EXPERIMENT - 9

APPLYING DEEP LEARNING METHODS TO SOLVE AN APPLICATION

AIM

To apply deep learning methods to solve an application.

ALGORITHM

1. Start.
2. Input units are passed with weights attached to it.
3. After passing inputs., all are connected to a
4. After passing inputs, all computation performed on hidden layer
   i) All inputs are multiplied to their weight
   ii) function applied to the linear equation 2.
   iii) We move to last layer, i.e., output layer to obtain output
5. We calculate accuracy / error. i.e, difference between actual and predicted value.
6. stop

PROBLEM

Given data set on indian diabetes dataset.

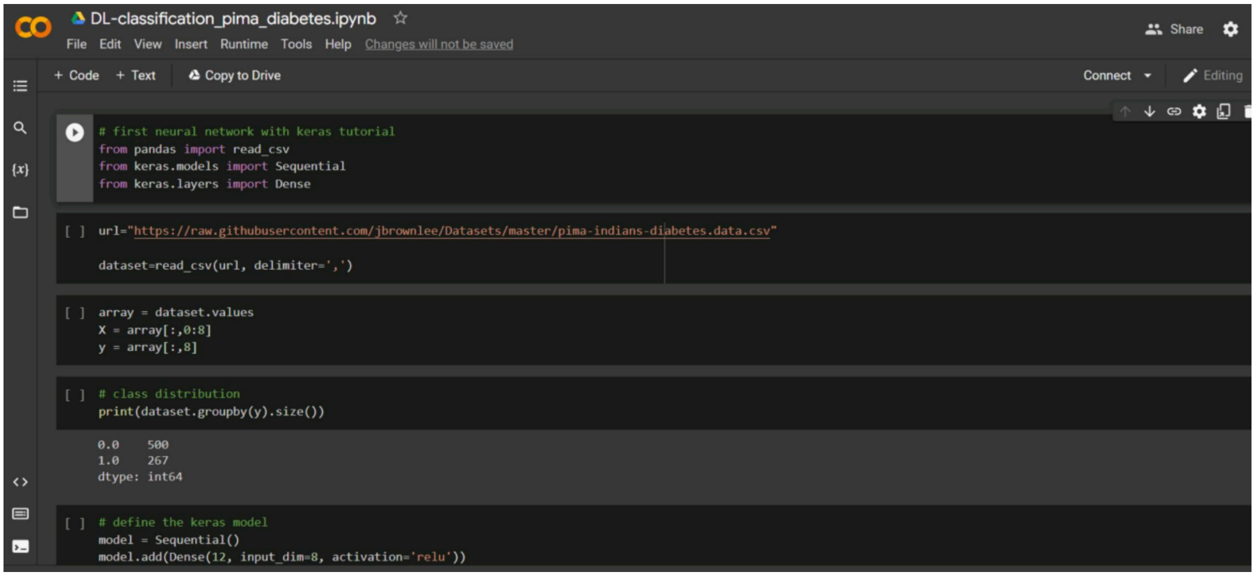
OUTPUT

Obtained result from dataset

Accuracy = 77.57

RESULT

We successfully implemented the deep learning algorithm.


DL-classification_pima_diabetes.ipynb
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```
# first neural network with keras tutorial
from pandas import read_csv
from keras.models import Sequential
from keras.layers import Dense
```

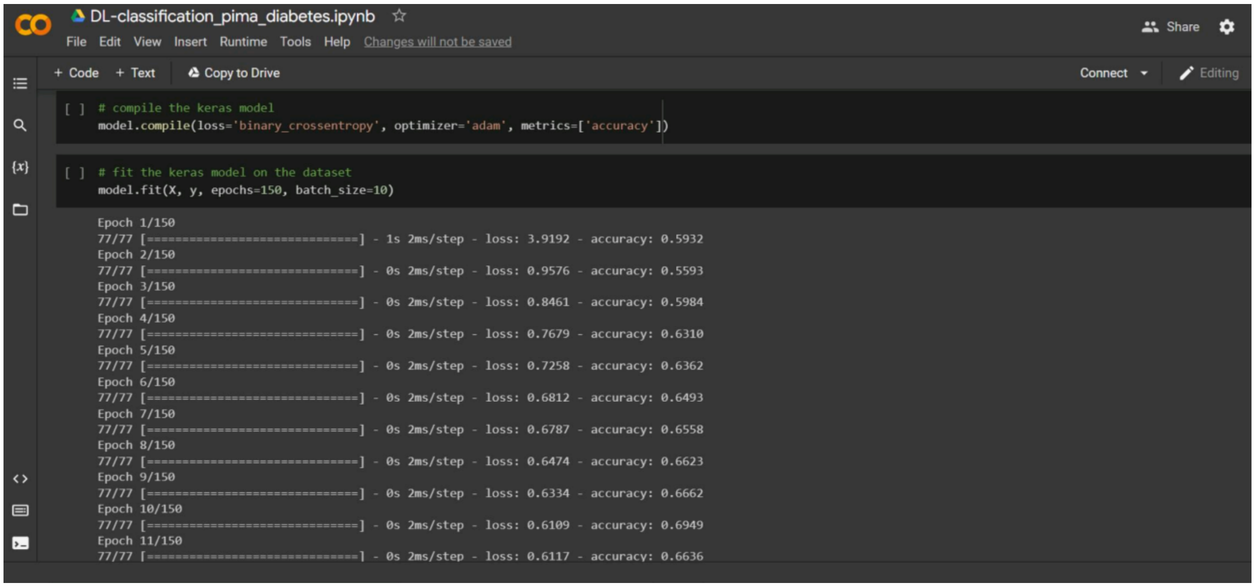
```
url="https://raw.githubusercontent.com/jbrownlee/Datasets/master/pima-indians-diabetes.data.csv"

dataset=read_csv(url, delimiter=',')
```

```
array = dataset.values
X = array[:,0:8]
y = array[:,8]
```

```
# class distribution
print(dataset.groupby(y).size())
```

```
0.0    500
1.0    267
dtype: int64
```

```
# define the keras model
model = Sequential()
model.add(Dense(12, input_dim=8, activation='relu'))
```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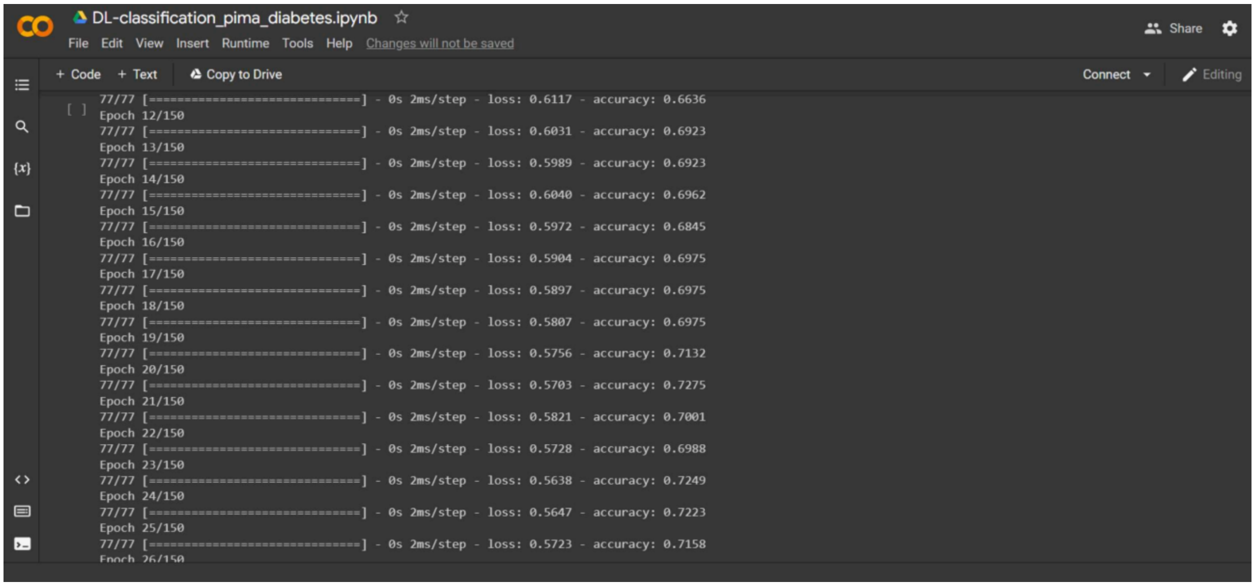
```
# compile the keras model
model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])
```

```
# fit the keras model on the dataset
model.fit(X, y, epochs=150, batch_size=10)
```

```
Epoch 1/150
77/77 [==============================] - 1s 2ms/step - loss: 3.9192 - accuracy: 0.5932
Epoch 2/150
77/77 [==============================] - 0s 2ms/step - loss: 0.9576 - accuracy: 0.5593
Epoch 3/150
77/77 [==============================] - 0s 2ms/step - loss: 0.8461 - accuracy: 0.5984
Epoch 4/150
77/77 [==============================] - 0s 2ms/step - loss: 0.7679 - accuracy: 0.6310
Epoch 5/150
77/77 [==============================] - 0s 2ms/step - loss: 0.7258 - accuracy: 0.6362
Epoch 6/150
77/77 [==============================] - 0s 2ms/step - loss: 0.6812 - accuracy: 0.6493
Epoch 7/150
77/77 [==============================] - 0s 2ms/step - loss: 0.6787 - accuracy: 0.6558
Epoch 8/150
77/77 [==============================] - 0s 2ms/step - loss: 0.6474 - accuracy: 0.6623
Epoch 9/150
77/77 [==============================] - 0s 2ms/step - loss: 0.6334 - accuracy: 0.6662
Epoch 10/150
77/77 [==============================] - 0s 2ms/step - loss: 0.6109 - accuracy: 0.6949
Epoch 11/150
77/77 [==============================] - 0s 2ms/step - loss: 0.6117 - accuracy: 0.6636
```


DL-classification_pima_diabetes.ipynb
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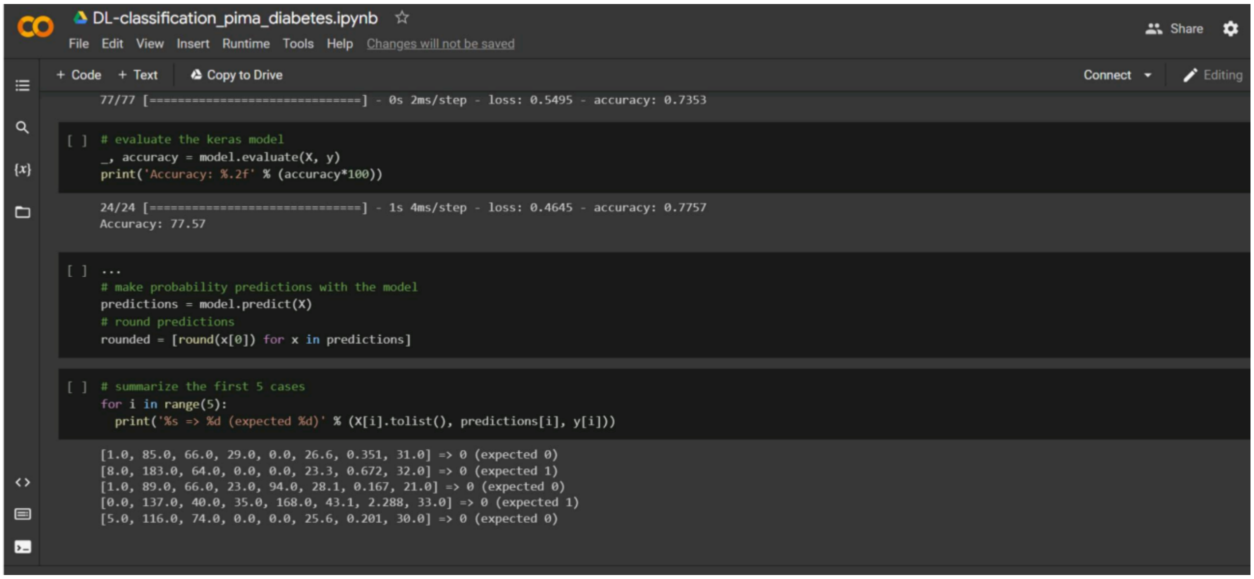
```
77/77 [==============================] - 0s 2ms/step - loss: 0.6117 - accuracy: 0.6636
Epoch 12/150
77/77 [==============================] - 0s 2ms/step - loss: 0.6031 - accuracy: 0.6923
Epoch 13/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5989 - accuracy: 0.6923
Epoch 14/150
77/77 [==============================] - 0s 2ms/step - loss: 0.6040 - accuracy: 0.6962
Epoch 15/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5972 - accuracy: 0.6845
Epoch 16/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5904 - accuracy: 0.6975
Epoch 17/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5897 - accuracy: 0.6975
Epoch 18/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5807 - accuracy: 0.6975
Epoch 19/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5756 - accuracy: 0.7132
Epoch 20/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5703 - accuracy: 0.7275
Epoch 21/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5821 - accuracy: 0.7001
Epoch 22/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5728 - accuracy: 0.6988
Epoch 23/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5638 - accuracy: 0.7249
Epoch 24/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5647 - accuracy: 0.7223
Epoch 25/150
77/77 [==============================] - 0s 2ms/step - loss: 0.5723 - accuracy: 0.7158
Epoch 26/150
```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```
77/77 [==============================] - 0s 2ms/step - loss: 0.5495 - accuracy: 0.7353
```

```
# evaluate the keras model
_, accuracy = model.evaluate(X, y)
print('Accuracy: %.2f' % (accuracy*100))
```

```
24/24 [==============================] - 1s 4ms/step - loss: 0.4645 - accuracy: 0.7757
Accuracy: 77.57
```

```
...
# make probability predictions with the model
predictions = model.predict(X)
# round predictions
rounded = [round(x[0]) for x in predictions]
```

```
# summarize the first 5 cases
for i in range(5):
  print('%s => %d (expected %d)' % (X[i].tolist(), predictions[i], y[i]))
```

```
[1.0, 85.0, 66.0, 29.0, 0.0, 26.6, 0.351, 31.0] => 0 (expected 0)
[8.0, 183.0, 64.0, 0.0, 0.0, 23.3, 0.672, 32.0] => 0 (expected 1)
[1.0, 89.0, 66.0, 23.0, 94.0, 28.1, 0.167, 21.0] => 0 (expected 0)
[0.0, 137.0, 40.0, 35.0, 168.0, 43.1, 2.288, 33.0] => 0 (expected 1)
[5.0, 116.0, 74.0, 0.0, 0.0, 25.6, 0.201, 30.0] => 0 (expected 0)
```