuous variables to have the means substracted
# and to vary around zero by the variance
# of the data.'
train1.describe()

```

```

[10]:

```

	Survived	Pclass	Sex	Age	SibSp \
count	891.000000	8.910000e+02	891.000000	7.140000e+02	8.910000e+02
mean	0.383838	-8.772133e-17	0.647587	2.388379e-16	4.386066e-17
std	0.486592	1.000562e+00	0.477990	1.000701e+00	1.000562e+00
min	0.000000	-1.566107e+00	0.000000	-2.016979e+00	-4.745452e-01
25%	0.000000	-3.693648e-01	0.000000	-6.595416e-01	-4.745452e-01
50%	0.000000	8.273772e-01	1.000000	-1.170488e-01	-4.745452e-01
75%	1.000000	8.273772e-01	1.000000	5.718310e-01	4.327934e-01
max	1.000000	8.273772e-01	1.000000	3.465126e+00	6.784163e+00

	Parch	Fare	Embarked_C	Embarked_Q	Embarked_S \
count	8.910000e+02	8.910000e+02	891.000000	891.000000	891.000000
mean	5.382900e-17	3.987333e-18	0.188552	0.086420	0.722783
std	1.000562e+00	1.000562e+00	0.391372	0.281141	0.447876
min	-4.736736e-01	-6.484217e-01	0.000000	0.000000	0.000000
25%	-4.736736e-01	-4.891482e-01	0.000000	0.000000	0.000000
50%	-4.736736e-01	-3.573909e-01	0.000000	0.000000	1.000000
75%	-4.736736e-01	-2.424635e-02	0.000000	0.000000	1.000000
max	6.974147e+00	9.667167e+00	1.000000	1.000000	1.000000

	Title_Master	Title_Miss	Title_Mr	Title_Mrs	Title_Others
count	891.000000	891.000000	891.000000	891.000000	891.000000
mean	0.044893	0.206510	0.580247	0.143659	0.024691
std	0.207186	0.405028	0.493796	0.350940	0.155270
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	1.000000	0.000000	0.000000
75%	0.000000	0.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

1.2.5 Dealing with NaN entries

With the data almost being ready, a quick check for the presence of empty values or NaN's.

```
[11]: train1.isnull().sum()
```

```
[11]: Survived      0
      Pclass       0
      Sex          0
      Age         177
      SibSp        0
      Parch        0
      Fare         0
      Embarked_C   0
      Embarked_Q   0
      Embarked_S   0
      Title_Master 0
      Title_Miss   0
      Title_Mr     0
      Title_Mrs    0
      Title_Others 0
      dtype: int64
```

```
[12]: # Clearly there are a significant number of NaN entries for the Age variable.
      # Replace all NaN's in Age with mean of all age values.

train1['Age'] = train1['Age'].fillna(train1['Age'].mean())
```

1.2.6 Train1 data is now ready

The dataframe now contains 15 columns of variables, including the Survived dependent variable.

```
[13]: train1
```

```
[13]:
```

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	\
0	0	0.827377	1	-5.303766e-01	0.432793	-0.473674	-0.502445	
1	1	-1.566107	0	5.718310e-01	0.432793	-0.473674	0.786845	
2	1	0.827377	0	-2.548247e-01	-0.474545	-0.473674	-0.488854	
3	1	-1.566107	0	3.651671e-01	0.432793	-0.473674	0.420730	
4	0	0.827377	1	3.651671e-01	-0.474545	-0.473674	-0.486337	
..	
886	0	-0.369365	1	-1.859368e-01	-0.474545	-0.473674	-0.386671	
887	1	-1.566107	0	-7.370406e-01	-0.474545	-0.473674	-0.044381	
888	0	0.827377	0	2.388379e-16	0.432793	2.008933	-0.176263	
889	1	-1.566107	1	-2.548247e-01	-0.474545	-0.473674	-0.044381	
890	0	0.827377	1	1.585031e-01	-0.474545	-0.473674	-0.492378	

	Embarked_C	Embarked_Q	Embarked_S	Title_Master	Title_Miss	Title_Mr	\
0	0	0	1	0	0	1	
1	1	0	0	0	0	0	
2	0	0	1	0	1	0	
3	0	0	1	0	0	0	
4	0	0	1	0	0	1	

..
886	0	0	1	0	0	0
887	0	0	1	0	1	0
888	0	0	1	0	1	0
889	1	0	0	0	0	1
890	0	1	0	0	0	1

	Title_Mrs	Title_Others
0	0	0
1	1	0
2	0	0
3	1	0
4	0	0
..
886	0	1
887	0	0
888	0	0
889	0	0
890	0	0

[891 rows x 15 columns]

1.2.7 Application of the same modifications to the ‘Test1’ dataframe

```
[14]: # Now applying these steps to test1 as well

# First the gender transformation.
test1['Sex'] = test1['Sex'].astype('category')
test1['Sex'] = test1['Sex'].cat.codes

# Now to split out the titles.
test1['Title'] = test1.Name.map( lambda x: x.split(',')[1].split( '.' )[0].
    ↳strip())

# Looking to replace all equivalent titles with more common versions.
test1['Title'] = test1['Title'].replace('Mlle', 'Miss')
test1['Title'] = test1['Title'].replace(['Mme','Lady','Ms'], 'Mrs')
title_counts2 = test1['Title'].value_counts()

# Now to bundle all rare titles into 'others'
counts2 = pd.DataFrame({'Title':title_counts2.index, 'Count':title_counts2.
    ↳values})

rare_title2 = counts2.loc[counts2['Count'] <= 20]
rare_title_list2 = rare_title2['Title'].tolist()
test1['Title'] = test1['Title'].replace(rare_title_list2, 'Others')

# Removing the variables that will not be used in this analysis
```

```

test1.drop(['PassengerId', 'Name', 'Ticket', 'Cabin'], axis=1, inplace=True)

for var in categorical:
    test1 = pd.concat([test1, pd.get_dummies(test1[var], prefix=var)], axis = 1)
    del test1[var]

# Now I need to scale all the continuous variables
for var in continuous:
    test1[var] = test1[var].astype('float64')
    test1[var] = StandardScaler().fit_transform(test1[var].values.reshape(-1, 1))

test1['Age'] = test1['Age'].fillna(train1['Age'].mean())

```

```

[15]: # Having a look for Null values.
test1.isnull().sum()

```

```

[15]: Pclass          0
Sex              0
Age             0
SibSp           0
Parch           0
Fare            1
Embarked_C      0
Embarked_Q      0
Embarked_S      0
Title_Master    0
Title_Miss      0
Title_Mr        0
Title_Mrs       0
Title_Others    0
dtype: int64

```

```

[16]: # One was found for Fare.
test1['Fare'] = test1['Fare'].fillna(train1['Fare'].mean())

```

1.2.8 The Test1 dataframe is ready to be applied to a NN model

```

[17]: # In order to first generate and train a model, the train1 dataset must be
      →divided into independent and dependent
      # variables.
X_train = train1[pd.notnull(train1['Survived'])].drop(['Survived'], axis=1)
Y_train = train1[pd.notnull(train1['Survived'])]['Survived']
Y_train

```



```
[17]: 0      0
      1      1
      2      1
      3      1
      4      0
      ..
      886    0
      887    1
      888    0
      889    1
      890    0
      Name: Survived, Length: 891, dtype: int64
```

1.3 Development of a Neural Network

Hyperparameters are variables that determine the structure of the NN (eg. hidden layers), as well as the parameters that determine how the NN is trained (eg. learning rate).

```
[18]: # This is a function that will allow for the parameterisation of the
      ↳ hyperparameters in the NN.

def create_model(lyrs=[8], act='relu', opt='Adam', dr=0.0):
    # Setting random seed
    seed(42)
    tf.random.set_seed(42)

    model = Sequential()

    # Create the first layer
    model.add(Dense(lyrs[0], input_dim=X_train.shape[1], activation=act))

    # Create additional hidden layer
    for i in range(1, len(lyrs)):
        model.add(Dense(lyrs[i], activation=act))

    # Add dropout, default = none
    model.add(Dropout(dr))

    # Create output layer
    model.add(Dense(1, activation='sigmoid')) # Output layer

    model.compile(loss='binary_crossentropy', optimizer=opt,
    ↳ metrics=['accuracy'])

    return model
```

```
[19]: # Now to create the first model and look at its structure
model = create_model()
print(model.summary())
```

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 8)	120
dropout (Dropout)	(None, 8)	0
dense_1 (Dense)	(None, 1)	9

Total params: 129
 Trainable params: 129
 Non-trainable params: 0

None

```
[20]: # In the first case I will train the model on the full train1 dataset, with 80/
      ↪ 20 Cross Validation split
training = model.fit(X_train, Y_train, epochs=100, batch_size=32,
      ↪ validation_split=0.2, verbose=0);
# A metric looking at the accuracy of the fit

scores = model.evaluate(X_train, Y_train);
print("\n%s: %.2f%%" % (model.metrics_names[1], scores[1]*100))
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3af0c560> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3af0c560> and will run it as-is.

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Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3b88e170> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3b88e170> and will run it as-is.

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Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

28/28 [=====] - 0s 523us/step - loss: 0.3839 -

accuracy: 0.8440

accuracy: 84.40%

[21]: *# Now to apply a grid search to find best parameters for batch size and epoch.
KerasClassifier is a wrapper that allows for k-fold cross validation as part
→ of this grid search.*

```
model = KerasClassifier(build_fn=create_model, verbose=0);
```

```
# Define the grid search parameters
```

```
batch_size = [16, 32, 64];
```

```
epochs = [50, 100, 150];
```

```
# Creating a grid in the form of a dictionary.
```

```
param_grid = dict(batch_size=batch_size, epochs=epochs);
```

```
# Search the grid
```

```
grid = GridSearchCV(estimator=model, param_grid=param_grid, cv=3, verbose=10,  
→ n_jobs=1);
```

```
grid_result = grid.fit(X_train, Y_train);
```

Fitting 3 folds for each of 9 candidates, totalling 27 fits

[CV] batch_size=16, epochs=50 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3b864710> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full

```

output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3b864710> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3b864d40> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3b864d40> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=16, epochs=50, score=0.808, total=    1.5s
[CV] batch_size=16, epochs=50 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ba5a7a0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ba5a7a0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the

```

```

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done   1 out of   1 | elapsed:   1.5s remaining:   0.0s
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3bb0ad40> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3bb0ad40> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=16, epochs=50, score=0.828, total=   1.4s
[CV] batch_size=16, epochs=50 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc33200> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc33200> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done   2 out of   2 | elapsed:   2.9s remaining:   0.0s
WARNING:tensorflow:AutoGraph could not transform <function

```

Model.make_test_function.<locals>.test_function at 0x1a3bc489e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bc489e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... batch_size=16, epochs=50, score=0.845, total= 1.4s

[CV] batch_size=16, epochs=100 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bd96d40> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bd96d40> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[Parallel(n_jobs=1)]: Done 3 out of 3 | elapsed: 4.3s remaining: 0.0s

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bdc7680> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3bdc7680> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... batch_size=16, epochs=100, score=0.808, total= 2.4s
```

```
[CV] batch_size=16, epochs=100 ...
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3bdc77a0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3bdc77a0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[Parallel(n_jobs=1)]: Done 4 out of 4 | elapsed: 6.6s remaining: 0.0s
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3c03b200> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3c03b200> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```

@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=16, epochs=100, score=0.828, total= 2.1s
[CV] batch_size=16, epochs=100 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c0cb680> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c0cb680> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done 5 out of 5 | elapsed: 8.7s remaining: 0.0s

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c17dc20> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c17dc20> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=16, epochs=100, score=0.848, total= 2.1s
[CV] batch_size=16, epochs=150 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c263ef0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full

```



```

output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c263ef0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done    6 out of    6 | elapsed:   10.8s remaining:    0.0s

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c2927a0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c2927a0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=16, epochs=150, score=0.808, total=   2.9s
[CV] batch_size=16, epochs=150 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c407c20> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c407c20> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the

```

```

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done   7 out of   7 | elapsed:   13.7s remaining:    0.0s
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c454560> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c454560> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=16, epochs=150, score=0.825, total=   2.9s
[CV] batch_size=16, epochs=150 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c5a58c0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c5a58c0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done   8 out of   8 | elapsed:   16.6s remaining:    0.0s
WARNING:tensorflow:AutoGraph could not transform <function

```

Model.make_test_function.<locals>.test_function at 0x1a3c6b1320> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c6b1320> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... batch_size=16, epochs=150, score=0.855, total= 2.9s

[CV] batch_size=32, epochs=50 ...

[Parallel(n_jobs=1)]: Done 9 out of 9 | elapsed: 19.5s remaining: 0.0s

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x13343c7a0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x13343c7a0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c6b1e60> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c6b1e60> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=32, epochs=50, score=0.811, total= 1.1s
[CV] batch_size=32, epochs=50 ...

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c538560> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c538560> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c6f77a0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c6f77a0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=32, epochs=50, score=0.808, total= 0.9s

```

[CV] batch_size=32, epochs=50 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bbc1b90> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bbc1b90> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3aea4950> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3aea4950> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... batch_size=32, epochs=50, score=0.845, total= 0.9s
[CV] batch_size=32, epochs=100 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c067830> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3c067830> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3bc29290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3bc29290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... batch_size=32, epochs=100, score=0.815, total= 1.4s

[CV] batch_size=32, epochs=100 ...

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3be7c4d0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3be7c4d0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c73cdd0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c73cdd0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... batch_size=32, epochs=100, score=0.825, total= 1.5s

[CV] batch_size=32, epochs=100 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c73ca70> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c73ca70> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bc21a70> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bc21a70> and will run it

as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... batch_size=32, epochs=100, score=0.848, total= 1.3s
```

```
[CV] batch_size=32, epochs=150 ...
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3bb67dd0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3bb67dd0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3b9f3290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3b9f3290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... batch_size=32, epochs=150, score=0.808, total= 1.8s
```

```
[CV] batch_size=32, epochs=150 ...
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bcd710> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bcd710> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bab8d40> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bab8d40> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... batch_size=32, epochs=150, score=0.822, total= 1.7s

[CV] batch_size=32, epochs=150 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c1d5290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c1d5290> and will run

it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c136cb0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c136cb0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... batch_size=32, epochs=150, score=0.855, total= 1.7s

[CV] batch_size=64, epochs=50 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3be03710> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3be03710> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c3329e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c3329e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... batch_size=64, epochs=50, score=0.801, total= 0.9s

[CV] batch_size=64, epochs=50 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bf65c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bf65c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bf65b00> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bf65b00> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... batch_size=64, epochs=50, score=0.798, total= 0.7s
```

```
[CV] batch_size=64, epochs=50 ...
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3b88ee60> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3b88ee60> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3b958950> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3b958950> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... batch_size=64, epochs=50, score=0.828, total= 0.7s
```

```
[CV] batch_size=64, epochs=100 ...
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3c385cb0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c385cb0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c10f5f0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c10f5f0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... batch_size=64, epochs=100, score=0.811, total= 1.0s

[CV] batch_size=64, epochs=100 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c5d6950> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c5d6950> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3ba01170> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING: AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3ba01170> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 [CV] ... batch_size=64, epochs=100, score=0.822, total= 1.0s
 [CV] batch_size=64, epochs=100 ...
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3ba01440> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING: AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3ba01440> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3bcbef80> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full

output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

```
Model.make_test_function.<locals>.test_function at 0x1a3bcbef80>
```

and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... batch_size=64, epochs=100, score=0.838, total= 1.0s

[CV] batch_size=64, epochs=150 ...

WARNING:tensorflow:AutoGraph could not transform <function

```
Model.make_train_function.<locals>.train_function at 0x1a3bdcc170>
```

and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

```
Model.make_train_function.<locals>.train_function at 0x1a3bdcc170>
```

and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

```
Model.make_test_function.<locals>.test_function at 0x1a3bd6e830>
```

and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

```
Model.make_test_function.<locals>.test_function at 0x1a3bd6e830>
```

and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 [CV] ... batch_size=64, epochs=150, score=0.815, total= 1.2s
 [CV] batch_size=64, epochs=150 ...
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3c60cb90> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING: AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3c60cb90> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3c3073b0> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING: AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3c3073b0> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 [CV] ... batch_size=64, epochs=150, score=0.822, total= 1.2s
 [CV] batch_size=64, epochs=150 ...
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3c740830> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full

output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

```
Model.make_train_function.<locals>.train_function at 0x1a3c740830> and will run it as-is.
```

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

```
Model.make_test_function.<locals>.test_function at 0x1a3bbff290> and will run it as-is.
```

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

```
Model.make_test_function.<locals>.test_function at 0x1a3bbff290> and will run it as-is.
```

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... batch_size=64, epochs=150, score=0.848, total= 1.2s

WARNING:tensorflow:AutoGraph could not transform <function

```
Model.make_train_function.<locals>.train_function at 0x1a3c2ae440> and will run it as-is.
```

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

```
Model.make_train_function.<locals>.train_function at 0x1a3c2ae440> and will run it as-is.
```

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`

[Parallel(n_jobs=1)]: Done 27 out of 27 | elapsed: 40.6s finished

```
[22]: # Summarise results
print("Best: %f using %s" % (grid_result.best_score_, grid_result.best_params_))
means = grid_result.cv_results_['mean_test_score']
stds = grid_result.cv_results_['std_test_score']
params = grid_result.cv_results_['params']
for mean, stdev, param in zip(means, stds, params):
    print("%f (%f) with: %r" % (mean, stdev, param))
```

```
Best: 0.829405 using {'batch_size': 32, 'epochs': 100}
0.827160 (0.015141) with: {'batch_size': 16, 'epochs': 50}
0.828283 (0.016495) with: {'batch_size': 16, 'epochs': 100}
0.829405 (0.019504) with: {'batch_size': 16, 'epochs': 150}
0.821549 (0.016722) with: {'batch_size': 32, 'epochs': 50}
0.829405 (0.014108) with: {'batch_size': 32, 'epochs': 100}
0.828283 (0.019824) with: {'batch_size': 32, 'epochs': 150}
0.809203 (0.013561) with: {'batch_size': 64, 'epochs': 50}
0.823793 (0.011111) with: {'batch_size': 64, 'epochs': 100}
0.828283 (0.014547) with: {'batch_size': 64, 'epochs': 150}
```

Note on outcome of the first grid screening It is interesting to note that the accuracy reported for the first pass of the model against the full train1 dataset with 80/20 split cross validation was 85.12%. However the optimal outcome of this grid screen above happens to be with the same epoch and batch size parameters that were used in the first pass, yet the accuracy here was only 82.94%.

The reason for this is likely to be either in how the cross validation breaks up the data, and indicates a level of instability for the model. Or, it relates to how the accuracy is calculated. I will return to this issue at the end of this project.

Interestingly I adjusted the seed from 42 to 23 (defined in create_model function) and the accuracy dropped to 84.95% so I do believe this has more to do with stochastic data sub-divisions than accuracy calculation methods.

```
[23]: # Optimisation algorithm
# Here I want to look at the range of available optimisation algorithms in
↳ Keras.

model = KerasClassifier(build_fn=create_model, epochs=100, batch_size=32,
↳ verbose=0)

# define the grid search parameters
optimizer = ['SGD', 'RMSprop', 'Adagrad', 'Adadelta', 'Adam', 'Nadam']
param_grid = dict(opt=optimizer)
```

```
# search the grid
grid = GridSearchCV(estimator=model, param_grid=param_grid, verbose=2)
grid_result = grid.fit(X_train, Y_train);
```

Fitting 3 folds for each of 6 candidates, totalling 18 fits

[CV] opt=SGD ...

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3ad7d4d0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3ad7d4d0> and will run it as-is.

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/opt/anaconda3/envs/grace/lib/python3.7/site-

packages/sklearn/model_selection/_split.py:1978: FutureWarning: The default value of cv will change from 3 to 5 in version 0.22. Specify it explicitly to silence this warning.

warnings.warn(CV_WARNING, FutureWarning)

[Parallel(n_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3ba78d40> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

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WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3ba78d40> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

```

To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... opt=SGD, total= 1.3s
[CV] opt=SGD ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3b8ff170> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
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Cause: 'arguments' object has no attribute 'posonlyargs'
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output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
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[Parallel(n_jobs=1)]: Done 1 out of 1 | elapsed: 1.3s remaining: 0.0s

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c6b1c20> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
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WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c6b1c20> and will run it
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Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... opt=SGD, total= 1.3s
[CV] opt=SGD ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ba784d0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the

```

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
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 @tf.autograph.experimental.do_not_convert
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 Model.make_train_function.<locals>.train_function at 0x1a3ba784d0> and will run it as-is.
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 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3c2cfef0> and will run it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING: AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3c2cfef0> and will run it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 [CV] ... opt=SGD, total= 1.3s
 [CV] opt=RMSprop ...
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3bee2200> and will run it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING: AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3bee2200> and will run it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full

output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c10a320> and will run it
as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

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@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c10a320> and will run it
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verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... opt=RMSprop, total= 1.4s
```

```
[CV] opt=RMSprop ...
```

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c5f17a0> and will run
it as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'

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@tf.autograph.experimental.do_not_convert
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WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c5f17a0> and will run
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Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c57dc20> and will run it
as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING: AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3c57dc20> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 [CV] ... opt=RMSprop, total= 1.4s
 [CV] opt=RMSprop ...
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3c6ceef0> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
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 Model.make_train_function.<locals>.train_function at 0x1a3c6ceef0> and will run
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 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3c035440> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
 @tf.autograph.experimental.do_not_convert
 WARNING: AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3c035440> and will run it
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 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
[CV] ... opt=RMSprop, total= 1.4s
[CV] opt=Adagrad ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ba917a0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
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Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
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WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c53d9e0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c53d9e0> and will run it
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output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
[CV] ... opt=Adagrad, total= 1.3s
[CV] opt=Adagrad ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bd6cd40> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
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 WARNING: AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3bd6cd40> and will run
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Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
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 Model.make_test_function.<locals>.test_function at 0x1a3c53d4d0> and will run it
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 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
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Cause: 'arguments' object has no attribute 'posonlyargs'
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 [CV] ... opt=Adagrad, total= 1.3s
 [CV] opt=Adagrad ...
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3c188680> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
 output.

Cause: 'arguments' object has no attribute 'posonlyargs'
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 WARNING: AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3c188680> and will run
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Cause: 'arguments' object has no attribute 'posonlyargs'

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`@tf.autograph.experimental.do_not_convert`
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3b8ff680> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
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WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3b8ff680> and will run it
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Cause: 'arguments' object has no attribute 'posonlyargs'
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[CV] ... opt=Adagrad, total= 1.4s
[CV] opt=Adadelata ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc7d290> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
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Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c2ae290> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with

```

@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c2ae290> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
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Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... opt=Adadelata, total= 1.3s
[CV] opt=Adadelata ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ae3d950> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
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Cause: 'arguments' object has no attribute 'posonlyargs'
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WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3b88e050> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3b88e050> and will run it
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Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

```

```

[CV] ... opt=Adadelata, total= 1.3s
[CV] opt=Adadelata ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c740d40> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
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Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
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Model.make_train_function.<locals>.train_function at 0x1a3c740d40> and will run
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Cause: 'arguments' object has no attribute 'posonlyargs'
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@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c003680> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c003680> and will run it
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output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... opt=Adadelata, total= 1.3s
[CV] opt=Adam ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c0b19e0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with

```

```

@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c0b19e0> and will run
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WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c0b1320> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
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@tf.autograph.experimental.do_not_convert
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Model.make_test_function.<locals>.test_function at 0x1a3c0b1320> and will run it
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verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... opt=Adam, total=    1.3s
[CV] opt=Adam ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c3a14d0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c3a14d0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3c1a9c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3c1a9c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... opt=Adam, total= 1.4s

[CV] opt=Adam ...

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3c3f7ef0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3c3f7ef0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3be2d8c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3be2d8c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... opt=Adam, total= 1.3s

[CV] opt=Nadam ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c211c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c211c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1318cd200> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1318cd200> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... opt=Nadam, total= 1.5s

[CV] opt=Nadam ...

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3baca440> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3baca440> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3bcda9e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3bcda9e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... opt=Nadam, total= 1.5s

[CV] opt=Nadam ...

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3af0cc20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3af0cc20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3bcdadd0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3bcdadd0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[CV] ... opt=Nadam, total= 1.7s

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1318cdef0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1318cdef0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

[Parallel(n_jobs=1)]: Done 18 out of 18 | elapsed: 24.5s finished

```
[24]: # summarize results
print("Best: %f using %s" % (grid_result.best_score_, grid_result.best_params_))
means = grid_result.cv_results_['mean_test_score']
stds = grid_result.cv_results_['std_test_score']
params = grid_result.cv_results_['params']
for mean, stdev, param in zip(means, stds, params):
    print("%f (%f) with: %r" % (mean, stdev, param))
```

```
Best: 0.830528 using {'opt': 'Nadam'}
0.790123 (0.009655) with: {'opt': 'SGD'}
0.829405 (0.016109) with: {'opt': 'RMSprop'}
0.716049 (0.030157) with: {'opt': 'Adagrad'}
0.510662 (0.023381) with: {'opt': 'Adadelat'}
0.829405 (0.014108) with: {'opt': 'Adam'}
0.830528 (0.013837) with: {'opt': 'Nadam'}
```

```
[25]: # Hidden neurons
# This grid screen looks into different NN architechures. This includes looking
    ↳ at multiple hidden layers.
seed(42)
tf.random.set_seed(42)

# Create model
model = KerasClassifier(build_fn=create_model, epochs=100, batch_size=32,
    ↳ opt='Nadam', verbose=0)

# Define the grid search parameters
layers = [[7],[8],[10],[10,5],[12,6],[12,8,4]]

param_grid = dict(lyrs=layers)
# type(param_grid)
# Search the grid
grid = GridSearchCV(estimator=model, param_grid=param_grid, verbose=2)

grid_result = grid.fit(X_train, Y_train);
```

Fitting 3 folds for each of 6 candidates, totalling 18 fits

[CV] lyrs=[7] ...

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3c0ef050> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c0ef050> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c7405f0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c7405f0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[CV] ... lyrs=[7], total= 1.6s
[CV] lyrs=[7] ...

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aea43b0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aea43b0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with

```

@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done   1 out of   1 | elapsed:   1.6s remaining:   0.0s

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3aea40e0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3aea40e0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... lyrs=[7], total=   1.6s
[CV] lyrs=[7] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3be034d0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3be034d0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3be69200> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'

```

To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3be69200> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
[CV] ... lyrs=[7], total= 1.5s
[CV] lyrs=[8] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bda4680> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bda4680> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3bddcb00> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3bddcb00> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with

```

@tf.autograph.experimental.do_not_convert
[CV] ... lyrs=[8], total= 1.5s
[CV] lyrs=[8] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc30e60> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc30e60> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3bc74440> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3bc74440> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... lyrs=[8], total= 1.5s
[CV] lyrs=[8] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc300e0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'

```

To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc300e0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3b88ee60> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3b88ee60> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
[CV] ... lyrs=[8], total= 1.7s
[CV] lyrs=[10] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc74950> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bc74950> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with

```

@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c2e9680> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c2e9680> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... lyrs=[10], total= 1.5s
[CV] lyrs=[10] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c642dd0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c642dd0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3acfb8c0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

```


WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3acfb8c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... lyrs=[10], total= 1.6s
```

```
[CV] lyrs=[10] ...
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3b8ff320> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3b8ff320> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3afbfff80> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3afbfff80> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... lyrs=[10], total= 1.6s
```

```

[CV] 1yrs=[10, 5] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1319f6170> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1319f6170> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3acfb5f0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3acfb5f0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... 1yrs=[10, 5], total= 1.7s
[CV] 1yrs=[10, 5] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c33b560> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

```

WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3c33b560> and will run
it as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3ba79680> and will run it
as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3ba79680> and will run it
as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[CV] ... lyrs=[10, 5], total= 1.7s
[CV] lyrs=[10, 5] ...

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1319749e0> and will run
it as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1319749e0> and will run
it as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1319f6680> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1319f6680> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... lyrs=[10, 5], total= 1.9s

[CV] lyrs=[12, 6] ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c4be170> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c4be170> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3be03050> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3be03050> and will run it

```

as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... lyrs=[12, 6], total= 1.7s
[CV] lyrs=[12, 6] ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bcdab00> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3bcdab00> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c33bb00> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c33bb00> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... lyrs=[12, 6], total= 1.8s
[CV] lyrs=[12, 6] ...
WARNING:tensorflow:AutoGraph could not transform <function

```

Model.make_train_function.<locals>.train_function at 0x1a3ae3def0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3ae3def0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3afbffd0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3afbffd0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... lyrs=[12, 6], total= 1.7s
```

```
[CV] lyrs=[12, 8, 4] ...
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c0ef950> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c0ef950> and will run

it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c0ef9e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c0ef9e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... lyrs=[12, 8, 4], total= 1.8s

[CV] lyrs=[12, 8, 4] ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1318ca290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1318ca290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c4035f0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c4035f0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... lyrs=[12, 8, 4], total= 1.8s
```

```
[CV] lyrs=[12, 8, 4] ...
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3aad0b90> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3aad0b90> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c5003b0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c5003b0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... lyrs=[12, 8, 4], total= 2.0s
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3ad7d5f0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3ad7d5f0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[Parallel(n_jobs=1)]: Done 18 out of 18 | elapsed: 30.3s finished
```

```
[26]: # Summarise results
print("Best: %f using %s" % (grid_result.best_score_, grid_result.best_params_))
means = grid_result.cv_results_['mean_test_score']
stds = grid_result.cv_results_['std_test_score']
params = grid_result.cv_results_['params']
for mean, stdev, param in zip(means, stds, params):
    print("%f (%f) with: %r" % (mean, stdev, param))
```

```
Best: 0.831650 using {'lyrs': [10]}
0.821549 (0.014547) with: {'lyrs': [7]}
0.830528 (0.013837) with: {'lyrs': [8]}
0.831650 (0.019244) with: {'lyrs': [10]}
0.821549 (0.014547) with: {'lyrs': [10, 5]}
0.821549 (0.017168) with: {'lyrs': [12, 6]}
0.829405 (0.009655) with: {'lyrs': [12, 8, 4]}
```

```
[27]: # Dropout refinement
# This refers to the potential for a node to be dropped out of the model.
model = KerasClassifier(build_fn=create_model, epochs=100, batch_size=32,
    ↳ opt='Nadam', verbose=0)
```

```
# Define the grid search parameters
drops = [0.0, 0.01, 0.05, 0.1, 0.2, 0.5]
param_grid = dict(dr=drops)
grid = GridSearchCV(estimator=model, param_grid=param_grid, verbose=2)
grid_result = grid.fit(X_train, Y_train);
```

Fitting 3 folds for each of 6 candidates, totalling 18 fits

[CV] dr=0.0 ...

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3bcda5f0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bcda5f0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c3a18c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c3a18c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... dr=0.0, total= 1.6s

```

[CV] dr=0.0 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1318e0cb0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1318e0cb0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done   1 out of   1 | elapsed:   1.6s remaining:   0.0s

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3be03e60> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3be03e60> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... dr=0.0, total=   1.5s
[CV] dr=0.0 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aa22320> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'

```

To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
 WARNING: AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3aa22320> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3ab05710> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
 WARNING: AutoGraph could not transform <function
 Model.make_test_function.<locals>.test_function at 0x1a3ab05710> and will run it
 as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
 [CV] ... dr=0.0, total= 1.5s
 [CV] dr=0.01 ...
 WARNING:tensorflow:AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3bd7ab00> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with
`@tf.autograph.experimental.do_not_convert`
 WARNING: AutoGraph could not transform <function
 Model.make_train_function.<locals>.train_function at 0x1a3bd7ab00> and will run
 it as-is.
 Please report this to the TensorFlow team. When filing the bug, set the
 verbosity to 10 (on Linux, ``export AUTOGRAPH_VERBOSITY=10``) and attach the full
 output.
 Cause: 'arguments' object has no attribute 'posonlyargs'
 To silence this warning, decorate the function with

```

@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3ab053b0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3ab053b0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... dr=0.01, total= 1.5s
[CV] dr=0.01 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1319b1200> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1319b1200> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3ba458c0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

```

WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3ba458c0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... dr=0.01, total= 1.6s
[CV] dr=0.01 ...

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ac94200> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ac94200> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c151200> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c151200> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... dr=0.01, total= 1.7s

```

[CV] dr=0.05 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aea4b00> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aea4b00> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3be03560> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3be03560> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... dr=0.05, total= 1.5s
[CV] dr=0.05 ...
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ae3dc20> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

```

WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3ae3dc20> and will run
it as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c500200> and will run it
as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3c500200> and will run it
as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[CV] ... dr=0.05, total= 1.5s
[CV] dr=0.05 ...

WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aa030e0> and will run
it as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aa030e0> and will run
it as-is.

Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.

Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c3a18c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c3a18c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... dr=0.05, total= 1.5s

[CV] dr=0.1 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x131af8c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x131af8c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x131af8e60> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x131af8e60> and will run it

as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... dr=0.1, total= 1.5s
```

```
[CV] dr=0.1 ...
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1318caef0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1318caef0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3c590170> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1a3c590170> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... dr=0.1, total= 1.5s
```

```
[CV] dr=0.1 ...
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3b9a99e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3b9a99e0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bc48c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bc48c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... dr=0.1, total= 1.7s
```

```
[CV] dr=0.2 ...
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3aea4b90> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3aea4b90> and will run

it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c590ef0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c590ef0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... dr=0.2, total= 1.5s

[CV] dr=0.2 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c3a18c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c3a18c0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3aa03e60> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3aa03e60> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
[CV] ... dr=0.2, total= 1.6s
```

```
[CV] dr=0.2 ...
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c4033b0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c4033b0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c403b90> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3c403b90> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... dr=0.2, total= 1.5s

[CV] dr=0.5 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c590b00> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

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Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

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WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3afb3b0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

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To silence this warning, decorate the function with

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[CV] ... dr=0.5, total= 1.5s

[CV] dr=0.5 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bde9b90> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

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Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

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WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bad9e60> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3bad9e60> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

[CV] ... dr=0.5, total= 1.5s

[CV] dr=0.5 ...

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c108290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

@tf.autograph.experimental.do_not_convert

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3c108290> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the

```

verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3bf764d0> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1a3bf764d0> and will run it
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output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
[CV] ... dr=0.5, total= 1.5s
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aa467a0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_train_function.<locals>.train_function at 0x1a3aa467a0> and will run
it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert

[Parallel(n_jobs=1)]: Done 18 out of 18 | elapsed: 28.0s finished

```

```

[28]: # Summarise results
print("Best: %f using %s" % (grid_result.best_score_, grid_result.best_params_))
means = grid_result.cv_results_['mean_test_score']

```



```
stds = grid_result.cv_results_['std_test_score']
params = grid_result.cv_results_['params']
for mean, stdev, param in zip(means, stds, params):
    print("%f (%f) with: %r" % (mean, stdev, param))
```

```
Best: 0.831650 using {'dr': 0.01}
0.830528 (0.013837) with: {'dr': 0.0}
0.831650 (0.012598) with: {'dr': 0.01}
0.828283 (0.014547) with: {'dr': 0.05}
0.829405 (0.011446) with: {'dr': 0.1}
0.827160 (0.010408) with: {'dr': 0.2}
0.828283 (0.011983) with: {'dr': 0.5}
```

1.3.1 Final Model

```
[29]: # Create final model
model = create_model(lyrs=[10], dr=0.01, opt='Nadam')

print(model.summary())
```

Model: "sequential_86"

Layer (type)	Output Shape	Param #
dense_184 (Dense)	(None, 10)	150
dropout_86 (Dropout)	(None, 10)	0
dense_185 (Dense)	(None, 1)	11

Total params: 161
 Trainable params: 161
 Non-trainable params: 0

None

```
[30]: # Train model on full train dataset with 80/20 CV split
training = model.fit(X_train, Y_train, epochs=100, batch_size=32,
    ↪validation_split=0.2, verbose=0);

# Evaluate the model
scores = model.evaluate(X_train, Y_train)
print("\n%s: %.2f%%" % (model.metrics_names[1], scores[1]*100))
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3bbf3c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_train_function.<locals>.train_function at 0x1a3bbf3c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3be03c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function

Model.make_test_function.<locals>.test_function at 0x1a3be03c20> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

28/28 [=====] - 0s 614us/step - loss: 0.3808 -

accuracy: 0.8485

accuracy: 84.85%

```
[31]: # As an exercise, reverting back to the original parameters that gave the 85.
      ↪ 12% yields a lower score when compared
      # to the final model above. See below.
      model1 = create_model(lyrs=[8], dr=0.0, opt='Adam')

      print(model1.summary())
```

Model: "sequential_87"

```
-----
Layer (type)                Output Shape                Param #
```

```
=====
dense_186 (Dense)                (None, 8)                120
-----
dropout_87 (Dropout)             (None, 8)                0
-----
dense_187 (Dense)                (None, 1)                9
=====

Total params: 129
Trainable params: 129
Non-trainable params: 0

-----
None
```

```
[32]: # Train model on full train dataset with 80/20 CV split
training = model1.fit(X_train, Y_train, epochs=100, batch_size=32,
    ↪validation_split=0.2, verbose=0);

# Evaluate the model
scores = model1.evaluate(X_train, Y_train)
print("\n%s: %.2f%%" % (model1.metrics_names[1], scores[1]*100))
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3ae3d3b0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING: AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x1a3ae3d3b0> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

WARNING:tensorflow:AutoGraph could not transform <function Model.make_test_function.<locals>.test_function at 0x1318e0560> and will run it as-is.

Please report this to the TensorFlow team. When filing the bug, set the verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full output.

Cause: 'arguments' object has no attribute 'posonlyargs'

To silence this warning, decorate the function with

```
@tf.autograph.experimental.do_not_convert
```

```
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_test_function.<locals>.test_function at 0x1318e0560> and will run it
as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
28/28 [=====] - 0s 627us/step - loss: 0.3839 -
accuracy: 0.8440

accuracy: 84.40%
```

1.4 Application of final model to test1 data to generate a survival prediction

```
[33]: # Using the final model to calculate predictions for test dataset
#test1 = test1.drop(['Survived'], 1)
test1['Survived'] = model.predict(test1)
test1['Survived'] = test1['Survived'].apply(lambda x: round(x,0)).astype('int')
test2 = test1.copy()
test2['PassengerId'] = test['PassengerId']
solution = test2[['PassengerId', 'Survived']]
#test2
solution
#test1
```

```
WARNING:tensorflow:AutoGraph could not transform <function
Model.make_predict_function.<locals>.predict_function at 0x1a3bde9950> and will
run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
WARNING: AutoGraph could not transform <function
Model.make_predict_function.<locals>.predict_function at 0x1a3bde9950> and will
run it as-is.
Please report this to the TensorFlow team. When filing the bug, set the
verbosity to 10 (on Linux, `export AUTOGRAPH_VERBOSITY=10`) and attach the full
output.
Cause: 'arguments' object has no attribute 'posonlyargs'
To silence this warning, decorate the function with
@tf.autograph.experimental.do_not_convert
```

```
[33]:
```

	PassengerId	Survived
0	892	0
1	893	1
2	894	0
3	895	0
4	896	1
..
413	1305	0
414	1306	1
415	1307	0
416	1308	0
417	1309	1

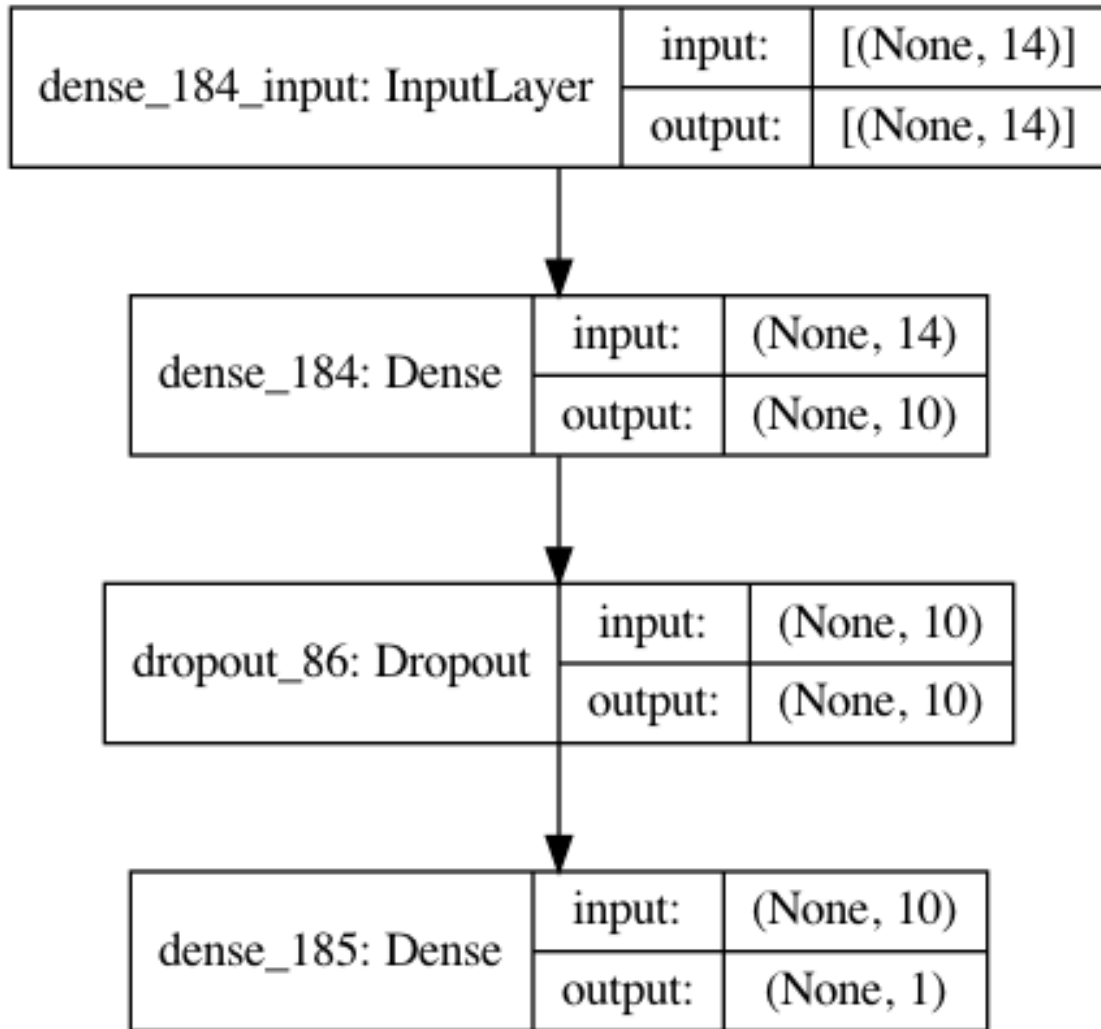
```
[418 rows x 2 columns]
```

1.4.1 Generate a plot of the final model

To better visualise the final model, I will generate the following graphic.

```
[34]: # Plot of final NN model
plot_model(model, to_file='210531_fin_model.png', show_shapes=True,
           ↳show_layer_names=True)
```

```
[34]:
```



1.4.2 Output of a csv file that can be uploaded to Kaggle website for assessment

```
[35]: solution.to_csv("210526_Neural_Network_Solution1.csv", index=False)
```

1.5 Results

Uploading this file into the kaggle website gave an accuracy for my model of 77.99%.
<https://www.kaggle.com/c/titanic/submit>

Reading online I discovered this drop in accuracy from train1 to test1 is not unusual as the test data has 'different patterns than the train data.

<https://www.kaggle.com/c/titanic/discussion/66780>

1.6 Discussion

Here is my first attempt at the creation and development of a Neural Network machine learning algorithm. I successfully trained my NN on the highly 'transformed' Titanic datasets and was able to get an accuracy for Survival prediction of 77.99%.

Not a terrible outcome using the entry level NN package Keras.