ICP5 REPORT

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RAM
Disk

```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
Mounted at /content/gdrive
```

```
[2] path_to_csv = '/content/gdrive/My Drive/diabetes.csv'
```

```
[3] import keras
    import pandas as pd
    import numpy as np
    from keras.models import Sequential
    from keras.layers import Dense
    from sklearn.model_selection import train_test_split

    # Load dataset
    dataset = pd.read_csv(path_to_csv, header=None).values

    # Split the dataset into training and testing sets
    X_train, X_test, Y_train, Y_test = train_test_split(dataset[:, 0:8], dataset[:, 8], test_size=0.25, random_state=87)
```

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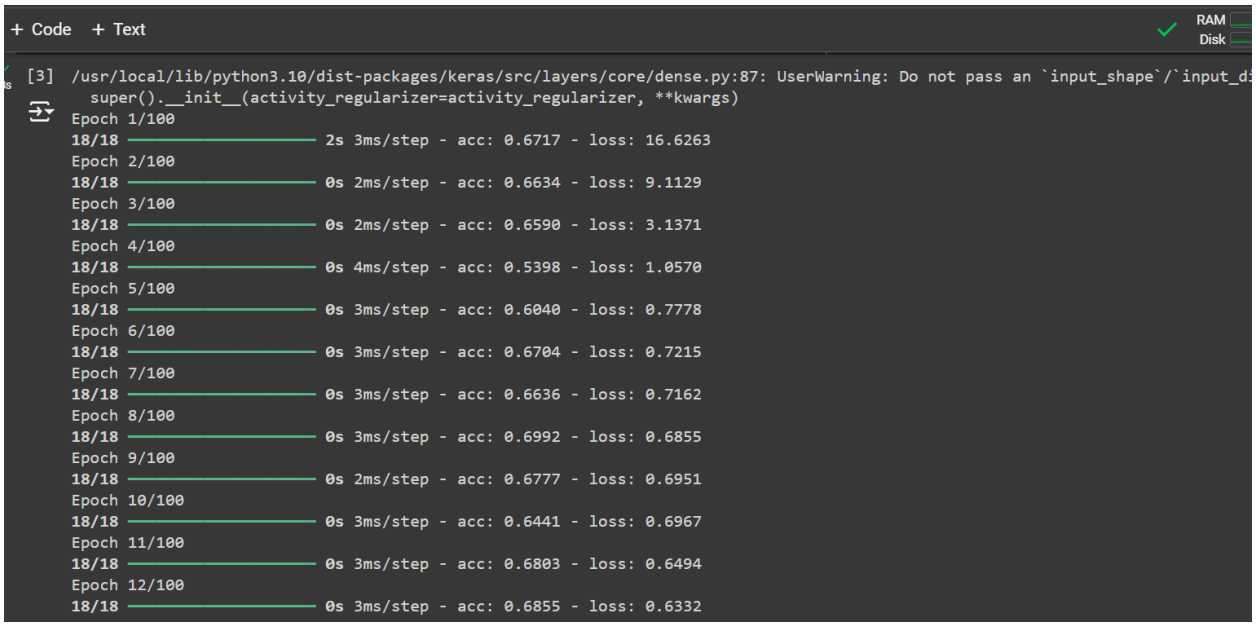
```
[3] # Set random seed for reproducibility
    np.random.seed(155)

    # Create a Sequential model
    model = Sequential()

    # Add Dense layers with 'relu' activation for hidden layers
    model.add(Dense(20, input_dim=8, activation='relu'))  # First hidden layer
    model.add(Dense(15, activation='relu'))  # Second hidden layer
    model.add(Dense(10, activation='relu'))  # Third hidden layer

    # Add output layer with 'sigmoid' activation
    model.add(Dense(1, activation='sigmoid'))

    # Compile the model using binary crossentropy and adam optimizer
    model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['acc'])

    # Train the model
    model_fitted = model.fit(X_train, Y_train, epochs=100, initial_epoch=0)

    # Print model summary and evaluate accuracy on the test set
    print(model.summary())
    print(model.evaluate(X_test,Y_test))
```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RAM
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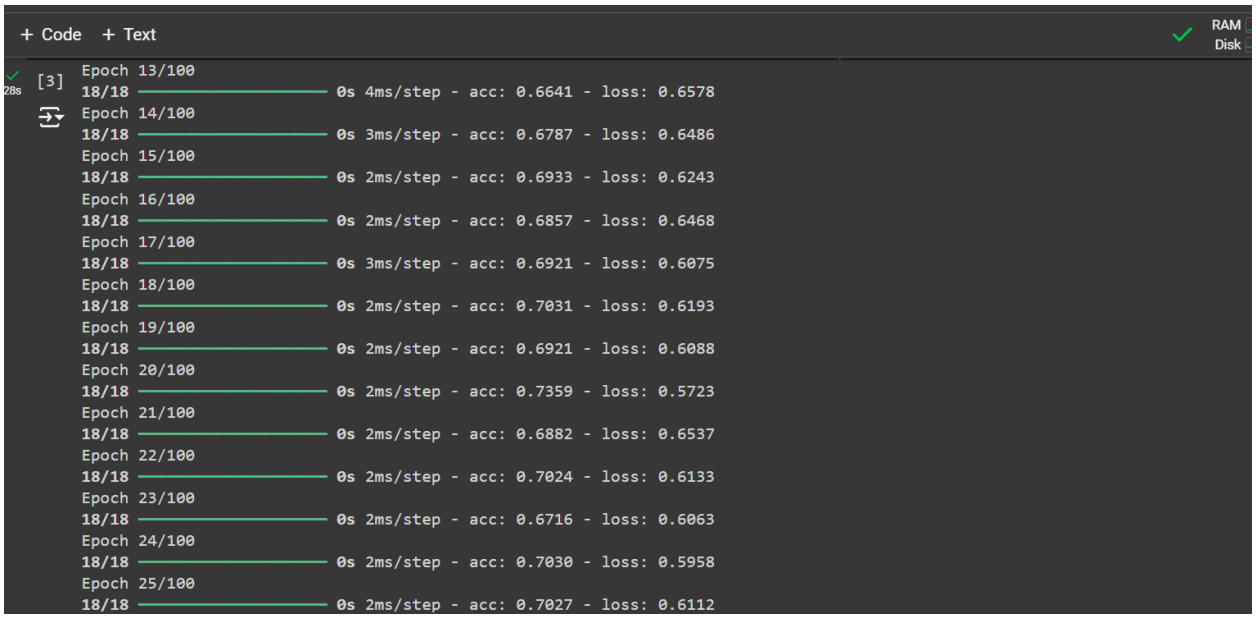
[3]
/usr/local/lib/python3.10/dist-packages/keras/src/layers/core/dense.py:87: UserWarning: Do not pass an `input_shape`/`input_di
super().__init__(activity_regularizer=activity_regularizer, **kwargs)
Epoch 1/100
18/18 2s 3ms/step - acc: 0.6717 - loss: 16.6263
Epoch 2/100
18/18 0s 2ms/step - acc: 0.6634 - loss: 9.1129
Epoch 3/100
18/18 0s 2ms/step - acc: 0.6590 - loss: 3.1371
Epoch 4/100
18/18 0s 4ms/step - acc: 0.5398 - loss: 1.0570
Epoch 5/100
18/18 0s 3ms/step - acc: 0.6040 - loss: 0.7778
Epoch 6/100
18/18 0s 3ms/step - acc: 0.6704 - loss: 0.7215
Epoch 7/100
18/18 0s 3ms/step - acc: 0.6636 - loss: 0.7162
Epoch 8/100
18/18 0s 3ms/step - acc: 0.6992 - loss: 0.6855
Epoch 9/100
18/18 0s 2ms/step - acc: 0.6777 - loss: 0.6951
Epoch 10/100
18/18 0s 3ms/step - acc: 0.6441 - loss: 0.6967
Epoch 11/100
18/18 0s 3ms/step - acc: 0.6803 - loss: 0.6494
Epoch 12/100
18/18 0s 3ms/step - acc: 0.6855 - loss: 0.6332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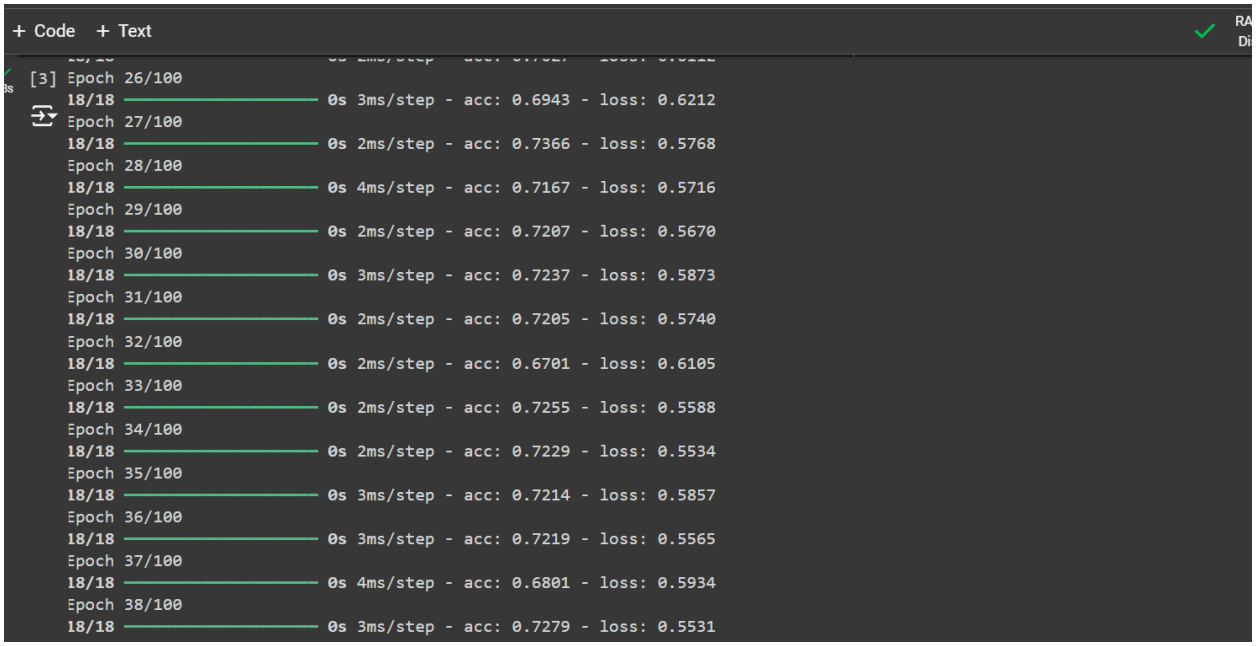
[3]
Epoch 13/100
18/18 0s 4ms/step - acc: 0.6641 - loss: 0.6578
Epoch 14/100
18/18 0s 3ms/step - acc: 0.6787 - loss: 0.6486
Epoch 15/100
18/18 0s 2ms/step - acc: 0.6933 - loss: 0.6243
Epoch 16/100
18/18 0s 2ms/step - acc: 0.6857 - loss: 0.6468
Epoch 17/100
18/18 0s 3ms/step - acc: 0.6921 - loss: 0.6075
Epoch 18/100
18/18 0s 2ms/step - acc: 0.7031 - loss: 0.6193
Epoch 19/100
18/18 0s 2ms/step - acc: 0.6921 - loss: 0.6088
Epoch 20/100
18/18 0s 2ms/step - acc: 0.7359 - loss: 0.5723
Epoch 21/100
18/18 0s 2ms/step - acc: 0.6882 - loss: 0.6537
Epoch 22/100
18/18 0s 2ms/step - acc: 0.7024 - loss: 0.6133
Epoch 23/100
18/18 0s 2ms/step - acc: 0.6716 - loss: 0.6063
Epoch 24/100
18/18 0s 2ms/step - acc: 0.7030 - loss: 0.5958
Epoch 25/100
18/18 0s 2ms/step - acc: 0.7027 - loss: 0.6112


+ Code
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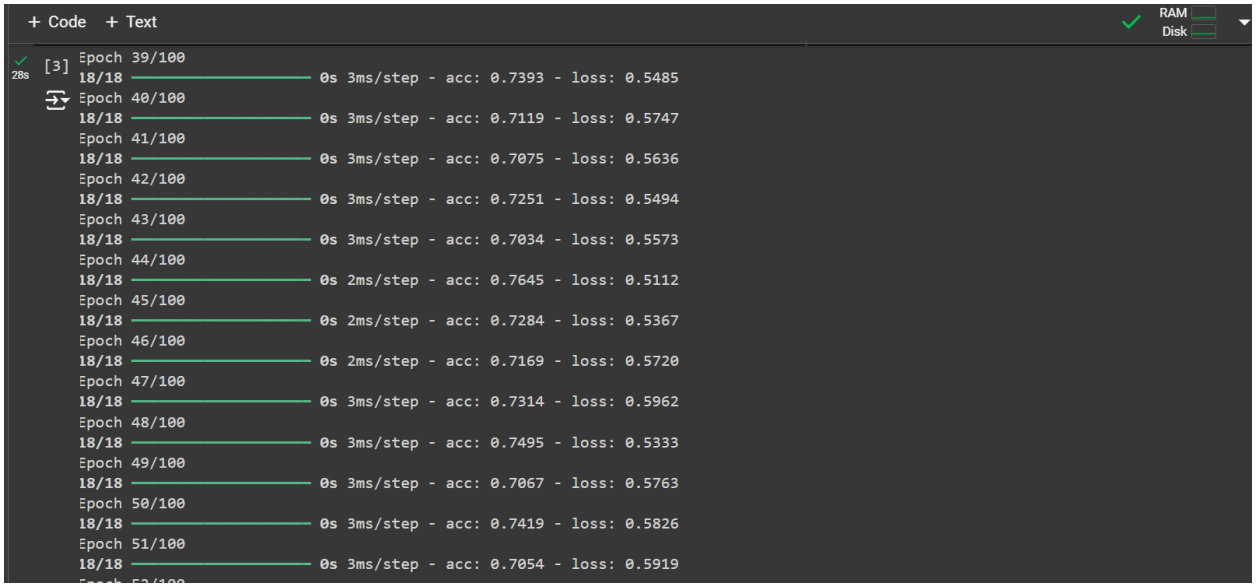
[3]
Epoch 26/100
18/18 0s 3ms/step - acc: 0.6943 - loss: 0.6212
Epoch 27/100
18/18 0s 2ms/step - acc: 0.7366 - loss: 0.5768
Epoch 28/100
18/18 0s 4ms/step - acc: 0.7167 - loss: 0.5716
Epoch 29/100
18/18 0s 2ms/step - acc: 0.7207 - loss: 0.5670
Epoch 30/100
18/18 0s 3ms/step - acc: 0.7237 - loss: 0.5873
Epoch 31/100
18/18 0s 2ms/step - acc: 0.7205 - loss: 0.5740
Epoch 32/100
18/18 0s 2ms/step - acc: 0.6701 - loss: 0.6105
Epoch 33/100
18/18 0s 2ms/step - acc: 0.7255 - loss: 0.5588
Epoch 34/100
18/18 0s 2ms/step - acc: 0.7229 - loss: 0.5534
Epoch 35/100
18/18 0s 3ms/step - acc: 0.7214 - loss: 0.5857
Epoch 36/100
18/18 0s 3ms/step - acc: 0.7219 - loss: 0.5565
Epoch 37/100
18/18 0s 4ms/step - acc: 0.6801 - loss: 0.5934
Epoch 38/100
18/18 0s 3ms/step - acc: 0.7279 - loss: 0.5531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28s
[3]
Epoch 39/100
18/18 0s 3ms/step - acc: 0.7393 - loss: 0.5485
Epoch 40/100
18/18 0s 3ms/step - acc: 0.7119 - loss: 0.5747
Epoch 41/100
18/18 0s 3ms/step - acc: 0.7075 - loss: 0.5636
Epoch 42/100
18/18 0s 3ms/step - acc: 0.7251 - loss: 0.5494
Epoch 43/100
18/18 0s 3ms/step - acc: 0.7034 - loss: 0.5573
Epoch 44/100
18/18 0s 2ms/step - acc: 0.7645 - loss: 0.5112
Epoch 45/100
18/18 0s 2ms/step - acc: 0.7284 - loss: 0.5367
Epoch 46/100
18/18 0s 2ms/step - acc: 0.7169 - loss: 0.5720
Epoch 47/100
18/18 0s 3ms/step - acc: 0.7314 - loss: 0.5962
Epoch 48/100
18/18 0s 3ms/step - acc: 0.7495 - loss: 0.5333
Epoch 49/100
18/18 0s 3ms/step - acc: 0.7067 - loss: 0.5763
Epoch 50/100
18/18 0s 3ms/step - acc: 0.7419 - loss: 0.5826
Epoch 51/100
18/18 0s 3ms/step - acc: 0.7054 - loss: 0.5919

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[3] Epoch 52/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7203 - loss: 0.5711
Epoch 53/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7412 - loss: 0.5299
Epoch 54/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7668 - loss: 0.5043
Epoch 55/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7599 - loss: 0.5275
Epoch 56/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7428 - loss: 0.5131
Epoch 57/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7434 - loss: 0.5358
Epoch 58/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7290 - loss: 0.5237
Epoch 59/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 0.7258 - loss: 0.5546
Epoch 60/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7149 - loss: 0.5741
Epoch 61/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 0.7155 - loss: 0.5356
Epoch 62/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 0.7377 - loss: 0.5256
Epoch 63/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7460 - loss: 0.5248
Epoch 64/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7339 - loss: 0.5444
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```
[3] Epoch 65/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7372 - loss: 0.5225
Epoch 66/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7540 - loss: 0.5494
Epoch 67/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7203 - loss: 0.5537
Epoch 68/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.6990 - loss: 0.5593
Epoch 69/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 0.7663 - loss: 0.5273
Epoch 70/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7269 - loss: 0.5359
Epoch 71/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - acc: 0.7273 - loss: 0.5246
Epoch 72/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7401 - loss: 0.5391
Epoch 73/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - acc: 0.7616 - loss: 0.5115
Epoch 74/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - acc: 0.7725 - loss: 0.5131
Epoch 75/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7532 - loss: 0.5322
Epoch 76/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7338 - loss: 0.5202
Epoch 77/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7794 - loss: 0.5053
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[3]
Epoch 78/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7438 - loss: 0.5097
Epoch 79/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7215 - loss: 0.5367
Epoch 80/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7597 - loss: 0.5286
Epoch 81/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7674 - loss: 0.4991
Epoch 82/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7342 - loss: 0.5289
Epoch 83/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7477 - loss: 0.5140
Epoch 84/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7583 - loss: 0.5113
Epoch 85/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7784 - loss: 0.4830
Epoch 86/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7384 - loss: 0.5200
Epoch 87/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7679 - loss: 0.5032
Epoch 88/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7430 - loss: 0.4867
Epoch 89/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7303 - loss: 0.5437
Epoch 90/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7462 - loss: 0.5184
```

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[3]
Epoch 91/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7296 - loss: 0.5747
Epoch 92/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7514 - loss: 0.5277
Epoch 93/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7498 - loss: 0.5045
Epoch 94/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7432 - loss: 0.5064
Epoch 95/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7752 - loss: 0.4924
Epoch 96/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.7738 - loss: 0.4813
Epoch 97/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 0.7557 - loss: 0.4968
Epoch 98/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 0.7255 - loss: 0.5222
Epoch 99/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.8008 - loss: 0.4960
Epoch 100/100
18/18 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - acc: 0.7692 - loss: 0.4917
Model: "sequential"
```

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 20)	180
dense_1 (Dense)	(None, 15)	315

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28s [3]

dense_2 (Dense)	(None, 10)	160
dense_3 (Dense)	(None, 1)	11

Total params: 2,000 (7.82 KB)
Trainable params: 666 (2.60 KB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 1,334 (5.21 KB)

```
None
5/6 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 0.6705 - loss: 0.6099
[0.6247989535331726, 0.6666666865348816]
```

0s [4]

```
path_to_csv1 = '/content/gdrive/My Drive/breastcancer.csv'
```

16s [5]

```
import keras
import pandas
from keras.models import Sequential
from keras.layers import Dense, Activation

# load dataset
from sklearn.model_selection import train_test_split
#from sklearn.preprocessing import StandardScaler
import pandas as pd
```

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6s [5]

```
import numpy as np

dataset = pd.read_csv(path_to_csv1, header=None).values

X = dataset[1:, 2:-1]  # Features
Y = dataset[1:, -1]   # Labels (M or B)

# Convert labels to binary format
Y = np.where(Y == 'M', 1, 0)  # M -> 1, B -> 0

#Convert to numeric
X = X.astype(np.float64) # Convert X to numeric

X_train, X_test, Y_train, Y_test = train_test_split(X, Y,
                                                    test_size=0.25, random_state=87)


np.random.seed(155)
my_first_nn = Sequential() # create model
my_first_nn.add(Dense(20, input_dim=30, activation='relu')) # hidden layer
my_first_nn.add(Dense(30, activation='relu')) # hidden layer
my_first_nn.add(Dense(40, activation='relu')) # hidden layer
my_first_nn.add(Dense(50, activation='relu')) # hidden layer
```

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```
[5] my_first_nn.add(Dense(1, activation='sigmoid')) # output layer
    my_first_nn.compile(loss='binary_crossentropy', optimizer='adam', metrics=['acc'])
    my_first_nn_fitted = my_first_nn.fit(X_train, Y_train, epochs=100,
                                         initial_epoch=0)
    print(my_first_nn.summary())
    print(my_first_nn.evaluate(X_test,Y_test))
```

```
Epoch 1/100
/usr/local/lib/python3.10/dist-packages/keras/src/layers/core/dense.py:87: UserWarning: Do not pass an `input_sha
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
14/14 ━━━━━━━━━━━━━━━━━━━━ 3s 4ms/step - acc: 0.1753 - loss: 44.9433
Epoch 2/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 9.3662e-11
Epoch 3/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.7119e-13
Epoch 4/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.8413e-14
Epoch 5/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 8.2208e-14
Epoch 6/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.5290e-14
Epoch 7/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 5.6485e-14
Epoch 8/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 5.6193e-14
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```
[5] Epoch 9/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.7084e-14
Epoch 10/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 6.8442e-14
Epoch 11/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.4374e-13
Epoch 12/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 5.9809e-14
Epoch 13/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 6.0432e-14
Epoch 14/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 3.9099e-14
Epoch 15/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 3.0003e-14
Epoch 16/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.3912e-13
Epoch 17/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 6.3567e-14
Epoch 18/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 5.7100e-14
Epoch 19/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.7659e-14
Epoch 20/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.2451e-14
Epoch 21/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 6.4129e-14
```

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[5] 16s

```
Epoch 22/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.3435e-14
Epoch 23/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.5981e-14
Epoch 24/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.4310e-14
Epoch 25/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 5.7022e-14
Epoch 26/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.8311e-14
Epoch 27/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.8912e-14
Epoch 28/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 3.4530e-14
Epoch 29/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 5.0878e-14
Epoch 30/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 2.6010e-14
Epoch 31/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 16ms/step - acc: 1.0000 - loss: 2.2038e-14
Epoch 32/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 1s 10ms/step - acc: 1.0000 - loss: 1.4061e-13
Epoch 33/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - acc: 1.0000 - loss: 3.6609e-14
Epoch 34/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - acc: 1.0000 - loss: 2.8678e-14
```

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[5] 16s

```
Epoch 35/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 7.9181e-14
Epoch 36/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - acc: 1.0000 - loss: 2.7725e-14
Epoch 37/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 1.9814e-14
Epoch 38/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 2.6040e-14
Epoch 39/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 6.9523e-14
Epoch 40/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step - acc: 1.0000 - loss: 7.1235e-14
Epoch 41/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - acc: 1.0000 - loss: 4.7231e-14
Epoch 42/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 8.3346e-14
Epoch 43/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - acc: 1.0000 - loss: 3.2421e-14
Epoch 44/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 2.3168e-14
Epoch 45/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 8.1239e-14
Epoch 46/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 3.7559e-14
Epoch 47/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.8261e-14
```

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14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.8261e-14
16s [5] Epoch 48/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 1.6027e-14
Epoch 49/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 4.2304e-14
Epoch 50/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - acc: 1.0000 - loss: 7.9889e-14
Epoch 51/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - acc: 1.0000 - loss: 3.0584e-14
Epoch 52/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 3.8558e-14
Epoch 53/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - acc: 1.0000 - loss: 2.8601e-14
Epoch 54/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 9.9136e-14
Epoch 55/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.1513e-14
Epoch 56/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.5864e-14
Epoch 57/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.6652e-14
Epoch 58/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.5801e-14
Epoch 59/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 9.8004e-14
Epoch 60/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.4365e-13
```

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16s [5] Epoch 61/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 6.6476e-14
Epoch 62/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.1300e-14
Epoch 63/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.4489e-14
Epoch 64/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.5764e-14
Epoch 65/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.6088e-14
Epoch 66/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.0819e-14
Epoch 67/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.5043e-14
Epoch 68/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.4882e-14
Epoch 69/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.0437e-14
Epoch 70/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.7378e-14
Epoch 71/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 3.8939e-14
Epoch 72/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.1065e-14
Epoch 73/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.0255e-13
```

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[5]
Epoch 74/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 9.8969e-14
Epoch 75/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.7581e-14
Epoch 76/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.9354e-14
Epoch 77/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.6671e-14
Epoch 78/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 9.7705e-14
Epoch 79/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 2.5600e-14
Epoch 80/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 3.8013e-14
Epoch 81/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 7.9338e-14
Epoch 82/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 1.3861e-13
Epoch 83/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 3.9042e-14
Epoch 84/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.4018e-14
Epoch 85/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 9.9889e-14
Epoch 86/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 5.5722e-14
```

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[5]
Epoch 87/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.2242e-14
Epoch 88/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 2.7213e-14
Epoch 89/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - acc: 1.0000 - loss: 3.3815e-14
Epoch 90/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 6.6463e-14
Epoch 91/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 1.9414e-14
Epoch 92/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 2.3979e-14
Epoch 93/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 8.3056e-14
Epoch 94/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 8.3342e-14
Epoch 95/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 2.1129e-14
Epoch 96/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 9.7982e-14
Epoch 97/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 8.0022e-14
Epoch 98/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.4541e-13
Epoch 99/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.0731e-13
```

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16s [5]
```
Epoch 100/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.0121e-13
```

Model: "sequential_1"

Layer (type)	Output Shape	Param #
dense_4 (Dense)	(None, 20)	620
dense_5 (Dense)	(None, 30)	630
dense_6 (Dense)	(None, 40)	1,240
dense_7 (Dense)	(None, 50)	2,050
dense_8 (Dense)	(None, 1)	51

```
 Total params: 13,775 (53.81 KB)
 Trainable params: 4,591 (17.93 KB)
 Non-trainable params: 0 (0.00 B)
 Optimizer params: 9,184 (35.88 KB)
None
5/5 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - acc: 1.0000 - loss: 1.2830e-12
[2.4695894201148816e-12, 1.0]
```

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12s [7]
```
import keras
import pandas as pd
import numpy as np
from keras.models import Sequential
from keras.layers import Dense, Activation
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler  # Import StandardScaler

# Load dataset
dataset = pd.read_csv(path_to_csv1, header=None).values

X = dataset[1:, 2:-1]  # Features
Y = dataset[1:, -1]   # Labels (M or B)

# Convert labels to binary format
Y = np.where(Y == 'M', 1, 0)  # M -> 1, B -> 0

# Convert to numeric
X = X.astype(np.float64)  # Convert X to numeric

X_train, X_test, Y_train, Y_test = train_test_split(X, Y,
                                                    test_size=0.25, random_state=87)
```

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RAM
Disk

```
[7]  # Normalizing the data
     sc = StandardScaler()
     X_train = sc.fit_transform(X_train)
     X_test = sc.transform(X_test)

     np.random.seed(155)
     my_first_nn = Sequential()  # Create model
     my_first_nn.add(Dense(20, input_dim=X_train.shape[1], activation='relu'))  # Hidden layer
     my_first_nn.add(Dense(30, activation='relu'))  # Hidden layer
     my_first_nn.add(Dense(40, activation='relu'))  # Hidden layer
     my_first_nn.add(Dense(50, activation='relu'))  # Hidden layer

     my_first_nn.add(Dense(1, activation='sigmoid'))  # Output layer
     my_first_nn.compile(loss='binary_crossentropy', optimizer='adam', metrics=['acc'])
     my_first_nn_fitted = my_first_nn.fit(X_train, Y_train, epochs=100, initial_epoch=0)

     print(my_first_nn.summary())
     print(my_first_nn.evaluate(X_test, Y_test))
```

```
/usr/local/lib/python3.10/dist-packages/keras/src/layers/core/dense.py:87: UserWarning: Do not pass an `input_shape`/`input_dim` argum
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
Epoch 1/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 4s 2ms/step - acc: 0.7512 - loss: 0.6261
```

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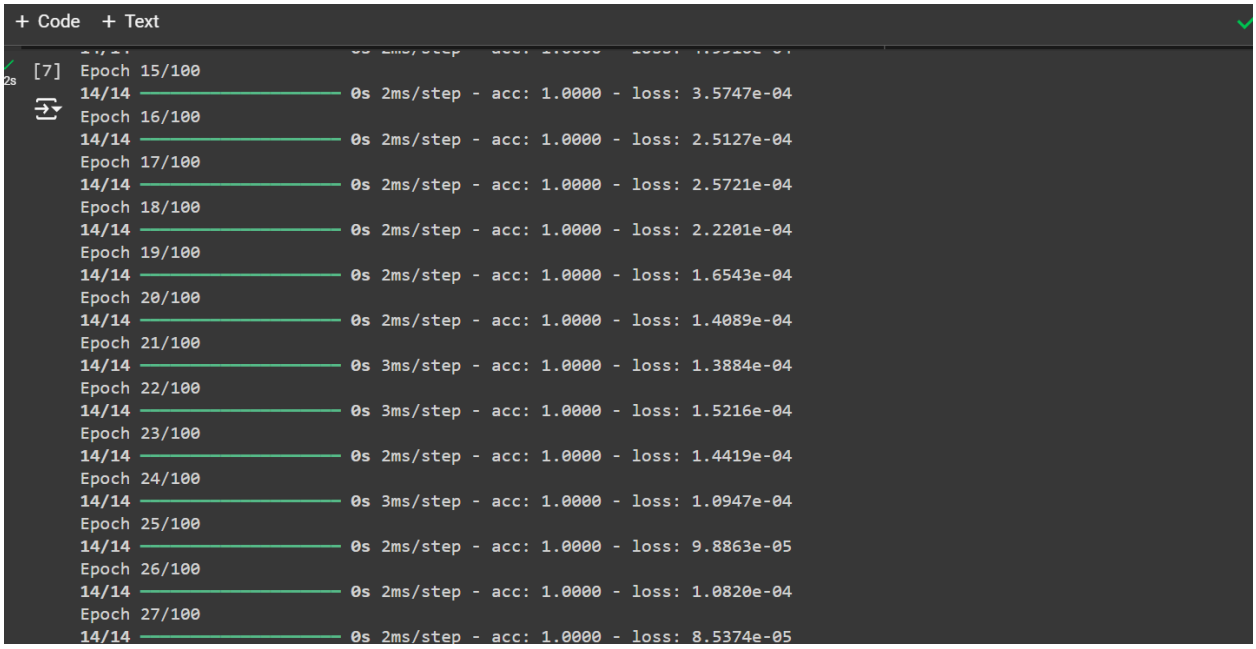
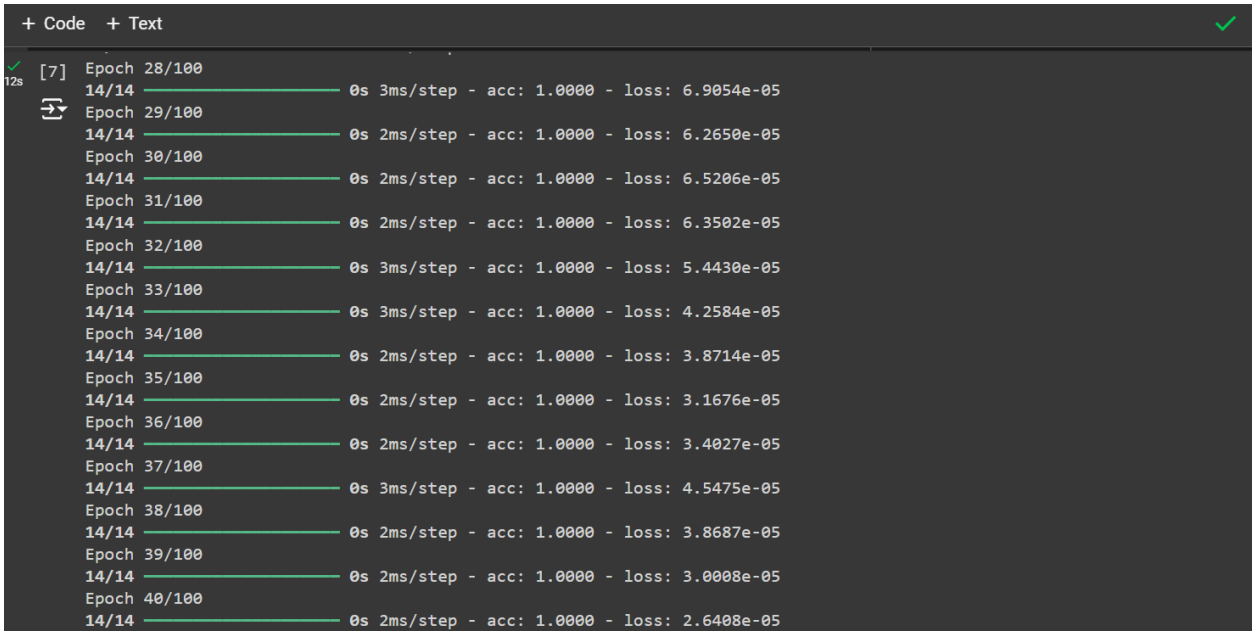
```
[7]  Epoch 2/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 0.3047
     Epoch 3/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 0.0880
     Epoch 4/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 0.0185
     Epoch 5/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - acc: 1.0000 - loss: 0.0060
     Epoch 6/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 0.0030
     Epoch 7/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 0.0018
     Epoch 8/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 0.0015
     Epoch 9/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 0.0011
     Epoch 10/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 8.0293e-04
     Epoch 11/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 5.6467e-04
     Epoch 12/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.2385e-04
     Epoch 13/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.3326e-04
     Epoch 14/100
     14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.9916e-04
```


+ Code + Text
[7]
Epoch 15/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 3.5747e-04
Epoch 16/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 2.5127e-04
Epoch 17/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 2.5721e-04
Epoch 18/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 2.2201e-04
Epoch 19/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 1.6543e-04
Epoch 20/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 1.4089e-04
Epoch 21/100
14/14 0s 3ms/step - acc: 1.0000 - loss: 1.3884e-04
Epoch 22/100
14/14 0s 3ms/step - acc: 1.0000 - loss: 1.5216e-04
Epoch 23/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 1.4419e-04
Epoch 24/100
14/14 0s 3ms/step - acc: 1.0000 - loss: 1.0947e-04
Epoch 25/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 9.8863e-05
Epoch 26/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 1.0820e-04
Epoch 27/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 8.5374e-05


+ Code + Text
[7]
Epoch 28/100
14/14 0s 3ms/step - acc: 1.0000 - loss: 6.9054e-05
Epoch 29/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 6.2650e-05
Epoch 30/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 6.5206e-05
Epoch 31/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 6.3502e-05
Epoch 32/100
14/14 0s 3ms/step - acc: 1.0000 - loss: 5.4430e-05
Epoch 33/100
14/14 0s 3ms/step - acc: 1.0000 - loss: 4.2584e-05
Epoch 34/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 3.8714e-05
Epoch 35/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 3.1676e-05
Epoch 36/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 3.4027e-05
Epoch 37/100
14/14 0s 3ms/step - acc: 1.0000 - loss: 4.5475e-05
Epoch 38/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 3.8687e-05
Epoch 39/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 3.0008e-05
Epoch 40/100
14/14 0s 2ms/step - acc: 1.0000 - loss: 2.6408e-05

+ Code + Text

[7] 12s

```
Epoch 41/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.6244e-05
Epoch 42/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.3102e-05
Epoch 43/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.1454e-05
Epoch 44/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.8872e-05
Epoch 45/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 2.3911e-05
Epoch 46/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.6697e-05
Epoch 47/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.3530e-05
Epoch 48/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.0894e-05
Epoch 49/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.7871e-05
Epoch 50/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.5416e-05
Epoch 51/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.7791e-05
Epoch 52/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.3028e-05
Epoch 53/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.6630e-05
```

+ Code + Text

[7] 12s

```
Epoch 54/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.5612e-05
Epoch 55/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.4960e-05
Epoch 56/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 9.9499e-06
Epoch 57/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 9.1375e-06
Epoch 58/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.2884e-05
Epoch 59/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 9.8688e-06
Epoch 60/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 1.2295e-05
Epoch 61/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 7.9914e-06
Epoch 62/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 9.6006e-06
Epoch 63/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 9.9735e-06
Epoch 64/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 7.2845e-06
Epoch 65/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 9.2481e-06
Epoch 66/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 7.0776e-06
```

+ Code + Text

[7]

```
Epoch 67/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 6.0911e-06
Epoch 68/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 5.6635e-06
Epoch 69/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 8.8481e-06
Epoch 70/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 6.9299e-06
Epoch 71/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 5.5708e-06
Epoch 72/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 7.5581e-06
Epoch 73/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 5.2203e-06
Epoch 74/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 7.6398e-06
Epoch 75/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.2681e-06
Epoch 76/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.6288e-06
Epoch 77/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.6701e-06
Epoch 78/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 6.7956e-06
Epoch 79/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 4.6778e-06
```

+ Code + Text

[7]

```
Epoch 80/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.9080e-06
Epoch 81/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.4403e-06
Epoch 82/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 5.0981e-06
Epoch 83/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 3.2279e-06
Epoch 84/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 5.5052e-06
Epoch 85/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 3.5592e-06
Epoch 86/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 4.4995e-06
Epoch 87/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.5942e-06
Epoch 88/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.6193e-06
Epoch 89/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.3897e-06
Epoch 90/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.8606e-06
Epoch 91/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 3.2607e-06
Epoch 92/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 3.2390e-06
```

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[7]
```
Epoch 93/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.7123e-06
Epoch 94/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.7100e-06
Epoch 95/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.8473e-06
Epoch 96/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.9794e-06
Epoch 97/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 2.1467e-06
Epoch 98/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 3.1280e-06
Epoch 99/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 1.8489e-06
Epoch 100/100
14/14 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 2.0521e-06
Model: "sequential_2"
```

Layer (type)	Output Shape	Param #
dense_9 (Dense)	(None, 20)	620
dense_10 (Dense)	(None, 30)	630
dense_11 (Dense)	(None, 40)	1,240
dense_12 (Dense)	(None, 50)	2,050

+ Code + Text

[7]

dense_13 (Dense)	(None, 1)	51

```
Total params: 13,775 (53.81 KB)
Trainable params: 4,591 (17.93 KB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 9,184 (35.88 KB)
None
5/5 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - acc: 1.0000 - loss: 2.6435e-06
[2.8497036055341596e-06, 1.0]
```

[8]
```
path_to_csv1 = '/content/gdrive/My Drive/breastcancer.csv'
```

[13]
```
import pandas as pd
import matplotlib.pyplot as plt

# Load the dataset
data = pd.read_csv('/content/gdrive/My Drive/breastcancer.csv')

# Print the column names to help you choose the correct column
print(data.columns)

# Replace 'label_column' with the actual column name for labels
label_column = 'diagnosis'  # Example: 'diagnosis' for benign/malignant
```

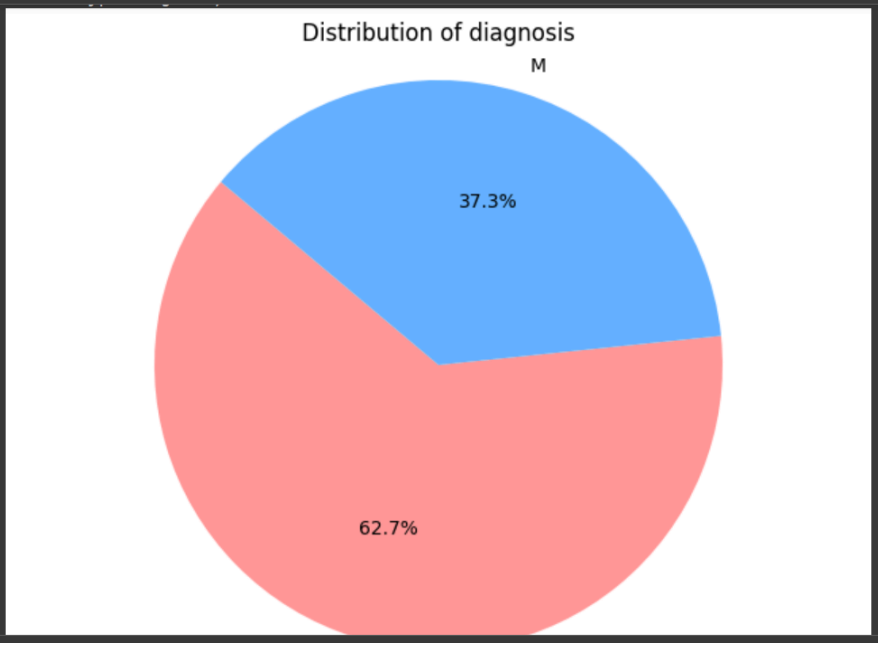
+ Code + Text

```
[13] # Count the occurrences of each class
     label_counts = data[label_column].value_counts()

     # Create a pie chart
     plt.figure(figsize=(8, 6))
     plt.pie(label_counts, labels=label_counts.index, autopct='%1.1f%%', startangle=140, colors=['#ff9999','#66b3ff'])
     plt.title(f'Distribution of {label_column}')

     # Show the plot
     plt.axis('equal')  # Equal aspect ratio ensures that pie chart is circular
     plt.show()
```

```
Index(['id', 'diagnosis', 'radius_mean', 'texture_mean', 'perimeter_mean',
       'area_mean', 'smoothness_mean', 'compactness_mean', 'concavity_mean',
       'concave points_mean', 'symmetry_mean', 'fractal_dimension_mean',
       'radius_se', 'texture_se', 'perimeter_se', 'area_se', 'smoothness_se',
       'compactness_se', 'concavity_se', 'concave points_se', 'symmetry_se',
       'fractal_dimension_se', 'radius_worst', 'texture_worst',
       'perimeter_worst', 'area_worst', 'smoothness_worst',
       'compactness_worst', 'concavity_worst', 'concave points_worst',
       'symmetry_worst', 'fractal_dimension_worst', 'Unnamed: 32'],
      dtype='object')
```

+ Code + Text

[13]



GITHUB REPO LINK:- https://github.com/niharika0912/BDA.git