

```
In [1]: !pip install tensorflow

Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: tensorflow in c:\users\vasu\appdata\roaming\python\python39\site-packages (2.13.0)
Requirement already satisfied: tensorflow-intel==2.13.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow) (2.13.0)
Requirement already satisfied: packaging in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (21.3)
Requirement already satisfied: keras<2.14,>=2.13.1 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (2.13.1)
Requirement already satisfied: opt-einsum==2.3.2 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (3.3.0)
Requirement already satisfied: numpy<2.0.0,>=1.21.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (1.24.3)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (1.57.0)
Requirement already satisfied: termcolor==1.1.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (2.3.0)
Requirement already satisfied: typing_extensions<4.6.0,>=3.6.8 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (4.2.0)
Requirement already satisfied: tensorflow-io-gcs-filesystem==0.23.1 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (0.3.1)
Requirement already satisfied: protobuf==4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<5.0.0dev,>=3.20.3 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (4.21.1)
Requirement already satisfied: h5py==2.9.0 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (3.7.0)
Requirement already satisfied: six==1.12.0 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (1.16.0)
Requirement already satisfied: packaging in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (21.3)
Requirement already satisfied: flatbuffers==23.1.21 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (23.5.26)
Requirement already satisfied: wrapt==1.11.0 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (1.14.1)
Requirement already satisfied: libclang==13.0.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (16.0.6)
Requirement already satisfied: astunparse==1.6.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (1.6.3)
Requirement already satisfied: tensorflow-estimator<2.14,>=2.13.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (2.13.0)
Requirement already satisfied: tensorboard<2.14,>=2.13 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (2.13.0)
Requirement already satisfied: setuptools in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (63.4.1)
Requirement already satisfied: absl-py==1.0.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorflow-intel==2.13.0->tensorflow) (1.4.0)
Requirement already satisfied: typing_extensions<4.6.0,>=3.6.8 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (4.2.0)
Requirement already satisfied: wheel<1.0,>=0.23.0 in c:\programdata\anaconda3\lib\site-packages (from astunparse==1.6.0->tensorflow-intel==2.13.0->tensorflow) (0.37.1)
Requirement already satisfied: google-auth-oauthlib<1.1,>=0.5 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from google-auth3,>=1.6.3->tensorflow-intel==2.13.0->tensorflow) (1.0.3)
Requirement already satisfied: tensorboard-server<8.0,>=8.0,!=7.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (0.7.1)
Requirement already satisfied: markdown==2.6.8 in c:\programdata\anaconda3\lib\site-packages (from tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (3.3.4)
Requirement already satisfied: requests==2.21.0 in c:\programdata\anaconda3\lib\site-packages (from tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (2.28.1)
Requirement already satisfied: google-auth3,>=1.6.3 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (2.22.0)
Requirement already satisfied: werkzeug==1.0.1 in c:\programdata\anaconda3\lib\site-packages (from tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (2.0.3)
Requirement already satisfied: pyrsn==3.0.5,>=2.0.2 in c:\programdata\anaconda3\lib\site-packages (from packaging->tensorflow-intel==2.13.0->tensorflow) (3.0.9)
Requirement already satisfied: typing_extensions<4.6.0,>=3.6.8 in c:\programdata\anaconda3\lib\site-packages (from google-auth3,>=1.6.3->tensorflow-intel==2.13.0->tensorflow) (4.2.0)
Requirement already satisfied: pyasn1-modules==0.2.1 in c:\programdata\anaconda3\lib\site-packages (from google-auth3,>=1.6.3->tensorflow-intel==2.13.0->tensorflow) (0.2.8)
Requirement already satisfied: pyasn1==0.5.0,>=0.4.6 in c:\programdata\anaconda3\lib\site-packages (from pyasn1-modules==0.2.1->tensorflow-intel==2.13.0->tensorflow) (0.4.8)
Requirement already satisfied: urllib3<2.0,>=1.24.3 in c:\programdata\anaconda3\lib\site-packages (from google-auth3,>=1.6.3->tensorflow-intel==2.13.0->tensorflow) (1.31.1)
Requirement already satisfied: requests-oauthlib==0.7.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from google-auth-oauthlib<1.1,>=0.5->tensorflow-intel==2.13.0->tensorflow) (1.3.1)
Requirement already satisfied: idna<4,>=2.5 in c:\programdata\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensorflow-intel==2.13.0->tensorflow) (3.3.1)
Requirement already satisfied: charset-normalizer<3,>=2 in c:\programdata\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensorflow-intel==2.13.0->tensorflow) (2.0.4)
Requirement already satisfied: certifi>=2017.4.17 in c:\programdata\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensorflow-intel==2.13.0->tensorflow) (2022.9.14)
Requirement already satisfied: pyasn1==0.5.0,>=0.4.6 in c:\programdata\anaconda3\lib\site-packages (from pyasn1-modules==0.2.1->tensorflow-intel==2.13.0->tensorflow) (0.4.8)
Requirement already satisfied: requests-oauthlib==0.7.0 in c:\users\vasu\appdata\roaming\python\python39\site-packages (from google-auth3,>=1.6.3->tensorflow-intel==2.13.0->tensorflow) (1.3.1)
Requirement already satisfied: idna<4,>=2.5 in c:\programdata\anaconda3\lib\site-packages (from requests-oauthlib==0.7.0->tensorflow-intel==2.13.0->tensorflow) (3.3.2)

In [2]: import tensorflow as tf
import pandas as pd

In [3]: loan = pd.read_csv('C:\Users\VASU\Downloads\personal_loan_updated.csv')

In [4]: loan

Out[4]:
```

	ID	Age	Experience	Income	ZIP Code	Family	CCAvg	Education	Mortgage	Personal Loan	Securities Account	CD Account	Online	CreditCard
0	1	25	1	49	91107	4	1.6	1	0	0	1	0	0	0
1	2	45	19	34	90089	3	1.5	1	0	0	1	0	0	0
2	3	39	15	11	94720	1	1.0	1	0	0	0	0	0	0
3	4	35	9	100	94112	1	2.7	2	0	0	0	0	0	0
4	5	35	8	45	91330	4	1.0	2	0	0	0	0	0	1
...
4995	4996	29	3	40	92097	1	1.9	3	0	0	0	0	1	0
4996	4997	30	4	15	92037	4	0.4	1	85	0	0	0	1	0
4997	4998	63	39	24	93023	2	0.3	3	0	0	0	0	0	0
4998	4999	65	40	49	90034	3	0.5	2	0	0	0	0	1	0
4999	5000	28	4	83	92612	3	0.8	1	0	0	0	0	1	1

5000 rows × 14 columns

```
In [5]: loan.isnull().sum()

Out[5]:
ID                0
Age                0
Experience         0
Income            0
ZIP Code          0
Family            0
CCAvg             0
Education         0
Mortgage          0
Personal Loan     0
Securities Account 0
CD Account        0
Online            0
CreditCard       0
dtype: int64
```

```
In [8]: loan.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5000 entries, 0 to 4999
Data columns (total 14 columns):
 #   Column                Non-Null Count  Dtype
---  ---
 0   ID                    5000 non-null    int64
 1   Age                  5000 non-null    int64
 2   Experience            5000 non-null    int64
 3   Income               5000 non-null    int64
 4   ZIP Code             5000 non-null    int64
 5   Family               5000 non-null    int64
 6   CCAvg                5000 non-null    float64
 7   Education            5000 non-null    int64
 8   Mortgage             5000 non-null    int64
 9   Personal Loan        5000 non-null    int64
10   Securities Account    5000 non-null    int64
11   CD Account           5000 non-null    int64
12   Online               5000 non-null    int64
13  CreditCard           5000 non-null    int64
dtypes: float64(1), int64(13)
memory usage: 547.0 KB
```

```
In [9]: loan_final = loan.drop(columns=['ID','ZIP Code'])

In [10]: loan_final
```

	Age	Experience	Income	Family	CCAvg	Education	Mortgage	Personal Loan	Securities Account	CD Account	Online	CreditCard
0	25	1	49	4	1.6	1	0	0	1	0	0	0
1	45	19	34	3	1.5	1	0	0	1	0	0	0
2	39	15	11	1	1.0	1	0	0	0	0	0	0
3	35	9	100	1	2.7	2	0	0	0	0	0	0
4	35	8	45	4	1.0	2	0	0	0	0	0	1
...
4995	29	3	40	1	1.9	3	0	0	0	0	1	0
4996	30	4	15	4	0.4	1	85	0	0	0	1	0
4997	63	39	24	2	0.3	3	0	0	0	0	0	0
4998	65	40	49	3	0.5	2	0	0	0	0	1	0
4999	28	4	83	3	0.8	1	0	0	0	0	1	1

5000 rows × 12 columns

```
In [11]: # Identifying target variable and inputs
y = loan_final[['Personal Loan']]
x = loan_final.drop(columns=['Personal Loan'])

In [12]: y
```

	Personal Loan
0	0
1	0
2	0
3	0
4	0
...	...
4995	0
4996	0
4997	0
4998	0
4999	0

5000 rows × 1 columns

```
In [13]: x

Out[13]:
```

	Age	Experience	Income	Family	CCAvg	Education	Mortgage	Securities Account	CD Account	Online	CreditCard
0	25	1	49	4	1.6	1	0	1	0	0	0
1	45	19	34	3	1.5	1	0	1	0	0	0
2	39	15	11	1	1.0	1	0	0	0	0	0
3	35	9	100	1	2.7	2	0	0	0	0	0
4	35	8	45	4	1.0	2	0	0	0	0	1
...
4995	29	3	40	1	1.9	3	0	0	0	1	0
4996	30	4	15	4	0.4	1	85	0	0	1	0
4997	63	39	24	2	0.3	3	0	0	0	0	0
4998	65	40	49	3	0.5	2	0	0	0	1	0
4999	28	4	83	3	0.8	1	0	0	0	1	1

5000 rows × 11 columns

```
In [15]: loan.shape

Out[15]: (5000, 14)
```

```
In [16]: loan_final.shape

Out[16]: (5000, 12)
```

```
In [14]: from sklearn.model_selection import train_test_split

In [ ]: x_train,x_test,y_train,y_test= train_test_split(x,y,test_size=0.2,random_state=999)
```

```
In [22]: len(x_train),len(x_test),len(y_train),len(y_test)

Out[22]: (4000, 1000, 4000, 1000)
```

step 1. iniatihsing the model and creating output from it

```
In [19]: ann= tf.keras.models.Sequential()
```

step 2. creating first hidden layer

```
In [20]: ann.add(tf.keras.layers.Dense(units=6,activation='relu'))
```

step 3. creating second hidden layer

```
In [21]: ann.add(tf.keras.layers.Dense(units=6,activation='relu'))
```

step 4. creating the ouyput layer

```
In [23]: ann.add(tf.keras.layers.Dense(units=1,activation='sigmoid'))
```

step 5 compiling the model

```
In [24]: ann.compile(optimizer='adam', loss='binary_crossentropy', metrics='accuracy')
```

step 6 fitting the data

```
In [25]: model=ann.fit(x_train,y_train,validation_split=0.2,batch_size=32,epochs=100)

Epoch 1/100
100/100 [=====] - 3s 10ms/step - loss: 11.6670 - accuracy: 0.4356 - val_loss: 0.6110 - val_accuracy: 0.8500
Epoch 2/100
100/100 [=====] - 0s 5ms/step - loss: 0.4427 - accuracy: 0.8800 - val_loss: 0.4489 - val_accuracy: 0.8425
Epoch 3/100
100/100 [=====] - 1s 6ms/step - loss: 0.3560 - accuracy: 0.8791 - val_loss: 0.3769 - val_accuracy: 0.8562
Epoch 4/100
100/100 [=====] - 1s 5ms/step - loss: 0.3153 - accuracy: 0.8888 - val_loss: 0.3550 - val_accuracy: 0.8575
Epoch 5/100
100/100 [=====] - 0s 5ms/step - loss: 0.3066 - accuracy: 0.8884 - val_loss: 0.3280 - val_accuracy: 0.8737
Epoch 6/100
100/100 [=====] - 0s 5ms/step - loss: 0.2869 - accuracy: 0.8934 - val_loss: 0.3768 - val_accuracy: 0.8537
Epoch 7/100
100/100 [=====] - 0s 5ms/step - loss: 0.2738 - accuracy: 0.8966 - val_loss: 0.3285 - val_accuracy: 0.8775
Epoch 8/100
100/100 [=====] - 0s 5ms/step - loss: 0.2675 - accuracy: 0.9044 - val_loss: 0.2914 - val_accuracy: 0.8788
Epoch 9/100
100/100 [=====] - 0s 4ms/step - loss: 0.2557 - accuracy: 0.9034 - val_loss: 0.2701 - val_accuracy: 0.8888
Epoch 10/100
100/100 [=====] - 0s 4ms/step - loss: 0.2436 - accuracy: 0.9034 - val_loss: 0.2633 - val_accuracy: 0.8913
Epoch 11/100
100/100 [=====] - 0s 5ms/step - loss: 0.2342 - accuracy: 0.9069 - val_loss: 0.2948 - val_accuracy: 0.8888
Epoch 12/100
100/100 [=====] - 0s 5ms/step - loss: 0.2326 - accuracy: 0.9081 - val_loss: 0.2626 - val_accuracy: 0.8913
Epoch 13/100
100/100 [=====] - 0s 5ms/step - loss: 0.2260 - accuracy: 0.9087 - val_loss: 0.2495 - val_accuracy: 0.8888
Epoch 14/100
100/100 [=====] - 0s 4ms/step - loss: 0.2231 - accuracy: 0.9100 - val_loss: 0.2493 - val_accuracy: 0.8913
Epoch 15/100
100/100 [=====] - 0s 5ms/step - loss: 0.2205 - accuracy: 0.9084 - val_loss: 0.2396 - val_accuracy: 0.8888
Epoch 16/100
100/100 [=====] - 0s 5ms/step - loss: 0.2173 - accuracy: 0.9069 - val_loss: 0.2277 - val_accuracy: 0.8950
Epoch 17/100
100/100 [=====] - 0s 5ms/step - loss: 0.2042 - accuracy: 0.9144 - val_loss: 0.2172 - val_accuracy: 0.8963
Epoch 18/100
100/100 [=====] - 0s 5ms/step - loss: 0.2065 - accuracy: 0.9116 - val_loss: 0.2221 - val_accuracy: 0.8963
Epoch 19/100
100/100 [=====] - 0s 5ms/step - loss: 0.2015 - accuracy: 0.9106 - val_loss: 0.2082 - val_accuracy: 0.9013
Epoch 20/100
100/100 [=====] - 0s 5ms/step - loss: 0.2078 - accuracy: 0.9106 - val_loss: 0.2189 - val_accuracy: 0.8925
Epoch 21/100
100/100 [=====] - 0s 5ms/step - loss: 0.2049 - accuracy: 0.9125 - val_loss: 0.2120 - val_accuracy: 0.8959
Epoch 22/100
100/100 [=====] - 0s 4ms/step - loss: 0.1960 - accuracy: 0.9141 - val_loss: 0.2191 - val_accuracy: 0.8988
Epoch 23/100
100/100 [=====] - 0s 4ms/step - loss: 0.1967 - accuracy: 0.9178 - val_loss: 0.2070 - val_accuracy: 0.8988
Epoch 24/100
100/100 [=====] - 0s 5ms/step - loss: 0.1929 - accuracy: 0.9166 - val_loss: 0.1582 - val_accuracy: 0.9087
Epoch 25/100
100/100 [=====] - 0s 4ms/step - loss: 0.1874 - accuracy: 0.9203 - val_loss: 0.1936 - val_accuracy: 0.9050
Epoch 26/100
100/100 [=====] - 0s 4ms/step - loss: 0.1878 - accuracy: 0.9181 - val_loss: 0.2057 - val_accuracy: 0.8963
Epoch 27/100
100/100 [=====] - 0s 4ms/step - loss: 0.1895 - accuracy: 0.9216 - val_loss: 0.1920 - val_accuracy: 0.9125
Epoch 28/100
100/100 [=====] - 0s 5ms/step - loss: 0.1854 - accuracy: 0.9156 - val_loss: 0.2010 - val_accuracy: 0.8975
Epoch 29/100
100/100 [=====] - 0s 4ms/step - loss: 0.1822 - accuracy: 0.9222 - val_loss: 0.1811 - val_accuracy: 0.9212
Epoch 30/100
100/100 [=====] - 1s 5ms/step - loss: 0.1827 - accuracy: 0.9191 - val_loss: 0.1848 - val_accuracy: 0.9162
Epoch 31/100
100/100 [=====] - 0s 4ms/step - loss: 0.1769 - accuracy: 0.9219 - val_loss: 0.1876 - val_accuracy: 0.9125
Epoch 32/100
100/100 [=====] - 0s 4ms/step - loss: 0.1784 - accuracy: 0.9203 - val_loss: 0.1832 - val_accuracy: 0.9250
Epoch 33/100
100/100 [=====] - 0s 4ms/step - loss: 0.1756 - accuracy: 0.9244 - val_loss: 0.2090 - val_accuracy: 0.9000
Epoch 34/100
100/100 [=====] - 0s 4ms/step - loss: 0.1741 - accuracy: 0.9244 - val_loss: 0.1697 - val_accuracy: 0.9137
Epoch 35/100
100/100 [=====] - 0s 4ms/step - loss: 0.1737 - accuracy: 0.9244 - val_loss: 0.1839 - val_accuracy: 0.9250
Epoch 36/100
100/100 [=====] - 0s 4ms/step - loss: 0.1761 - accuracy: 0.9272 - val_loss: 0.1887 - val_accuracy: 0.9087
Epoch 37/100
100/100 [=====] - 0s 4ms/step - loss: 0.1744 - accuracy: 0.9291 - val_loss: 0.1761 - val_accuracy: 0.9237
Epoch 38/100
100/100 [=====] - 0s 4ms/step - loss: 0.1808 - accuracy: 0.9206 - val_loss: 0.2450 - val_accuracy: 0.8913
Epoch 39/100
100/100 [=====] - 0s 4ms/step - loss: 0.1762 - accuracy: 0.9281 - val_loss: 0.1697 - val_accuracy: 0.9137
Epoch 40/100
100/100 [=====] - 0s 4ms/step - loss: 0.1736 - accuracy: 0.9247 - val_loss: 0.1703 - val_accuracy: 0.9225
Epoch 41/100
100/100 [=====] - 0s 4ms/step - loss: 0.1762 - accuracy: 0.9278 - val_loss: 0.2145 - val_accuracy: 0.9137
Epoch 42/100
100/100 [=====] - 0s 3ms/step - loss: 0.1710 - accuracy: 0.9259 - val_loss: 0.1723 - val_accuracy: 0.9275
Epoch 43/100
100/100 [=====] - 0s 4ms/step - loss: 0.1704 - accuracy: 0.9306 - val_loss: 0.1662 - val_accuracy: 0.9212
Epoch 44/100
100/100 [=====] - 0s 4ms/step - loss: 0.1831 - accuracy: 0.9284 - val_loss: 0.1562 - val_accuracy: 0.9100
Epoch 45/100
100/100 [=====] - 0s 4ms/step - loss: 0.1680 - accuracy: 0.9281 - val_loss: 0.1675 - val_accuracy: 0.9162
Epoch 46/100
100/100 [=====] - 0s 4ms/step - loss: 0.1647 - accuracy: 0.9309 - val_loss: 0.1621 - val_accuracy: 0.9217
Epoch 47/100
100/100 [=====] - 0s 4ms/step - loss: 0.1647 - accuracy: 0.9337 - val_loss: 0.1758 - val_accuracy: 0.9135
Epoch 48/100
100/100 [=====] - 0s 4ms/step - loss: 0.1664 - accuracy: 0.9322 - val_loss: 0.1801 - val_accuracy: 0.9212
Epoch 49/100
100/100 [=====] - 0s 4ms/step - loss: 0.1641 - accuracy: 0.9344 - val_loss: 0.1681 - val_accuracy: 0.9250
Epoch 50/100
100/100 [=====] - 0s 4ms/step - loss: 0.1587 - accuracy: 0.9350 - val_loss: 0.1872 - val_accuracy: 0.9162
Epoch 51/100
100/100 [=====] - 0s 4ms/step - loss: 0.1620 - accuracy: 0.9325 - val_loss: 0.1880 - val_accuracy: 0.9175
Epoch 52/100
100/100 [=====] - 0s 4ms/step - loss: 0.1613 - accuracy: 0.9334 - val_loss: 0.1578 - val_accuracy: 0.9250
Epoch 53/100
100/100 [=====] - 0s 4ms/step - loss: 0.1665 - accuracy: 0.9325 - val_loss: 0.1740 - val_accuracy: 0.9162
Epoch 54/100
100/100 [=====] - 0s 4ms/step - loss: 0.1619 - accuracy: 0.9325 - val_loss: 0.1650 - val_accuracy: 0.9250
Epoch 55/100
100/100 [=====] - 0s 4ms/step - loss: 0.1586 - accuracy: 0.9375 - val_loss: 0.1660 - val_accuracy: 0.9212
Epoch 56/100
100/100 [=====] - 0s 4ms/step - loss: 0.1599 - accuracy: 0.9334 - val_loss: 0.1593 - val_accuracy: 0.9287
Epoch 57/100
100/100 [=====] - 0s 4ms/step - loss: 0.1597 - accuracy: 0.9344 - val_loss: 0.1560 - val_accuracy: 0.9287
Epoch 58/100
100/100 [=====] - 0s 4ms/step - loss: 0.1628 - accuracy: 0.9312 - val_loss: 0.1628 - val_accuracy: 0.9337
Epoch 59/100
100/100 [=====] - 0s 4ms/step - loss: 0.1605 - accuracy: 0.9348 - val_loss: 0.1683 - val_accuracy: 0.9225
Epoch 60/100
100/100 [=====] - 0s 4ms/step - loss: 0.1542 - accuracy: 0.9387 - val_loss: 0.1613 - val_accuracy: 0.9287
Epoch 61/100
100/
```