```
from __future__ import absolute_import
from __future__ import division
from __future__ import print_function


import warnings
warnings.filterwarnings('ignore')

import tensorflow as tf
import tensorflow.keras as keras

import numpy as np
import pandas as pd

data = pd.read_csv('attrition.csv')

data
```

```
      Age Attrition     BusinessTravel  DailyRate
Department  \
0      41       Yes      Travel_Rarely       1102
Sales
1      49        No  Travel_Frequently        279  Research &
Development
2      37       Yes      Travel_Rarely       1373  Research &
Development
3      33        No  Travel_Frequently       1392  Research &
Development
4      27        No      Travel_Rarely        591  Research &
Development
...   ...       ...                ...         ...
...
1465   36        No  Travel_Frequently        884  Research &
Development
1466   39        No      Travel_Rarely        613  Research &
Development
1467   27        No      Travel_Rarely        155  Research &
Development
1468   49        No  Travel_Frequently       1023
Sales
1469   34        No      Travel_Rarely        628  Research &
Development

      DistanceFromHome  Education EducationField  EmployeeCount  \
0                    1          2  Life Sciences              1
1                    8          1  Life Sciences              1
2                    2          2          Other              1
3                    3          4  Life Sciences              1
4                    2          1        Medical              1
...                ...        ...            ...            ...
1465                23          2        Medical              1
```

```
1466                   6          1        Medical              1
1467                   4          3  Life Sciences              1
1468                   2          3        Medical              1
1469                   8          3        Medical              1

      EmployeeNumber  ...  RelationshipSatisfaction StandardHours  \
0                  1  ...                         1            80
1                  2  ...                         4            80
2                  4  ...                         2            80
3                  5  ...                         3            80
4                  7  ...                         4            80
...              ...  ...                       ...           ...
1465            2061  ...                         3            80
1466            2062  ...                         1            80
1467            2064  ...                         2            80
1468            2065  ...                         4            80
1469            2068  ...                         1            80

      StockOptionLevel  TotalWorkingYears  TrainingTimesLastYear  \
0                    0                  8                      0
1                    1                 10                      3
2                    0                  7                      3
3                    0                  8                      3
4                    1                  6                      3
...                ...                ...                    ...
1465                 1                 17                      3
1466                 1                  9                      5
1467                 1                  6                      0
1468                 0                 17                      3
1469                 0                  6                      3

     WorkLifeBalance  YearsAtCompany YearsInCurrentRole  \
0                  1               6                  4
1                  3              10                  7
2                  3               0                  0
3                  3               8                  7
4                  3               2                  2
...              ...             ...                ...
1465               3               5                  2
1466               3               7                  7
1467               3               6                  2
1468               2               9                  6
1469               4               4                  3

      YearsSinceLastPromotion  YearsWithCurrManager
0                           0                     5
1                           1                     7
2                           0                     0
3                           3                     0
4                           2                     2
```

```
...                         ...                    ...
1465                          0                      3
1466                          1                      7
1467                          0                      3
1468                          0                      8
1469                          1                      2

[1470 rows x 35 columns]
```

```
Y = data["Attrition"]

from sklearn import preprocessing

le = preprocessing.LabelEncoder()
data_transformed = data.apply(le.fit_transform)
data_transformed.head()
```

```
   Age  Attrition  BusinessTravel  DailyRate  Department
DistanceFromHome  \
0   23          1               2        624           2
0
1   31          0               1        113           1
7
2   19          1               2        805           1
1
3   15          0               1        820           1
2
4    9          0               2        312           1
1

   Education  EducationField  EmployeeCount  EmployeeNumber  ...  \
0          1               1              0               0  ...
1          0               1              0               1  ...
2          1               4              0               2  ...
3          3               1              0               3  ...
4          0               3              0               4  ...

   RelationshipSatisfaction  StandardHours  StockOptionLevel  \
0                         0              0                 0
1                         3              0                 1
2                         1              0                 0
3                         2              0                 0
4                         3              0                 1

   TotalWorkingYears  TrainingTimesLastYear  WorkLifeBalance
YearsAtCompany  \
0                  8                      0                0
6
1                 10                      3                2
10
```

```
2                    7                          3                  2
0
3                    8                          3                  2
8
4                    6                          3                  2
2

   YearsInCurrentRole  YearsSinceLastPromotion  YearsWithCurrManager
0                   4                        0                     5
1                   7                        1                     7
2                   0                        0                     0
3                   7                        3                     0
4                   2                        2                     2

[5 rows x 35 columns]
```

```
X =
data_transformed[["Age","BusinessTravel","DistanceFromHome","Education
","Gender","JobInvolvement","JobLevel","JobRole","JobSatisfaction","Mo
nthlyRate","OverTime","PercentSalaryHike","PerformanceRating","Relatio
nshipSatisfaction","RelationshipSatisfaction","StockOptionLevel","Tota
lWorkingYears","TrainingTimesLastYear","WorkLifeBalance","YearsAtCompa
ny","YearsInCurrentRole","YearsSinceLastPromotion","YearsWithCurrManag
er"]]

Y = data_transformed["Attrition"]

from numpy import array
from numpy import argmax
from sklearn.preprocessing import LabelEncoder
from sklearn.preprocessing import OneHotEncoder

enc = preprocessing.OneHotEncoder()
enc.fit(X)

OneHotEncoder(categorical_features=None, categories=None, drop=None,
              dtype=<class 'numpy.float64'>, handle_unknown='error',
              n_values=None, sparse=True)

onehotlabels = enc.transform(X).toarray()
onehotlabels.shape

(1470, 1703)

onehotlabels

array([[0., 0., 0., ..., 0., 0., 0.],
       [0., 0., 0., ..., 0., 0., 0.],
       [0., 0., 0., ..., 0., 0., 0.],
       ...,
       [0., 0., 0., ..., 0., 0., 0.],
```

```
       [0., 0., 0., ..., 0., 0., 0.],
       [0., 0., 0., ..., 0., 0., 0.]])

Y = np.array(Y)

x_train = onehotlabels[:int(0.80*len(X))]
x_test = onehotlabels[int(0.80*len(X)):]

y_train = Y[:int(0.80*len(Y))]
y_test = Y[int(0.80*len(Y)):]

%load_ext tensorboard

from datetime import datetime
from packaging import version

import tensorflow as tf
from tensorflow import keras

model = tf.keras.models.Sequential()

model.add(tf.keras.layers.Dense(128, activation=tf.nn.relu))
model.add(tf.keras.layers.Dense(120, activation=tf.nn.relu))
model.add(tf.keras.layers.Dense(15, activation=tf.nn.relu))

# model.add(tf.keras.layers.Dense(15, activation=tf.nn.softmax))
model.compile(optimizer='adam',
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])

# Define the Keras TensorBoard callback.
logdir="logs/fit/" + datetime.now().strftime("%Y%m%d-%H%M%S")
tensorboard_callback = keras.callbacks.TensorBoard(log_dir=logdir)

model.fit(x_train,y_train, epochs=10,callbacks=[tensorboard_callback])

Epoch 1/10
1176/1176 [==============================] - 0s 171us/sample - loss:
1.0504 - acc: 0.7934
Epoch 2/10
1176/1176 [==============================] - 0s 131us/sample - loss:
0.4367 - acc: 0.8359
Epoch 3/10
1176/1176 [==============================] - 0s 114us/sample - loss:
0.3247 - acc: 0.8469
Epoch 4/10
1176/1176 [==============================] - 0s 119us/sample - loss:
0.2087 - acc: 0.9133
Epoch 5/10
1176/1176 [==============================] - 0s 113us/sample - loss:
1.7940 - acc: 0.9039
```

```
Epoch 6/10
1176/1176 [==============================] - 0s 110us/sample - loss:
2.6919 - acc: 0.8359
Epoch 7/10
1176/1176 [==============================] - 0s 102us/sample - loss:
2.6919 - acc: 0.8359
Epoch 8/10
1176/1176 [==============================] - 0s 113us/sample - loss:
2.6919 - acc: 0.8359
Epoch 9/10
1176/1176 [==============================] - 0s 109us/sample - loss:
2.6919 - acc: 0.8359
Epoch 10/10
1176/1176 [==============================] - 0s 125us/sample - loss:
2.6919 - acc: 0.8359

<tensorflow.python.keras.callbacks.History at 0x1c38aa0990>

model.save('attrition.model')
new_model = tf.keras.models.load_model('attrition.model')

WARNING:tensorflow:Sequential models without an `input_shape` passed
to the first layer cannot reload their optimizer state. As a result,
your model isstarting with a freshly initialized optimizer.

predictions = new_model.predict(x_test)

oneD_predictions = [np.argmax(x) for x in predictions]

import sklearn
from sklearn.metrics import accuracy_score
sklearn.metrics.accuracy_score(y_test, oneD_predictions)

0.8537414965986394

oneD_predictions

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```

```
import keras
keras.utils.plot_model(
    new_model, to_file='model.png', show_shapes=True,
show_layer_names=True, expand_nested=True, dpi=300
)
```

```
Using TensorFlow backend.
```

dense: Dense	input:	multiple
	output:	multiple

dense_1: Dense	input:	multiple
	output:	multiple

dense_2: Dense	input:	multiple
	output:	multiple

```
%tensorboard --logdir logs
```

```
<IPython.lib.display.IFrame at 0x1a365e2c50>
```