24MDT0184_24_july

July 26, 2025

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Course Name:	Deep Learning Lab
Course Code:	PMDS603P
Experiment:	2
Date:	24 July,2025

0.1 Question1. Today, we will try to recall the logistic regression model that you have seen in your Machine learning Course. With the given dataset 'liver patient.csv' we will first fit a logistic regression model. Then we can see how a deep learning model framework can be used to create a model that does the same job.

0.1.1 importing the necessary libraries

```
[1]: import numpy as np
     import pandas as pd
     from sklearn.preprocessing import MinMaxScaler
     from sklearn.model_selection import train_test_split
     from sklearn.metrics import accuracy_score
     from sklearn.linear_model import LogisticRegression
```

0.1.2 Loading the dataset

```
[2]: df = pd.read_csv("liver_patient.csv")
     df
```

```
[2]:      Age  Gender  Total_Bilirubin  Direct_Bilirubin  Alkaline_Phosphotase  \
     0     65  Female              0.7               0.1                   187
     1     62    Male             10.9               5.5                   699
     2     62    Male              7.3               4.1                   490
     3     58    Male              1.0               0.4                   182
     4     72    Male              3.9               2.0                   195
     ..   ...     ...              ...               ...                   ...
     578   60    Male              0.5               0.1                   500
     579   40    Male              0.6               0.1                    98
     580   52    Male              0.8               0.2                   245
```

```
581   31    Male              1.3            0.5                    184
582   38    Male              1.0            0.3                    216

       Alamine_Aminotransferase  Aspartate_Aminotransferase  Total_Protiens  \
0                            16                          18             6.8
1                            64                         100             7.5
2                            60                          68             7.0
3                            14                          20             6.8
4                            27                          59             7.3
..                          ...                         ...             ...
578                          20                          34             5.9
579                          35                          31             6.0
580                          48                          49             6.4
581                          29                          32             6.8
582                          21                          24             7.3

     Albumin  Albumin_and_Globulin_Ratio  liver_disease
0        3.3                        0.90              1
1        3.2                        0.74              1
2        3.3                        0.89              1
3        3.4                        1.00              1
4        2.4                        0.40              1
..       ...                         ...            ...
578      1.6                        0.37              0
579      3.2                        1.10              1
580      3.2                        1.00              1
581      3.4                        1.00              1
582      4.4                        1.50              0

[583 rows x 11 columns]
```

0.1.3 Dropping the unnecessary gender column

```
[3]: df.drop('Gender', axis = 1 , inplace = True)
```

0.1.4 Min max scaling

```
[4]: MM = MinMaxScaler()
     X = MM.fit_transform(df)
```

0.1.5 Splitting data intro train test split

```
[5]: x = X[:,:9]
     y = X[:,9]
     x_train,x_test,y_train,y_test = train_test_split(x,y, test_size=0.2,␣
       ↪random_state=1)
```

```
[6]: logistic_model = LogisticRegression()
     logistic_model.fit(x_train,y_train)
     y_pred = logistic_model.predict(x_test)
     print(f"Accuracy score:{accuracy_score(y_test,y_pred)*100:.2f}%")
```

Accuracy score:71.79%

0.1.6 Using Keras

```
[7]: import keras
     from keras.models import Sequential
     from keras.layers import Dense
     import warnings
     warnings.filterwarnings('ignore')
```

```
[8]: model = Sequential()
     model.add(Dense(1,activation = 'sigmoid', input_shape = (9,)))
     model.summary()
```

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 1)	10

Total params: 10 (40.00 B)

Trainable params: 10 (40.00 B)

Non-trainable params: 0 (0.00 B)

```
[9]: from keras.optimizers import SGD
     model.compile(loss = 'BinaryCrossentropy', optimizer='SGD',␣
       ↪metrics=['accuracy'])
     history = model.fit(x_train, y_train, batch_size=50, epochs=500,
                         verbose=1, validation_data=(x_test, y_test))
```

```
Epoch 1/500
10/10              1s 42ms/step -
accuracy: 0.6387 - loss: 0.6703 - val_accuracy: 0.6581 - val_loss: 0.6687
Epoch 2/500
10/10              0s 12ms/step -
accuracy: 0.6612 - loss: 0.6656 - val_accuracy: 0.6581 - val_loss: 0.6642
Epoch 3/500
```

```
10/10                0s 17ms/step -
accuracy: 0.6856 - loss: 0.6574 - val_accuracy: 0.6667 - val_loss: 0.6598
Epoch 4/500
10/10                0s 12ms/step -
accuracy: 0.6808 - loss: 0.6591 - val_accuracy: 0.6923 - val_loss: 0.6561
Epoch 5/500
10/10                0s 13ms/step -
accuracy: 0.7128 - loss: 0.6479 - val_accuracy: 0.6923 - val_loss: 0.6526
Epoch 6/500
10/10                0s 15ms/step -
accuracy: 0.6923 - loss: 0.6493 - val_accuracy: 0.6923 - val_loss: 0.6494
Epoch 7/500
10/10                0s 15ms/step -
accuracy: 0.7065 - loss: 0.6447 - val_accuracy: 0.6923 - val_loss: 0.6466
Epoch 8/500
10/10                0s 18ms/step -
accuracy: 0.7114 - loss: 0.6460 - val_accuracy: 0.6923 - val_loss: 0.6442
Epoch 9/500
10/10                0s 17ms/step -
accuracy: 0.6873 - loss: 0.6485 - val_accuracy: 0.7009 - val_loss: 0.6416
Epoch 10/500
10/10                0s 18ms/step -
accuracy: 0.6962 - loss: 0.6418 - val_accuracy: 0.7094 - val_loss: 0.6393
Epoch 11/500
10/10                0s 17ms/step -
accuracy: 0.7209 - loss: 0.6259 - val_accuracy: 0.7094 - val_loss: 0.6374
Epoch 12/500
10/10                0s 19ms/step -
accuracy: 0.7176 - loss: 0.6283 - val_accuracy: 0.7094 - val_loss: 0.6354
Epoch 13/500
10/10                0s 20ms/step -
accuracy: 0.7160 - loss: 0.6244 - val_accuracy: 0.7094 - val_loss: 0.6338
Epoch 14/500
10/10                0s 21ms/step -
accuracy: 0.7068 - loss: 0.6334 - val_accuracy: 0.7094 - val_loss: 0.6322
Epoch 15/500
10/10                0s 23ms/step -
accuracy: 0.6980 - loss: 0.6310 - val_accuracy: 0.7094 - val_loss: 0.6308
Epoch 16/500
10/10                0s 23ms/step -
accuracy: 0.7122 - loss: 0.6251 - val_accuracy: 0.7094 - val_loss: 0.6295
Epoch 17/500
10/10                0s 22ms/step -
accuracy: 0.7117 - loss: 0.6303 - val_accuracy: 0.7094 - val_loss: 0.6281
Epoch 18/500
10/10                0s 21ms/step -
accuracy: 0.7135 - loss: 0.6256 - val_accuracy: 0.7094 - val_loss: 0.6269
Epoch 19/500
```

```
10/10              0s 22ms/step -
accuracy: 0.7089 - loss: 0.6209 - val_accuracy: 0.7094 - val_loss: 0.6258
Epoch 20/500
10/10              0s 23ms/step -
accuracy: 0.7127 - loss: 0.6206 - val_accuracy: 0.7094 - val_loss: 0.6248
Epoch 21/500
10/10              0s 22ms/step -
accuracy: 0.7248 - loss: 0.6127 - val_accuracy: 0.7094 - val_loss: 0.6237
Epoch 22/500
10/10              0s 16ms/step -
accuracy: 0.7099 - loss: 0.6197 - val_accuracy: 0.7094 - val_loss: 0.6228
Epoch 23/500
10/10              0s 17ms/step -
accuracy: 0.6952 - loss: 0.6268 - val_accuracy: 0.7094 - val_loss: 0.6220
Epoch 24/500
10/10              0s 20ms/step -
accuracy: 0.7129 - loss: 0.6180 - val_accuracy: 0.7094 - val_loss: 0.6212
Epoch 25/500
10/10              0s 22ms/step -
accuracy: 0.6836 - loss: 0.6400 - val_accuracy: 0.7094 - val_loss: 0.6205
Epoch 26/500
10/10              0s 21ms/step -
accuracy: 0.7307 - loss: 0.6033 - val_accuracy: 0.7094 - val_loss: 0.6198
Epoch 27/500
10/10              0s 20ms/step -
accuracy: 0.7167 - loss: 0.6149 - val_accuracy: 0.7094 - val_loss: 0.6192
Epoch 28/500
10/10              0s 24ms/step -
accuracy: 0.7198 - loss: 0.6098 - val_accuracy: 0.7094 - val_loss: 0.6187
Epoch 29/500
10/10              0s 23ms/step -
accuracy: 0.7117 - loss: 0.6171 - val_accuracy: 0.7094 - val_loss: 0.6183
Epoch 30/500
10/10              0s 21ms/step -
accuracy: 0.7391 - loss: 0.5940 - val_accuracy: 0.7094 - val_loss: 0.6178
Epoch 31/500
10/10              0s 22ms/step -
accuracy: 0.7093 - loss: 0.6194 - val_accuracy: 0.7094 - val_loss: 0.6173
Epoch 32/500
10/10              0s 23ms/step -
accuracy: 0.7215 - loss: 0.6049 - val_accuracy: 0.7094 - val_loss: 0.6168
Epoch 33/500
10/10              0s 22ms/step -
accuracy: 0.7371 - loss: 0.5937 - val_accuracy: 0.7094 - val_loss: 0.6165
Epoch 34/500
10/10              0s 26ms/step -
accuracy: 0.7260 - loss: 0.6003 - val_accuracy: 0.7094 - val_loss: 0.6161
Epoch 35/500
```

```
10/10              0s 22ms/step -
accuracy: 0.6966 - loss: 0.6255 - val_accuracy: 0.7094 - val_loss: 0.6157
Epoch 36/500
10/10              0s 25ms/step -
accuracy: 0.7550 - loss: 0.5806 - val_accuracy: 0.7094 - val_loss: 0.6154
Epoch 37/500
10/10              0s 24ms/step -
accuracy: 0.7296 - loss: 0.5958 - val_accuracy: 0.7094 - val_loss: 0.6150
Epoch 38/500
10/10              0s 24ms/step -
accuracy: 0.7162 - loss: 0.6105 - val_accuracy: 0.7094 - val_loss: 0.6147
Epoch 39/500
10/10              0s 22ms/step -
accuracy: 0.7313 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.6145
Epoch 40/500
10/10              0s 22ms/step -
accuracy: 0.7356 - loss: 0.5917 - val_accuracy: 0.7094 - val_loss: 0.6142
Epoch 41/500
10/10              0s 20ms/step -
accuracy: 0.7309 - loss: 0.5972 - val_accuracy: 0.7094 - val_loss: 0.6139
Epoch 42/500
10/10              0s 21ms/step -
accuracy: 0.6877 - loss: 0.6293 - val_accuracy: 0.7094 - val_loss: 0.6137
Epoch 43/500
10/10              0s 22ms/step -
accuracy: 0.7080 - loss: 0.6134 - val_accuracy: 0.7094 - val_loss: 0.6134
Epoch 44/500
10/10              0s 23ms/step -
accuracy: 0.7384 - loss: 0.5875 - val_accuracy: 0.7094 - val_loss: 0.6132
Epoch 45/500
10/10              0s 19ms/step -
accuracy: 0.7286 - loss: 0.5971 - val_accuracy: 0.7094 - val_loss: 0.6130
Epoch 46/500
10/10              0s 23ms/step -
accuracy: 0.7224 - loss: 0.6016 - val_accuracy: 0.7094 - val_loss: 0.6127
Epoch 47/500
10/10              0s 23ms/step -
accuracy: 0.7229 - loss: 0.5979 - val_accuracy: 0.7094 - val_loss: 0.6126
Epoch 48/500
10/10              0s 23ms/step -
accuracy: 0.7165 - loss: 0.6016 - val_accuracy: 0.7094 - val_loss: 0.6123
Epoch 49/500
10/10              0s 24ms/step -
accuracy: 0.7067 - loss: 0.6118 - val_accuracy: 0.7094 - val_loss: 0.6122
Epoch 50/500
10/10              0s 21ms/step -
accuracy: 0.6947 - loss: 0.6185 - val_accuracy: 0.7094 - val_loss: 0.6119
Epoch 51/500
```

```
10/10              0s 22ms/step -
accuracy: 0.7115 - loss: 0.6098 - val_accuracy: 0.7094 - val_loss: 0.6118
Epoch 52/500
10/10              0s 20ms/step -
accuracy: 0.7027 - loss: 0.6188 - val_accuracy: 0.7094 - val_loss: 0.6116
Epoch 53/500
10/10              0s 21ms/step -
accuracy: 0.7071 - loss: 0.6126 - val_accuracy: 0.7094 - val_loss: 0.6114
Epoch 54/500
10/10              0s 23ms/step -
accuracy: 0.7298 - loss: 0.5913 - val_accuracy: 0.7094 - val_loss: 0.6113
Epoch 55/500
10/10              0s 22ms/step -
accuracy: 0.6893 - loss: 0.6245 - val_accuracy: 0.7094 - val_loss: 0.6111
Epoch 56/500
10/10              0s 21ms/step -
accuracy: 0.7387 - loss: 0.5840 - val_accuracy: 0.7094 - val_loss: 0.6109
Epoch 57/500
10/10              0s 23ms/step -
accuracy: 0.6817 - loss: 0.6347 - val_accuracy: 0.7094 - val_loss: 0.6108
Epoch 58/500
10/10              0s 24ms/step -
accuracy: 0.7302 - loss: 0.5941 - val_accuracy: 0.7094 - val_loss: 0.6106
Epoch 59/500
10/10              0s 21ms/step -
accuracy: 0.6941 - loss: 0.6195 - val_accuracy: 0.7094 - val_loss: 0.6105
Epoch 60/500
10/10              0s 20ms/step -
accuracy: 0.7440 - loss: 0.5773 - val_accuracy: 0.7094 - val_loss: 0.6103
Epoch 61/500
10/10              0s 22ms/step -
accuracy: 0.7069 - loss: 0.6117 - val_accuracy: 0.7094 - val_loss: 0.6102
Epoch 62/500
10/10              0s 25ms/step -
accuracy: 0.7272 - loss: 0.5963 - val_accuracy: 0.7094 - val_loss: 0.6101
Epoch 63/500
10/10              0s 18ms/step -
accuracy: 0.7245 - loss: 0.5951 - val_accuracy: 0.7094 - val_loss: 0.6100
Epoch 64/500
10/10              0s 22ms/step -
accuracy: 0.7150 - loss: 0.6034 - val_accuracy: 0.7094 - val_loss: 0.6098
Epoch 65/500
10/10              0s 21ms/step -
accuracy: 0.7182 - loss: 0.6012 - val_accuracy: 0.7094 - val_loss: 0.6097
Epoch 66/500
10/10              0s 22ms/step -
accuracy: 0.7304 - loss: 0.5880 - val_accuracy: 0.7094 - val_loss: 0.6096
Epoch 67/500
```

```
10/10               0s 20ms/step -
accuracy: 0.7165 - loss: 0.6027 - val_accuracy: 0.7094 - val_loss: 0.6095
Epoch 68/500
10/10               0s 21ms/step -
accuracy: 0.7141 - loss: 0.6040 - val_accuracy: 0.7094 - val_loss: 0.6094
Epoch 69/500
10/10               0s 23ms/step -
accuracy: 0.7051 - loss: 0.6099 - val_accuracy: 0.7094 - val_loss: 0.6093
Epoch 70/500
10/10               0s 30ms/step -
accuracy: 0.7102 - loss: 0.6062 - val_accuracy: 0.7094 - val_loss: 0.6091
Epoch 71/500
10/10               0s 21ms/step -
accuracy: 0.7248 - loss: 0.5947 - val_accuracy: 0.7094 - val_loss: 0.6090
Epoch 72/500
10/10               0s 22ms/step -
accuracy: 0.7242 - loss: 0.5950 - val_accuracy: 0.7094 - val_loss: 0.6089
Epoch 73/500
10/10               0s 23ms/step -
accuracy: 0.6831 - loss: 0.6305 - val_accuracy: 0.7094 - val_loss: 0.6088
Epoch 74/500
10/10               0s 23ms/step -
accuracy: 0.7113 - loss: 0.6069 - val_accuracy: 0.7094 - val_loss: 0.6087
Epoch 75/500
10/10               0s 21ms/step -
accuracy: 0.7130 - loss: 0.6023 - val_accuracy: 0.7094 - val_loss: 0.6086
Epoch 76/500
10/10               0s 26ms/step -
accuracy: 0.7184 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.6085
Epoch 77/500
10/10               0s 20ms/step -
accuracy: 0.7229 - loss: 0.5974 - val_accuracy: 0.7094 - val_loss: 0.6084
Epoch 78/500
10/10               0s 20ms/step -
accuracy: 0.7316 - loss: 0.5875 - val_accuracy: 0.7094 - val_loss: 0.6083
Epoch 79/500
10/10               0s 21ms/step -
accuracy: 0.7099 - loss: 0.6089 - val_accuracy: 0.7094 - val_loss: 0.6082
Epoch 80/500
10/10               0s 19ms/step -
accuracy: 0.7154 - loss: 0.6030 - val_accuracy: 0.7094 - val_loss: 0.6081
Epoch 81/500
10/10               0s 19ms/step -
accuracy: 0.7099 - loss: 0.6030 - val_accuracy: 0.7094 - val_loss: 0.6079
Epoch 82/500
10/10               0s 17ms/step -
accuracy: 0.7158 - loss: 0.5990 - val_accuracy: 0.7094 - val_loss: 0.6078
Epoch 83/500
```

```
10/10                0s 18ms/step -
accuracy: 0.7081 - loss: 0.6098 - val_accuracy: 0.7094 - val_loss: 0.6077
Epoch 84/500
10/10                0s 21ms/step -
accuracy: 0.7090 - loss: 0.6055 - val_accuracy: 0.7094 - val_loss: 0.6076
Epoch 85/500
10/10                0s 19ms/step -
accuracy: 0.6976 - loss: 0.6180 - val_accuracy: 0.7094 - val_loss: 0.6076
Epoch 86/500
10/10                0s 19ms/step -
accuracy: 0.7220 - loss: 0.5962 - val_accuracy: 0.7094 - val_loss: 0.6074
Epoch 87/500
10/10                0s 19ms/step -
accuracy: 0.7063 - loss: 0.6071 - val_accuracy: 0.7094 - val_loss: 0.6073
Epoch 88/500
10/10                0s 18ms/step -
accuracy: 0.7174 - loss: 0.5985 - val_accuracy: 0.7094 - val_loss: 0.6072
Epoch 89/500
10/10                0s 22ms/step -
accuracy: 0.7135 - loss: 0.6035 - val_accuracy: 0.7094 - val_loss: 0.6071
Epoch 90/500
10/10                0s 18ms/step -
accuracy: 0.7084 - loss: 0.6098 - val_accuracy: 0.7094 - val_loss: 0.6070
Epoch 91/500
10/10                0s 22ms/step -
accuracy: 0.7238 - loss: 0.5938 - val_accuracy: 0.7094 - val_loss: 0.6069
Epoch 92/500
10/10                0s 21ms/step -
accuracy: 0.7376 - loss: 0.5830 - val_accuracy: 0.7094 - val_loss: 0.6068
Epoch 93/500
10/10                0s 30ms/step -
accuracy: 0.6966 - loss: 0.6155 - val_accuracy: 0.7094 - val_loss: 0.6067
Epoch 94/500
10/10                0s 18ms/step -
accuracy: 0.7286 - loss: 0.5916 - val_accuracy: 0.7094 - val_loss: 0.6066
Epoch 95/500
10/10                0s 21ms/step -
accuracy: 0.7251 - loss: 0.5897 - val_accuracy: 0.7094 - val_loss: 0.6065
Epoch 96/500
10/10                0s 22ms/step -
accuracy: 0.7355 - loss: 0.5832 - val_accuracy: 0.7094 - val_loss: 0.6065
Epoch 97/500
10/10                0s 20ms/step -
accuracy: 0.6988 - loss: 0.6147 - val_accuracy: 0.7094 - val_loss: 0.6064
Epoch 98/500
10/10                0s 22ms/step -
accuracy: 0.6894 - loss: 0.6205 - val_accuracy: 0.7094 - val_loss: 0.6063
Epoch 99/500
```

```
10/10              0s 20ms/step -
accuracy: 0.7100 - loss: 0.6049 - val_accuracy: 0.7094 - val_loss: 0.6062
Epoch 100/500
10/10              0s 22ms/step -
accuracy: 0.7219 - loss: 0.5963 - val_accuracy: 0.7094 - val_loss: 0.6061
Epoch 101/500
10/10              0s 18ms/step -
accuracy: 0.7129 - loss: 0.6041 - val_accuracy: 0.7094 - val_loss: 0.6060
Epoch 102/500
10/10              0s 23ms/step -
accuracy: 0.7274 - loss: 0.5900 - val_accuracy: 0.7094 - val_loss: 0.6059
Epoch 103/500
10/10              0s 22ms/step -
accuracy: 0.7112 - loss: 0.6044 - val_accuracy: 0.7094 - val_loss: 0.6058
Epoch 104/500
10/10              0s 17ms/step -
accuracy: 0.7042 - loss: 0.6081 - val_accuracy: 0.7094 - val_loss: 0.6057
Epoch 105/500
10/10              0s 37ms/step -
accuracy: 0.7140 - loss: 0.6001 - val_accuracy: 0.7094 - val_loss: 0.6056
Epoch 106/500
10/10              0s 17ms/step -
accuracy: 0.7148 - loss: 0.5960 - val_accuracy: 0.7094 - val_loss: 0.6055
Epoch 107/500
10/10              0s 18ms/step -
accuracy: 0.7109 - loss: 0.6011 - val_accuracy: 0.7094 - val_loss: 0.6054
Epoch 108/500
10/10              0s 22ms/step -
accuracy: 0.6977 - loss: 0.6136 - val_accuracy: 0.7094 - val_loss: 0.6053
Epoch 109/500
10/10              0s 22ms/step -
accuracy: 0.7378 - loss: 0.5793 - val_accuracy: 0.7094 - val_loss: 0.6052
Epoch 110/500
10/10              0s 22ms/step -
accuracy: 0.7072 - loss: 0.6060 - val_accuracy: 0.7094 - val_loss: 0.6051
Epoch 111/500
10/10              0s 24ms/step -
accuracy: 0.7173 - loss: 0.5959 - val_accuracy: 0.7094 - val_loss: 0.6050
Epoch 112/500
10/10              0s 21ms/step -
accuracy: 0.7089 - loss: 0.6035 - val_accuracy: 0.7094 - val_loss: 0.6049
Epoch 113/500
10/10              0s 22ms/step -
accuracy: 0.7367 - loss: 0.5781 - val_accuracy: 0.7094 - val_loss: 0.6048
Epoch 114/500
10/10              0s 21ms/step -
accuracy: 0.7206 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.6047
Epoch 115/500
```

```
10/10              0s 23ms/step -
accuracy: 0.7326 - loss: 0.5778 - val_accuracy: 0.7094 - val_loss: 0.6047
Epoch 116/500
10/10              0s 22ms/step -
accuracy: 0.7166 - loss: 0.5967 - val_accuracy: 0.7094 - val_loss: 0.6046
Epoch 117/500
10/10              0s 25ms/step -
accuracy: 0.7145 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.6045
Epoch 118/500
10/10              0s 23ms/step -
accuracy: 0.7062 - loss: 0.6044 - val_accuracy: 0.7094 - val_loss: 0.6044
Epoch 119/500
10/10              0s 22ms/step -
accuracy: 0.6925 - loss: 0.6182 - val_accuracy: 0.7094 - val_loss: 0.6043
Epoch 120/500
10/10              0s 22ms/step -
accuracy: 0.7154 - loss: 0.5968 - val_accuracy: 0.7094 - val_loss: 0.6042
Epoch 121/500
10/10              0s 22ms/step -
accuracy: 0.7061 - loss: 0.6065 - val_accuracy: 0.7094 - val_loss: 0.6041
Epoch 122/500
10/10              0s 21ms/step -
accuracy: 0.7160 - loss: 0.5971 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 123/500
10/10              0s 21ms/step -
accuracy: 0.6826 - loss: 0.6251 - val_accuracy: 0.7094 - val_loss: 0.6039
Epoch 124/500
10/10              0s 21ms/step -
accuracy: 0.7213 - loss: 0.5945 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 125/500
10/10              0s 21ms/step -
accuracy: 0.6992 - loss: 0.6127 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 126/500
10/10              0s 21ms/step -
accuracy: 0.7243 - loss: 0.5897 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 127/500
10/10              0s 21ms/step -
accuracy: 0.7132 - loss: 0.5987 - val_accuracy: 0.7094 - val_loss: 0.6036
Epoch 128/500
10/10              0s 24ms/step -
accuracy: 0.7167 - loss: 0.5911 - val_accuracy: 0.7094 - val_loss: 0.6035
Epoch 129/500
10/10              0s 21ms/step -
accuracy: 0.7382 - loss: 0.5760 - val_accuracy: 0.7094 - val_loss: 0.6034
Epoch 130/500
10/10              0s 21ms/step -
accuracy: 0.7196 - loss: 0.5918 - val_accuracy: 0.7094 - val_loss: 0.6033
Epoch 131/500
```

```
10/10              0s 23ms/step -
accuracy: 0.6898 - loss: 0.6194 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 132/500
10/10              0s 21ms/step -
accuracy: 0.7308 - loss: 0.5842 - val_accuracy: 0.7094 - val_loss: 0.6031
Epoch 133/500
10/10              0s 22ms/step -
accuracy: 0.7110 - loss: 0.6005 - val_accuracy: 0.7094 - val_loss: 0.6030
Epoch 134/500
10/10              0s 20ms/step -
accuracy: 0.6829 - loss: 0.6225 - val_accuracy: 0.7094 - val_loss: 0.6029
Epoch 135/500
10/10              0s 22ms/step -
accuracy: 0.7116 - loss: 0.5994 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 136/500
10/10              0s 20ms/step -
accuracy: 0.7207 - loss: 0.5872 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 137/500
10/10              0s 34ms/step -
accuracy: 0.6953 - loss: 0.6128 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 138/500
10/10              0s 21ms/step -
accuracy: 0.7073 - loss: 0.6042 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 139/500
10/10              0s 21ms/step -
accuracy: 0.7068 - loss: 0.6027 - val_accuracy: 0.7094 - val_loss: 0.6025
Epoch 140/500
10/10              0s 33ms/step -
accuracy: 0.7124 - loss: 0.5962 - val_accuracy: 0.7094 - val_loss: 0.6024
Epoch 141/500
10/10              0s 19ms/step -
accuracy: 0.7249 - loss: 0.5862 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 142/500
10/10              0s 21ms/step -
accuracy: 0.7361 - loss: 0.5759 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 143/500
10/10              0s 20ms/step -
accuracy: 0.7059 - loss: 0.6009 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 144/500
10/10              0s 21ms/step -
accuracy: 0.7040 - loss: 0.6070 - val_accuracy: 0.7094 - val_loss: 0.6020
Epoch 145/500
10/10              0s 20ms/step -
accuracy: 0.7159 - loss: 0.5969 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 146/500
10/10              0s 20ms/step -
accuracy: 0.7035 - loss: 0.6061 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 147/500
```

```
10/10                0s 21ms/step -
accuracy: 0.7273 - loss: 0.5813 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 148/500
10/10                0s 21ms/step -
accuracy: 0.7165 - loss: 0.5965 - val_accuracy: 0.7094 - val_loss: 0.6017
Epoch 149/500
10/10                0s 19ms/step -
accuracy: 0.7365 - loss: 0.5759 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 150/500
10/10                0s 21ms/step -
accuracy: 0.7257 - loss: 0.5872 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 151/500
10/10                0s 21ms/step -
accuracy: 0.6857 - loss: 0.6214 - val_accuracy: 0.7094 - val_loss: 0.6014
Epoch 152/500
10/10                0s 21ms/step -
accuracy: 0.6912 - loss: 0.6169 - val_accuracy: 0.7094 - val_loss: 0.6013
Epoch 153/500
10/10                0s 18ms/step -
accuracy: 0.7221 - loss: 0.5891 - val_accuracy: 0.7094 - val_loss: 0.6013
Epoch 154/500
10/10                0s 20ms/step -
accuracy: 0.7466 - loss: 0.5668 - val_accuracy: 0.7094 - val_loss: 0.6012
Epoch 155/500
10/10                0s 22ms/step -
accuracy: 0.6959 - loss: 0.6107 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 156/500
10/10                0s 19ms/step -
accuracy: 0.7106 - loss: 0.5963 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 157/500
10/10                0s 19ms/step -
accuracy: 0.7032 - loss: 0.6060 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 158/500
10/10                0s 22ms/step -
accuracy: 0.7347 - loss: 0.5780 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 159/500
10/10                0s 24ms/step -
accuracy: 0.7169 - loss: 0.5919 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 160/500
10/10                0s 21ms/step -
accuracy: 0.7139 - loss: 0.5964 - val_accuracy: 0.7094 - val_loss: 0.6007
Epoch 161/500
10/10                0s 19ms/step -
accuracy: 0.7036 - loss: 0.6026 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 162/500
10/10                0s 21ms/step -
accuracy: 0.7044 - loss: 0.6053 - val_accuracy: 0.7094 - val_loss: 0.6005
Epoch 163/500
```

```
10/10              0s 23ms/step -
accuracy: 0.7310 - loss: 0.5769 - val_accuracy: 0.7094 - val_loss: 0.6004
Epoch 164/500
10/10              0s 21ms/step -
accuracy: 0.7260 - loss: 0.5821 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 165/500
10/10              0s 32ms/step -
accuracy: 0.7196 - loss: 0.5859 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 166/500
10/10              0s 19ms/step -
accuracy: 0.7141 - loss: 0.5940 - val_accuracy: 0.7094 - val_loss: 0.6002
Epoch 167/500
10/10              0s 16ms/step -
accuracy: 0.7042 - loss: 0.6016 - val_accuracy: 0.7094 - val_loss: 0.6001
Epoch 168/500
10/10              0s 16ms/step -
accuracy: 0.7237 - loss: 0.5863 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 169/500
10/10              0s 31ms/step -
accuracy: 0.7012 - loss: 0.6071 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 170/500
10/10              0s 18ms/step -
accuracy: 0.7100 - loss: 0.5962 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 171/500
10/10              0s 22ms/step -
accuracy: 0.7066 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 172/500
10/10              0s 23ms/step -
accuracy: 0.7251 - loss: 0.5856 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 173/500
10/10              0s 22ms/step -
accuracy: 0.7095 - loss: 0.5997 - val_accuracy: 0.7094 - val_loss: 0.5996
Epoch 174/500
10/10              0s 22ms/step -
accuracy: 0.7181 - loss: 0.5896 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 175/500
10/10              0s 21ms/step -
accuracy: 0.7088 - loss: 0.5994 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 176/500
10/10              0s 22ms/step -
accuracy: 0.7236 - loss: 0.5843 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 177/500
10/10              0s 25ms/step -
accuracy: 0.7345 - loss: 0.5732 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 178/500
10/10              0s 24ms/step -
accuracy: 0.7186 - loss: 0.5892 - val_accuracy: 0.7094 - val_loss: 0.5992
Epoch 179/500
```

```
10/10              0s 21ms/step -
accuracy: 0.7365 - loss: 0.5729 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 180/500
10/10              0s 22ms/step -
accuracy: 0.7054 - loss: 0.6008 - val_accuracy: 0.7094 - val_loss: 0.5990
Epoch 181/500
10/10              0s 22ms/step -
accuracy: 0.7124 - loss: 0.5910 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 182/500
10/10              0s 27ms/step -
accuracy: 0.7057 - loss: 0.5992 - val_accuracy: 0.7094 - val_loss: 0.5988
Epoch 183/500
10/10              0s 22ms/step -
accuracy: 0.7191 - loss: 0.5873 - val_accuracy: 0.7094 - val_loss: 0.5988
Epoch 184/500
10/10              0s 25ms/step -
accuracy: 0.6975 - loss: 0.6060 - val_accuracy: 0.7094 - val_loss: 0.5987
Epoch 185/500
10/10              0s 24ms/step -
accuracy: 0.6979 - loss: 0.6060 - val_accuracy: 0.7094 - val_loss: 0.5986
Epoch 186/500
10/10              0s 23ms/step -
accuracy: 0.7246 - loss: 0.5839 - val_accuracy: 0.7094 - val_loss: 0.5985
Epoch 187/500
10/10              0s 23ms/step -
accuracy: 0.7248 - loss: 0.5873 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 188/500
10/10              0s 25ms/step -
accuracy: 0.7271 - loss: 0.5825 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 189/500
10/10              0s 27ms/step -
accuracy: 0.7313 - loss: 0.5766 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 190/500
10/10              0s 23ms/step -
accuracy: 0.7214 - loss: 0.5862 - val_accuracy: 0.7094 - val_loss: 0.5982
Epoch 191/500
10/10              0s 21ms/step -
accuracy: 0.7322 - loss: 0.5775 - val_accuracy: 0.7094 - val_loss: 0.5981
Epoch 192/500
10/10              0s 23ms/step -
accuracy: 0.7434 - loss: 0.5653 - val_accuracy: 0.7094 - val_loss: 0.5980
Epoch 193/500
10/10              0s 25ms/step -
accuracy: 0.7106 - loss: 0.5941 - val_accuracy: 0.7094 - val_loss: 0.5980
Epoch 194/500
10/10              0s 23ms/step -
accuracy: 0.7180 - loss: 0.5899 - val_accuracy: 0.7094 - val_loss: 0.5979
Epoch 195/500
```

```
10/10              0s 23ms/step -
accuracy: 0.6992 - loss: 0.6060 - val_accuracy: 0.7094 - val_loss: 0.5978
Epoch 196/500
10/10              0s 25ms/step -
accuracy: 0.7059 - loss: 0.5932 - val_accuracy: 0.7094 - val_loss: 0.5977
Epoch 197/500
10/10              0s 21ms/step -
accuracy: 0.7202 - loss: 0.5886 - val_accuracy: 0.7094 - val_loss: 0.5976
Epoch 198/500
10/10              0s 19ms/step -
accuracy: 0.7386 - loss: 0.5689 - val_accuracy: 0.7094 - val_loss: 0.5976
Epoch 199/500
10/10              0s 9ms/step -
accuracy: 0.7109 - loss: 0.5988 - val_accuracy: 0.7094 - val_loss: 0.5975
Epoch 200/500
10/10              0s 19ms/step -
accuracy: 0.7186 - loss: 0.5866 - val_accuracy: 0.7094 - val_loss: 0.5974
Epoch 201/500
10/10              0s 20ms/step -
accuracy: 0.7242 - loss: 0.5839 - val_accuracy: 0.7094 - val_loss: 0.5973
Epoch 202/500
10/10              0s 19ms/step -
accuracy: 0.7363 - loss: 0.5689 - val_accuracy: 0.7094 - val_loss: 0.5973
Epoch 203/500
10/10              0s 18ms/step -
accuracy: 0.6932 - loss: 0.6095 - val_accuracy: 0.7094 - val_loss: 0.5972
Epoch 204/500
10/10              0s 17ms/step -
accuracy: 0.7148 - loss: 0.5907 - val_accuracy: 0.7094 - val_loss: 0.5971
Epoch 205/500
10/10              0s 15ms/step -
accuracy: 0.7133 - loss: 0.5904 - val_accuracy: 0.7094 - val_loss: 0.5970
Epoch 206/500
10/10              0s 10ms/step -
accuracy: 0.7421 - loss: 0.5637 - val_accuracy: 0.7094 - val_loss: 0.5970
Epoch 207/500
10/10              0s 20ms/step -
accuracy: 0.7414 - loss: 0.5666 - val_accuracy: 0.7094 - val_loss: 0.5969
Epoch 208/500
10/10              0s 20ms/step -
accuracy: 0.7225 - loss: 0.5851 - val_accuracy: 0.7094 - val_loss: 0.5968
Epoch 209/500
10/10              0s 21ms/step -
accuracy: 0.7295 - loss: 0.5767 - val_accuracy: 0.7094 - val_loss: 0.5967
Epoch 210/500
10/10              0s 15ms/step -
accuracy: 0.7592 - loss: 0.5509 - val_accuracy: 0.7094 - val_loss: 0.5966
Epoch 211/500
```

```
10/10              0s 9ms/step -
accuracy: 0.6947 - loss: 0.6080 - val_accuracy: 0.7094 - val_loss: 0.5966
Epoch 212/500
10/10              0s 9ms/step -
accuracy: 0.6861 - loss: 0.6143 - val_accuracy: 0.7094 - val_loss: 0.5965
Epoch 213/500
10/10              0s 9ms/step -
accuracy: 0.6943 - loss: 0.6079 - val_accuracy: 0.7094 - val_loss: 0.5964
Epoch 214/500
10/10              0s 19ms/step -
accuracy: 0.7124 - loss: 0.5905 - val_accuracy: 0.7094 - val_loss: 0.5964
Epoch 215/500
10/10              0s 20ms/step -
accuracy: 0.6981 - loss: 0.6027 - val_accuracy: 0.7094 - val_loss: 0.5963
Epoch 216/500
10/10              0s 21ms/step -
accuracy: 0.7261 - loss: 0.5761 - val_accuracy: 0.7094 - val_loss: 0.5962
Epoch 217/500
10/10              0s 13ms/step -
accuracy: 0.7434 - loss: 0.5653 - val_accuracy: 0.7094 - val_loss: 0.5961
Epoch 218/500
10/10              0s 17ms/step -
accuracy: 0.6919 - loss: 0.6082 - val_accuracy: 0.7094 - val_loss: 0.5960
Epoch 219/500
10/10              0s 21ms/step -
accuracy: 0.6940 - loss: 0.6073 - val_accuracy: 0.7094 - val_loss: 0.5960
Epoch 220/500
10/10              0s 12ms/step -
accuracy: 0.7129 - loss: 0.5921 - val_accuracy: 0.7094 - val_loss: 0.5959
Epoch 221/500
10/10              0s 14ms/step -
accuracy: 0.7043 - loss: 0.5989 - val_accuracy: 0.7094 - val_loss: 0.5958
Epoch 222/500
10/10              0s 18ms/step -
accuracy: 0.7122 - loss: 0.5915 - val_accuracy: 0.7094 - val_loss: 0.5957
Epoch 223/500
10/10              0s 22ms/step -
accuracy: 0.7182 - loss: 0.5880 - val_accuracy: 0.7094 - val_loss: 0.5957
Epoch 224/500
10/10              0s 19ms/step -
accuracy: 0.7109 - loss: 0.5918 - val_accuracy: 0.7094 - val_loss: 0.5956
Epoch 225/500
10/10              0s 21ms/step -
accuracy: 0.6957 - loss: 0.6047 - val_accuracy: 0.7094 - val_loss: 0.5955
Epoch 226/500
10/10              0s 20ms/step -
accuracy: 0.7383 - loss: 0.5678 - val_accuracy: 0.7094 - val_loss: 0.5954
Epoch 227/500
```

```
10/10              0s 20ms/step -
accuracy: 0.7143 - loss: 0.5897 - val_accuracy: 0.7094 - val_loss: 0.5954
Epoch 228/500
10/10              0s 19ms/step -
accuracy: 0.7086 - loss: 0.5930 - val_accuracy: 0.7094 - val_loss: 0.5953
Epoch 229/500
10/10              0s 21ms/step -
accuracy: 0.7086 - loss: 0.5938 - val_accuracy: 0.7094 - val_loss: 0.5952
Epoch 230/500
10/10              0s 21ms/step -
accuracy: 0.7237 - loss: 0.5795 - val_accuracy: 0.7094 - val_loss: 0.5951
Epoch 231/500
10/10              0s 12ms/step -
accuracy: 0.7166 - loss: 0.5869 - val_accuracy: 0.7094 - val_loss: 0.5951
Epoch 232/500
10/10              0s 20ms/step -
accuracy: 0.7008 - loss: 0.5984 - val_accuracy: 0.7094 - val_loss: 0.5950
Epoch 233/500
10/10              0s 20ms/step -
accuracy: 0.7230 - loss: 0.5802 - val_accuracy: 0.7094 - val_loss: 0.5949
Epoch 234/500
10/10              0s 14ms/step -
accuracy: 0.6821 - loss: 0.6170 - val_accuracy: 0.7094 - val_loss: 0.5949
Epoch 235/500
10/10              0s 19ms/step -
accuracy: 0.7101 - loss: 0.5915 - val_accuracy: 0.7094 - val_loss: 0.5948
Epoch 236/500
10/10              0s 20ms/step -
accuracy: 0.7188 - loss: 0.5845 - val_accuracy: 0.7094 - val_loss: 0.5947
Epoch 237/500
10/10              0s 22ms/step -
accuracy: 0.6964 - loss: 0.6055 - val_accuracy: 0.7094 - val_loss: 0.5947
Epoch 238/500
10/10              0s 20ms/step -
accuracy: 0.7295 - loss: 0.5761 - val_accuracy: 0.7094 - val_loss: 0.5946
Epoch 239/500
10/10              0s 20ms/step -
accuracy: 0.7210 - loss: 0.5826 - val_accuracy: 0.7094 - val_loss: 0.5945
Epoch 240/500
10/10              0s 18ms/step -
accuracy: 0.6825 - loss: 0.6197 - val_accuracy: 0.7094 - val_loss: 0.5944
Epoch 241/500
10/10              0s 13ms/step -
accuracy: 0.7279 - loss: 0.5764 - val_accuracy: 0.7094 - val_loss: 0.5943
Epoch 242/500
10/10              0s 21ms/step -
accuracy: 0.7001 - loss: 0.6006 - val_accuracy: 0.7094 - val_loss: 0.5943
Epoch 243/500
```

```
10/10              0s 20ms/step -
accuracy: 0.7108 - loss: 0.5910 - val_accuracy: 0.7094 - val_loss: 0.5942
Epoch 244/500
10/10              0s 21ms/step -
accuracy: 0.6983 - loss: 0.6015 - val_accuracy: 0.7094 - val_loss: 0.5941
Epoch 245/500
10/10              0s 20ms/step -
accuracy: 0.7286 - loss: 0.5729 - val_accuracy: 0.7094 - val_loss: 0.5941
Epoch 246/500
10/10              0s 22ms/step -
accuracy: 0.7027 - loss: 0.6009 - val_accuracy: 0.7094 - val_loss: 0.5940
Epoch 247/500
10/10              0s 17ms/step -
accuracy: 0.7147 - loss: 0.5883 - val_accuracy: 0.7094 - val_loss: 0.5939
Epoch 248/500
10/10              0s 20ms/step -
accuracy: 0.7319 - loss: 0.5720 - val_accuracy: 0.7094 - val_loss: 0.5938
Epoch 249/500
10/10              0s 20ms/step -
accuracy: 0.7000 - loss: 0.6012 - val_accuracy: 0.7094 - val_loss: 0.5938
Epoch 250/500
10/10              0s 23ms/step -
accuracy: 0.7246 - loss: 0.5794 - val_accuracy: 0.7094 - val_loss: 0.5937
Epoch 251/500
10/10              0s 20ms/step -
accuracy: 0.7217 - loss: 0.5793 - val_accuracy: 0.7094 - val_loss: 0.5936
Epoch 252/500
10/10              0s 26ms/step -
accuracy: 0.7100 - loss: 0.5898 - val_accuracy: 0.7094 - val_loss: 0.5936
Epoch 253/500
10/10              0s 15ms/step -
accuracy: 0.7425 - loss: 0.5625 - val_accuracy: 0.7094 - val_loss: 0.5935
Epoch 254/500
10/10              0s 21ms/step -
accuracy: 0.7143 - loss: 0.5871 - val_accuracy: 0.7094 - val_loss: 0.5934
Epoch 255/500
10/10              0s 20ms/step -
accuracy: 0.7006 - loss: 0.5991 - val_accuracy: 0.7094 - val_loss: 0.5933
Epoch 256/500
10/10              0s 22ms/step -
accuracy: 0.7338 - loss: 0.5696 - val_accuracy: 0.7094 - val_loss: 0.5933
Epoch 257/500
10/10              0s 18ms/step -
accuracy: 0.7223 - loss: 0.5801 - val_accuracy: 0.7094 - val_loss: 0.5932
Epoch 258/500
10/10              0s 19ms/step -
accuracy: 0.7497 - loss: 0.5570 - val_accuracy: 0.7094 - val_loss: 0.5931
Epoch 259/500
```

```
10/10              0s 15ms/step -
accuracy: 0.6823 - loss: 0.6138 - val_accuracy: 0.7094 - val_loss: 0.5931
Epoch 260/500
10/10              0s 21ms/step -
accuracy: 0.6967 - loss: 0.6009 - val_accuracy: 0.7094 - val_loss: 0.5930
Epoch 261/500
10/10              0s 19ms/step -
accuracy: 0.7184 - loss: 0.5827 - val_accuracy: 0.7094 - val_loss: 0.5929
Epoch 262/500
10/10              0s 21ms/step -
accuracy: 0.6979 - loss: 0.6026 - val_accuracy: 0.7094 - val_loss: 0.5928
Epoch 263/500
10/10              0s 21ms/step -
accuracy: 0.7285 - loss: 0.5732 - val_accuracy: 0.7094 - val_loss: 0.5928
Epoch 264/500
10/10              0s 19ms/step -
accuracy: 0.7387 - loss: 0.5636 - val_accuracy: 0.7094 - val_loss: 0.5927
Epoch 265/500
10/10              0s 12ms/step -
accuracy: 0.7065 - loss: 0.5948 - val_accuracy: 0.7094 - val_loss: 0.5926
Epoch 266/500
10/10              0s 22ms/step -
accuracy: 0.7124 - loss: 0.5875 - val_accuracy: 0.7094 - val_loss: 0.5926
Epoch 267/500
10/10              0s 18ms/step -
accuracy: 0.7277 - loss: 0.5736 - val_accuracy: 0.7094 - val_loss: 0.5925
Epoch 268/500
10/10              0s 20ms/step -
accuracy: 0.7406 - loss: 0.5614 - val_accuracy: 0.7094 - val_loss: 0.5924
Epoch 269/500
10/10              0s 22ms/step -
accuracy: 0.7347 - loss: 0.5672 - val_accuracy: 0.7094 - val_loss: 0.5923
Epoch 270/500
10/10              0s 19ms/step -
accuracy: 0.7148 - loss: 0.5864 - val_accuracy: 0.7094 - val_loss: 0.5923
Epoch 271/500
10/10              0s 19ms/step -
accuracy: 0.7172 - loss: 0.5808 - val_accuracy: 0.7094 - val_loss: 0.5922
Epoch 272/500
10/10              0s 23ms/step -
accuracy: 0.7015 - loss: 0.5974 - val_accuracy: 0.7094 - val_loss: 0.5921
Epoch 273/500
10/10              0s 21ms/step -
accuracy: 0.7082 - loss: 0.5882 - val_accuracy: 0.7094 - val_loss: 0.5921
Epoch 274/500
10/10              0s 21ms/step -
accuracy: 0.7322 - loss: 0.5687 - val_accuracy: 0.7094 - val_loss: 0.5920
Epoch 275/500
```

```
10/10              0s 19ms/step -
accuracy: 0.7174 - loss: 0.5858 - val_accuracy: 0.7094 - val_loss: 0.5919
Epoch 276/500
10/10              0s 18ms/step -
accuracy: 0.6939 - loss: 0.6034 - val_accuracy: 0.7094 - val_loss: 0.5919
Epoch 277/500
10/10              0s 20ms/step -
accuracy: 0.7033 - loss: 0.5978 - val_accuracy: 0.7094 - val_loss: 0.5918
Epoch 278/500
10/10              0s 12ms/step -
accuracy: 0.7076 - loss: 0.5931 - val_accuracy: 0.7094 - val_loss: 0.5917
Epoch 279/500
10/10              0s 21ms/step -
accuracy: 0.7286 - loss: 0.5736 - val_accuracy: 0.7094 - val_loss: 0.5917
Epoch 280/500
10/10              0s 23ms/step -
accuracy: 0.7208 - loss: 0.5778 - val_accuracy: 0.7094 - val_loss: 0.5916
Epoch 281/500
10/10              0s 22ms/step -
accuracy: 0.6941 - loss: 0.6035 - val_accuracy: 0.7094 - val_loss: 0.5916
Epoch 282/500
10/10              0s 21ms/step -
accuracy: 0.7128 - loss: 0.5870 - val_accuracy: 0.7094 - val_loss: 0.5915
Epoch 283/500
10/10              0s 15ms/step -
accuracy: 0.7321 - loss: 0.5703 - val_accuracy: 0.7094 - val_loss: 0.5914
Epoch 284/500
10/10              0s 21ms/step -
accuracy: 0.6893 - loss: 0.6066 - val_accuracy: 0.7094 - val_loss: 0.5913
Epoch 285/500
10/10              0s 19ms/step -
accuracy: 0.7219 - loss: 0.5753 - val_accuracy: 0.7094 - val_loss: 0.5913
Epoch 286/500
10/10              0s 21ms/step -
accuracy: 0.7013 - loss: 0.5983 - val_accuracy: 0.7094 - val_loss: 0.5912
Epoch 287/500
10/10              0s 9ms/step -
accuracy: 0.7184 - loss: 0.5836 - val_accuracy: 0.7094 - val_loss: 0.5911
Epoch 288/500
10/10              0s 19ms/step -
accuracy: 0.7154 - loss: 0.5841 - val_accuracy: 0.7094 - val_loss: 0.5911
Epoch 289/500
10/10              0s 22ms/step -
accuracy: 0.7318 - loss: 0.5677 - val_accuracy: 0.7094 - val_loss: 0.5910
Epoch 290/500
10/10              0s 20ms/step -
accuracy: 0.7037 - loss: 0.5947 - val_accuracy: 0.7094 - val_loss: 0.5909
Epoch 291/500
```

```
10/10              0s 17ms/step -
accuracy: 0.7308 - loss: 0.5702 - val_accuracy: 0.7094 - val_loss: 0.5909
Epoch 292/500
10/10              0s 19ms/step -
accuracy: 0.7217 - loss: 0.5768 - val_accuracy: 0.7094 - val_loss: 0.5908
Epoch 293/500
10/10              0s 21ms/step -
accuracy: 0.7253 - loss: 0.5746 - val_accuracy: 0.7094 - val_loss: 0.5907
Epoch 294/500
10/10              0s 18ms/step -
accuracy: 0.7134 - loss: 0.5850 - val_accuracy: 0.7094 - val_loss: 0.5907
Epoch 295/500
10/10              0s 18ms/step -
accuracy: 0.6890 - loss: 0.6067 - val_accuracy: 0.7094 - val_loss: 0.5906
Epoch 296/500
10/10              0s 15ms/step -
accuracy: 0.6986 - loss: 0.5952 - val_accuracy: 0.7094 - val_loss: 0.5905
Epoch 297/500
10/10              0s 18ms/step -
accuracy: 0.7095 - loss: 0.5871 - val_accuracy: 0.7094 - val_loss: 0.5905
Epoch 298/500
10/10              0s 16ms/step -
accuracy: 0.7038 - loss: 0.5962 - val_accuracy: 0.7094 - val_loss: 0.5904
Epoch 299/500
10/10              0s 18ms/step -
accuracy: 0.6960 - loss: 0.6044 - val_accuracy: 0.7094 - val_loss: 0.5903
Epoch 300/500
10/10              0s 21ms/step -
accuracy: 0.7021 - loss: 0.5956 - val_accuracy: 0.7094 - val_loss: 0.5903
Epoch 301/500
10/10              0s 19ms/step -
accuracy: 0.7280 - loss: 0.5707 - val_accuracy: 0.7094 - val_loss: 0.5902
Epoch 302/500
10/10              0s 10ms/step -
accuracy: 0.7154 - loss: 0.5822 - val_accuracy: 0.7094 - val_loss: 0.5901
Epoch 303/500
10/10              0s 13ms/step -
accuracy: 0.7230 - loss: 0.5753 - val_accuracy: 0.7094 - val_loss: 0.5901
Epoch 304/500
10/10              0s 10ms/step -
accuracy: 0.7278 - loss: 0.5736 - val_accuracy: 0.7094 - val_loss: 0.5900
Epoch 305/500
10/10              0s 20ms/step -
accuracy: 0.6970 - loss: 0.5952 - val_accuracy: 0.7094 - val_loss: 0.5899
Epoch 306/500
10/10              0s 20ms/step -
accuracy: 0.7074 - loss: 0.5911 - val_accuracy: 0.7094 - val_loss: 0.5899
Epoch 307/500
```

```
10/10              0s 20ms/step -
accuracy: 0.7035 - loss: 0.5919 - val_accuracy: 0.7094 - val_loss: 0.5898
Epoch 308/500
10/10              0s 21ms/step -
accuracy: 0.7121 - loss: 0.5856 - val_accuracy: 0.7094 - val_loss: 0.5897
Epoch 309/500
10/10              0s 20ms/step -
accuracy: 0.7269 - loss: 0.5711 - val_accuracy: 0.7094 - val_loss: 0.5897
Epoch 310/500
10/10              0s 19ms/step -
accuracy: 0.6827 - loss: 0.6089 - val_accuracy: 0.7094 - val_loss: 0.5896
Epoch 311/500
10/10              0s 19ms/step -
accuracy: 0.7082 - loss: 0.5883 - val_accuracy: 0.7094 - val_loss: 0.5895
Epoch 312/500
10/10              0s 9ms/step -
accuracy: 0.7156 - loss: 0.5798 - val_accuracy: 0.7094 - val_loss: 0.5895
Epoch 313/500
10/10              0s 10ms/step -
accuracy: 0.7406 - loss: 0.5611 - val_accuracy: 0.7094 - val_loss: 0.5894
Epoch 314/500
10/10              0s 10ms/step -
accuracy: 0.7238 - loss: 0.5767 - val_accuracy: 0.7094 - val_loss: 0.5893
Epoch 315/500
10/10              0s 11ms/step -
accuracy: 0.6767 - loss: 0.6166 - val_accuracy: 0.7094 - val_loss: 0.5893
Epoch 316/500
10/10              0s 21ms/step -
accuracy: 0.7087 - loss: 0.5848 - val_accuracy: 0.7094 - val_loss: 0.5892
Epoch 317/500
10/10              0s 19ms/step -
accuracy: 0.6938 - loss: 0.5984 - val_accuracy: 0.7094 - val_loss: 0.5892
Epoch 318/500
10/10              0s 10ms/step -
accuracy: 0.7053 - loss: 0.5925 - val_accuracy: 0.7094 - val_loss: 0.5891
Epoch 319/500
10/10              0s 11ms/step -
accuracy: 0.6838 - loss: 0.6125 - val_accuracy: 0.7094 - val_loss: 0.5890
Epoch 320/500
10/10              0s 17ms/step -
accuracy: 0.7308 - loss: 0.5653 - val_accuracy: 0.7094 - val_loss: 0.5890
Epoch 321/500
10/10              0s 18ms/step -
accuracy: 0.7382 - loss: 0.5591 - val_accuracy: 0.7094 - val_loss: 0.5889
Epoch 322/500
10/10              0s 16ms/step -
accuracy: 0.7055 - loss: 0.5904 - val_accuracy: 0.7094 - val_loss: 0.5888
Epoch 323/500
```

```
10/10              0s 18ms/step -
accuracy: 0.7456 - loss: 0.5596 - val_accuracy: 0.7094 - val_loss: 0.5888
Epoch 324/500
10/10              0s 20ms/step -
accuracy: 0.7308 - loss: 0.5687 - val_accuracy: 0.7094 - val_loss: 0.5887
Epoch 325/500
10/10              0s 20ms/step -
accuracy: 0.7224 - loss: 0.5761 - val_accuracy: 0.7094 - val_loss: 0.5887
Epoch 326/500
10/10              0s 14ms/step -
accuracy: 0.7343 - loss: 0.5654 - val_accuracy: 0.7094 - val_loss: 0.5886
Epoch 327/500
10/10              0s 17ms/step -
accuracy: 0.7109 - loss: 0.5835 - val_accuracy: 0.7094 - val_loss: 0.5885
Epoch 328/500
10/10              0s 18ms/step -
accuracy: 0.7023 - loss: 0.5907 - val_accuracy: 0.7094 - val_loss: 0.5885
Epoch 329/500
10/10              0s 19ms/step -
accuracy: 0.7114 - loss: 0.5827 - val_accuracy: 0.7094 - val_loss: 0.5884
Epoch 330/500
10/10              0s 18ms/step -
accuracy: 0.7385 - loss: 0.5623 - val_accuracy: 0.7094 - val_loss: 0.5884
Epoch 331/500
10/10              0s 11ms/step -
accuracy: 0.6874 - loss: 0.6057 - val_accuracy: 0.7094 - val_loss: 0.5883
Epoch 332/500
10/10              0s 9ms/step -
accuracy: 0.7181 - loss: 0.5794 - val_accuracy: 0.7094 - val_loss: 0.5882
Epoch 333/500
10/10              0s 14ms/step -
accuracy: 0.7224 - loss: 0.5740 - val_accuracy: 0.7094 - val_loss: 0.5882
Epoch 334/500
10/10              0s 19ms/step -
accuracy: 0.7202 - loss: 0.5772 - val_accuracy: 0.7094 - val_loss: 0.5881
Epoch 335/500
10/10              0s 20ms/step -
accuracy: 0.7183 - loss: 0.5759 - val_accuracy: 0.7094 - val_loss: 0.5881
Epoch 336/500
10/10              0s 21ms/step -
accuracy: 0.7374 - loss: 0.5607 - val_accuracy: 0.7094 - val_loss: 0.5880
Epoch 337/500
10/10              0s 21ms/step -
accuracy: 0.7322 - loss: 0.5667 - val_accuracy: 0.7094 - val_loss: 0.5879
Epoch 338/500
10/10              0s 19ms/step -
accuracy: 0.7005 - loss: 0.5942 - val_accuracy: 0.7094 - val_loss: 0.5879
Epoch 339/500
```

```
10/10              0s 17ms/step -
accuracy: 0.6857 - loss: 0.6085 - val_accuracy: 0.7094 - val_loss: 0.5878
Epoch 340/500
10/10              0s 19ms/step -
accuracy: 0.7377 - loss: 0.5583 - val_accuracy: 0.7094 - val_loss: 0.5877
Epoch 341/500
10/10              0s 20ms/step -
accuracy: 0.7309 - loss: 0.5650 - val_accuracy: 0.7094 - val_loss: 0.5877
Epoch 342/500
10/10              0s 21ms/step -
accuracy: 0.7224 - loss: 0.5744 - val_accuracy: 0.7094 - val_loss: 0.5876
Epoch 343/500
10/10              0s 19ms/step -
accuracy: 0.7198 - loss: 0.5745 - val_accuracy: 0.7094 - val_loss: 0.5876
Epoch 344/500
10/10              0s 20ms/step -
accuracy: 0.7072 - loss: 0.5894 - val_accuracy: 0.7094 - val_loss: 0.5875
Epoch 345/500
10/10              0s 21ms/step -
accuracy: 0.7109 - loss: 0.5868 - val_accuracy: 0.7094 - val_loss: 0.5874
Epoch 346/500
10/10              0s 15ms/step -
accuracy: 0.7152 - loss: 0.5777 - val_accuracy: 0.7094 - val_loss: 0.5874
Epoch 347/500
10/10              0s 16ms/step -
accuracy: 0.7330 - loss: 0.5631 - val_accuracy: 0.7094 - val_loss: 0.5873
Epoch 348/500
10/10              0s 9ms/step -
accuracy: 0.7164 - loss: 0.5771 - val_accuracy: 0.7094 - val_loss: 0.5872
Epoch 349/500
10/10              0s 18ms/step -
accuracy: 0.6943 - loss: 0.5995 - val_accuracy: 0.7094 - val_loss: 0.5872
Epoch 350/500
10/10              0s 15ms/step -
accuracy: 0.7090 - loss: 0.5829 - val_accuracy: 0.7094 - val_loss: 0.5871
Epoch 351/500
10/10              0s 22ms/step -
accuracy: 0.7255 - loss: 0.5705 - val_accuracy: 0.7094 - val_loss: 0.5871
Epoch 352/500
10/10              0s 22ms/step -
accuracy: 0.6950 - loss: 0.5964 - val_accuracy: 0.7094 - val_loss: 0.5870
Epoch 353/500
10/10              0s 18ms/step -
accuracy: 0.7124 - loss: 0.5830 - val_accuracy: 0.7094 - val_loss: 0.5870
Epoch 354/500
10/10              0s 11ms/step -
accuracy: 0.7170 - loss: 0.5762 - val_accuracy: 0.7094 - val_loss: 0.5869
Epoch 355/500
```

```
10/10            0s 20ms/step -
accuracy: 0.7060 - loss: 0.5880 - val_accuracy: 0.7094 - val_loss: 0.5868
Epoch 356/500
10/10            0s 21ms/step -
accuracy: 0.6998 - loss: 0.5918 - val_accuracy: 0.7094 - val_loss: 0.5868
Epoch 357/500
10/10            0s 22ms/step -
accuracy: 0.7193 - loss: 0.5790 - val_accuracy: 0.7094 - val_loss: 0.5867
Epoch 358/500
10/10            0s 19ms/step -
accuracy: 0.7059 - loss: 0.5860 - val_accuracy: 0.7094 - val_loss: 0.5867
Epoch 359/500
10/10            0s 21ms/step -
accuracy: 0.7046 - loss: 0.5911 - val_accuracy: 0.7094 - val_loss: 0.5866
Epoch 360/500
10/10            0s 19ms/step -
accuracy: 0.7464 - loss: 0.5545 - val_accuracy: 0.7094 - val_loss: 0.5866
Epoch 361/500
10/10            0s 21ms/step -
accuracy: 0.7277 - loss: 0.5677 - val_accuracy: 0.7094 - val_loss: 0.5865
Epoch 362/500
10/10            0s 17ms/step -
accuracy: 0.7237 - loss: 0.5705 - val_accuracy: 0.7094 - val_loss: 0.5864
Epoch 363/500
10/10            0s 21ms/step -
accuracy: 0.7310 - loss: 0.5647 - val_accuracy: 0.7094 - val_loss: 0.5864
Epoch 364/500
10/10            0s 16ms/step -
accuracy: 0.7385 - loss: 0.5590 - val_accuracy: 0.7094 - val_loss: 0.5863
Epoch 365/500
10/10            0s 18ms/step -
accuracy: 0.7280 - loss: 0.5678 - val_accuracy: 0.7094 - val_loss: 0.5863
Epoch 366/500
10/10            0s 11ms/step -
accuracy: 0.7167 - loss: 0.5784 - val_accuracy: 0.7094 - val_loss: 0.5862
Epoch 367/500
10/10            0s 10ms/step -
accuracy: 0.6980 - loss: 0.5941 - val_accuracy: 0.7094 - val_loss: 0.5862
Epoch 368/500
10/10            0s 12ms/step -
accuracy: 0.7403 - loss: 0.5581 - val_accuracy: 0.7094 - val_loss: 0.5861
Epoch 369/500
10/10            0s 22ms/step -
accuracy: 0.7019 - loss: 0.5890 - val_accuracy: 0.7094 - val_loss: 0.5861
Epoch 370/500
10/10            0s 26ms/step -
accuracy: 0.7082 - loss: 0.5868 - val_accuracy: 0.7094 - val_loss: 0.5860
Epoch 371/500
```

```
10/10                 0s 23ms/step -
accuracy: 0.7042 - loss: 0.5897 - val_accuracy: 0.7094 - val_loss: 0.5860
Epoch 372/500
10/10                 0s 21ms/step -
accuracy: 0.6996 - loss: 0.5938 - val_accuracy: 0.7094 - val_loss: 0.5859
Epoch 373/500
10/10                 0s 24ms/step -
accuracy: 0.7148 - loss: 0.5785 - val_accuracy: 0.7094 - val_loss: 0.5858
Epoch 374/500
10/10                 0s 24ms/step -
accuracy: 0.7084 - loss: 0.5862 - val_accuracy: 0.7094 - val_loss: 0.5858
Epoch 375/500
10/10                 0s 22ms/step -
accuracy: 0.6956 - loss: 0.5943 - val_accuracy: 0.7094 - val_loss: 0.5858
Epoch 376/500
10/10                 0s 23ms/step -
accuracy: 0.7131 - loss: 0.5771 - val_accuracy: 0.7094 - val_loss: 0.5857
Epoch 377/500
10/10                 0s 22ms/step -
accuracy: 0.7130 - loss: 0.5794 - val_accuracy: 0.7094 - val_loss: 0.5856
Epoch 378/500
10/10                 0s 23ms/step -
accuracy: 0.7451 - loss: 0.5526 - val_accuracy: 0.7094 - val_loss: 0.5856
Epoch 379/500
10/10                 0s 28ms/step -
accuracy: 0.7124 - loss: 0.5791 - val_accuracy: 0.7094 - val_loss: 0.5855
Epoch 380/500
10/10                 0s 23ms/step -
accuracy: 0.7359 - loss: 0.5603 - val_accuracy: 0.7094 - val_loss: 0.5854
Epoch 381/500
10/10                 0s 22ms/step -
accuracy: 0.7126 - loss: 0.5810 - val_accuracy: 0.7094 - val_loss: 0.5854
Epoch 382/500
10/10                 0s 27ms/step -
accuracy: 0.6946 - loss: 0.5990 - val_accuracy: 0.7094 - val_loss: 0.5853
Epoch 383/500
10/10                 0s 23ms/step -
accuracy: 0.7281 - loss: 0.5698 - val_accuracy: 0.7094 - val_loss: 0.5853
Epoch 384/500
10/10                 0s 22ms/step -
accuracy: 0.7071 - loss: 0.5865 - val_accuracy: 0.7094 - val_loss: 0.5852
Epoch 385/500
10/10                 0s 23ms/step -
accuracy: 0.7038 - loss: 0.5878 - val_accuracy: 0.7094 - val_loss: 0.5852
Epoch 386/500
10/10                 0s 23ms/step -
accuracy: 0.7022 - loss: 0.5864 - val_accuracy: 0.7094 - val_loss: 0.5851
Epoch 387/500
```

```
10/10                0s 22ms/step -
accuracy: 0.7329 - loss: 0.5634 - val_accuracy: 0.7094 - val_loss: 0.5850
Epoch 388/500
10/10                0s 22ms/step -
accuracy: 0.7164 - loss: 0.5791 - val_accuracy: 0.7094 - val_loss: 0.5850
Epoch 389/500
10/10                0s 20ms/step -
accuracy: 0.7260 - loss: 0.5695 - val_accuracy: 0.7094 - val_loss: 0.5849
Epoch 390/500
10/10                0s 19ms/step -
accuracy: 0.7141 - loss: 0.5820 - val_accuracy: 0.7094 - val_loss: 0.5849
Epoch 391/500
10/10                0s 20ms/step -
accuracy: 0.7109 - loss: 0.5789 - val_accuracy: 0.7094 - val_loss: 0.5848
Epoch 392/500
10/10                0s 22ms/step -
accuracy: 0.7105 - loss: 0.5805 - val_accuracy: 0.7094 - val_loss: 0.5848
Epoch 393/500
10/10                0s 22ms/step -
accuracy: 0.7045 - loss: 0.5836 - val_accuracy: 0.7094 - val_loss: 0.5847
Epoch 394/500
10/10                0s 20ms/step -
accuracy: 0.7127 - loss: 0.5790 - val_accuracy: 0.7094 - val_loss: 0.5847
Epoch 395/500
10/10                0s 21ms/step -
accuracy: 0.7195 - loss: 0.5756 - val_accuracy: 0.7094 - val_loss: 0.5846
Epoch 396/500
10/10                0s 21ms/step -
accuracy: 0.7053 - loss: 0.5842 - val_accuracy: 0.7094 - val_loss: 0.5845
Epoch 397/500
10/10                0s 22ms/step -
accuracy: 0.7003 - loss: 0.5905 - val_accuracy: 0.7094 - val_loss: 0.5845
Epoch 398/500
10/10                0s 22ms/step -
accuracy: 0.7238 - loss: 0.5665 - val_accuracy: 0.7094 - val_loss: 0.5844
Epoch 399/500
10/10                0s 22ms/step -
accuracy: 0.7266 - loss: 0.5642 - val_accuracy: 0.7094 - val_loss: 0.5844
Epoch 400/500
10/10                0s 22ms/step -
accuracy: 0.7094 - loss: 0.5814 - val_accuracy: 0.7094 - val_loss: 0.5843
Epoch 401/500
10/10                0s 21ms/step -
accuracy: 0.7003 - loss: 0.5861 - val_accuracy: 0.7094 - val_loss: 0.5843
Epoch 402/500
10/10                0s 22ms/step -
accuracy: 0.7206 - loss: 0.5721 - val_accuracy: 0.7094 - val_loss: 0.5842
Epoch 403/500
```

```
10/10              0s 21ms/step -
accuracy: 0.7153 - loss: 0.5770 - val_accuracy: 0.7094 - val_loss: 0.5842
Epoch 404/500
10/10              0s 22ms/step -
accuracy: 0.7059 - loss: 0.5823 - val_accuracy: 0.7094 - val_loss: 0.5841
Epoch 405/500
10/10              0s 22ms/step -
accuracy: 0.6959 - loss: 0.5936 - val_accuracy: 0.7094 - val_loss: 0.5841
Epoch 406/500
10/10              0s 21ms/step -
accuracy: 0.7140 - loss: 0.5802 - val_accuracy: 0.7094 - val_loss: 0.5840
Epoch 407/500
10/10              0s 22ms/step -
accuracy: 0.7181 - loss: 0.5741 - val_accuracy: 0.7094 - val_loss: 0.5840
Epoch 408/500
10/10              0s 22ms/step -
accuracy: 0.7318 - loss: 0.5658 - val_accuracy: 0.7094 - val_loss: 0.5839
Epoch 409/500
10/10              0s 21ms/step -
accuracy: 0.7197 - loss: 0.5744 - val_accuracy: 0.7094 - val_loss: 0.5839
Epoch 410/500
10/10              0s 24ms/step -
accuracy: 0.7022 - loss: 0.5859 - val_accuracy: 0.7094 - val_loss: 0.5838
Epoch 411/500
10/10              0s 25ms/step -
accuracy: 0.7273 - loss: 0.5654 - val_accuracy: 0.7094 - val_loss: 0.5838
Epoch 412/500
10/10              0s 22ms/step -
accuracy: 0.7301 - loss: 0.5651 - val_accuracy: 0.7094 - val_loss: 0.5837
Epoch 413/500
10/10              0s 22ms/step -
accuracy: 0.6664 - loss: 0.6214 - val_accuracy: 0.7094 - val_loss: 0.5836
Epoch 414/500
10/10              0s 24ms/step -
accuracy: 0.7082 - loss: 0.5819 - val_accuracy: 0.7094 - val_loss: 0.5836
Epoch 415/500
10/10              0s 22ms/step -
accuracy: 0.7304 - loss: 0.5647 - val_accuracy: 0.7094 - val_loss: 0.5835
Epoch 416/500
10/10              0s 23ms/step -
accuracy: 0.6913 - loss: 0.5980 - val_accuracy: 0.7094 - val_loss: 0.5835
Epoch 417/500
10/10              0s 22ms/step -
accuracy: 0.7233 - loss: 0.5716 - val_accuracy: 0.7094 - val_loss: 0.5834
Epoch 418/500
10/10              0s 25ms/step -
accuracy: 0.7083 - loss: 0.5804 - val_accuracy: 0.7094 - val_loss: 0.5834
Epoch 419/500
```

```
10/10                0s 23ms/step -
accuracy: 0.7043 - loss: 0.5800 - val_accuracy: 0.7094 - val_loss: 0.5833
Epoch 420/500
10/10                0s 24ms/step -
accuracy: 0.6902 - loss: 0.5958 - val_accuracy: 0.7094 - val_loss: 0.5833
Epoch 421/500
10/10                0s 22ms/step -
accuracy: 0.7242 - loss: 0.5681 - val_accuracy: 0.7094 - val_loss: 0.5832
Epoch 422/500
10/10                0s 32ms/step -
accuracy: 0.7164 - loss: 0.5735 - val_accuracy: 0.7094 - val_loss: 0.5832
Epoch 423/500
10/10                0s 23ms/step -
accuracy: 0.7499 - loss: 0.5475 - val_accuracy: 0.7094 - val_loss: 0.5831
Epoch 424/500
10/10                0s 24ms/step -
accuracy: 0.7302 - loss: 0.5671 - val_accuracy: 0.7094 - val_loss: 0.5831
Epoch 425/500
10/10                0s 23ms/step -
accuracy: 0.7193 - loss: 0.5725 - val_accuracy: 0.7094 - val_loss: 0.5830
Epoch 426/500
10/10                0s 24ms/step -
accuracy: 0.7212 - loss: 0.5716 - val_accuracy: 0.7094 - val_loss: 0.5830
Epoch 427/500
10/10                0s 28ms/step -
accuracy: 0.7101 - loss: 0.5793 - val_accuracy: 0.7094 - val_loss: 0.5829
Epoch 428/500
10/10                0s 25ms/step -
accuracy: 0.7123 - loss: 0.5776 - val_accuracy: 0.7094 - val_loss: 0.5829
Epoch 429/500
10/10                0s 26ms/step -
accuracy: 0.7119 - loss: 0.5779 - val_accuracy: 0.7094 - val_loss: 0.5828
Epoch 430/500
10/10                0s 21ms/step -
accuracy: 0.7471 - loss: 0.5483 - val_accuracy: 0.7094 - val_loss: 0.5828
Epoch 431/500
10/10                0s 24ms/step -
accuracy: 0.7181 - loss: 0.5753 - val_accuracy: 0.7094 - val_loss: 0.5827
Epoch 432/500
10/10                0s 23ms/step -
accuracy: 0.7158 - loss: 0.5744 - val_accuracy: 0.7094 - val_loss: 0.5826
Epoch 433/500
10/10                0s 23ms/step -
accuracy: 0.7212 - loss: 0.5740 - val_accuracy: 0.7094 - val_loss: 0.5826
Epoch 434/500
10/10                0s 21ms/step -
accuracy: 0.7245 - loss: 0.5724 - val_accuracy: 0.7094 - val_loss: 0.5826
Epoch 435/500
```

```
10/10              0s 16ms/step -
accuracy: 0.7339 - loss: 0.5595 - val_accuracy: 0.7094 - val_loss: 0.5825
Epoch 436/500
10/10              0s 12ms/step -
accuracy: 0.7045 - loss: 0.5813 - val_accuracy: 0.7094 - val_loss: 0.5825
Epoch 437/500
10/10              0s 18ms/step -
accuracy: 0.7256 - loss: 0.5673 - val_accuracy: 0.7094 - val_loss: 0.5824
Epoch 438/500
10/10              0s 19ms/step -
accuracy: 0.7291 - loss: 0.5615 - val_accuracy: 0.7094 - val_loss: 0.5823
Epoch 439/500
10/10              0s 9ms/step -
accuracy: 0.7063 - loss: 0.5818 - val_accuracy: 0.7094 - val_loss: 0.5823
Epoch 440/500
10/10              0s 17ms/step -
accuracy: 0.7050 - loss: 0.5846 - val_accuracy: 0.7094 - val_loss: 0.5823
Epoch 441/500
10/10              0s 22ms/step -
accuracy: 0.7235 - loss: 0.5671 - val_accuracy: 0.7094 - val_loss: 0.5822
Epoch 442/500
10/10              0s 21ms/step -
accuracy: 0.7127 - loss: 0.5775 - val_accuracy: 0.7094 - val_loss: 0.5821
Epoch 443/500
10/10              0s 20ms/step -
accuracy: 0.7306 - loss: 0.5602 - val_accuracy: 0.7094 - val_loss: 0.5821
Epoch 444/500
10/10              0s 22ms/step -
accuracy: 0.7053 - loss: 0.5800 - val_accuracy: 0.7094 - val_loss: 0.5820
Epoch 445/500
10/10              0s 20ms/step -
accuracy: 0.7001 - loss: 0.5894 - val_accuracy: 0.7094 - val_loss: 0.5820
Epoch 446/500
10/10              0s 15ms/step -
accuracy: 0.7037 - loss: 0.5808 - val_accuracy: 0.7094 - val_loss: 0.5819
Epoch 447/500
10/10              0s 22ms/step -
accuracy: 0.6907 - loss: 0.5952 - val_accuracy: 0.7094 - val_loss: 0.5819
Epoch 448/500
10/10              0s 16ms/step -
accuracy: 0.7296 - loss: 0.5653 - val_accuracy: 0.7094 - val_loss: 0.5818
Epoch 449/500
10/10              0s 17ms/step -
accuracy: 0.7411 - loss: 0.5539 - val_accuracy: 0.7094 - val_loss: 0.5818
Epoch 450/500
10/10              0s 14ms/step -
accuracy: 0.7029 - loss: 0.5860 - val_accuracy: 0.7094 - val_loss: 0.5817
Epoch 451/500
```

```
10/10              0s 17ms/step -
accuracy: 0.7141 - loss: 0.5779 - val_accuracy: 0.7094 - val_loss: 0.5817
Epoch 452/500
10/10              0s 15ms/step -
accuracy: 0.7248 - loss: 0.5682 - val_accuracy: 0.7094 - val_loss: 0.5816
Epoch 453/500
10/10              0s 19ms/step -
accuracy: 0.7163 - loss: 0.5713 - val_accuracy: 0.7094 - val_loss: 0.5816
Epoch 454/500
10/10              0s 20ms/step -
accuracy: 0.7246 - loss: 0.5630 - val_accuracy: 0.7094 - val_loss: 0.5815
Epoch 455/500
10/10              0s 18ms/step -
accuracy: 0.7213 - loss: 0.5724 - val_accuracy: 0.7094 - val_loss: 0.5815
Epoch 456/500
10/10              0s 18ms/step -
accuracy: 0.7137 - loss: 0.5737 - val_accuracy: 0.7094 - val_loss: 0.5814
Epoch 457/500
10/10              0s 21ms/step -
accuracy: 0.7357 - loss: 0.5580 - val_accuracy: 0.7094 - val_loss: 0.5814
Epoch 458/500
10/10              0s 20ms/step -
accuracy: 0.7191 - loss: 0.5676 - val_accuracy: 0.7094 - val_loss: 0.5813
Epoch 459/500
10/10              0s 19ms/step -
accuracy: 0.7156 - loss: 0.5763 - val_accuracy: 0.7094 - val_loss: 0.5813
Epoch 460/500
10/10              0s 11ms/step -
accuracy: 0.7236 - loss: 0.5680 - val_accuracy: 0.7094 - val_loss: 0.5812
Epoch 461/500
10/10              0s 10ms/step -
accuracy: 0.7117 - loss: 0.5750 - val_accuracy: 0.7094 - val_loss: 0.5812
Epoch 462/500
10/10              0s 11ms/step -
accuracy: 0.7120 - loss: 0.5780 - val_accuracy: 0.7094 - val_loss: 0.5811
Epoch 463/500
10/10              0s 20ms/step -
accuracy: 0.6959 - loss: 0.5886 - val_accuracy: 0.7094 - val_loss: 0.5811
Epoch 464/500
10/10              0s 18ms/step -
accuracy: 0.7140 - loss: 0.5735 - val_accuracy: 0.7094 - val_loss: 0.5810
Epoch 465/500
10/10              0s 17ms/step -
accuracy: 0.7033 - loss: 0.5810 - val_accuracy: 0.7094 - val_loss: 0.5810
Epoch 466/500
10/10              0s 20ms/step -
accuracy: 0.7127 - loss: 0.5763 - val_accuracy: 0.7094 - val_loss: 0.5809
Epoch 467/500
```

```
10/10              0s 18ms/step -
accuracy: 0.7266 - loss: 0.5633 - val_accuracy: 0.7094 - val_loss: 0.5809
Epoch 468/500
10/10              0s 21ms/step -
accuracy: 0.6990 - loss: 0.5900 - val_accuracy: 0.7094 - val_loss: 0.5808
Epoch 469/500
10/10              0s 21ms/step -
accuracy: 0.7138 - loss: 0.5752 - val_accuracy: 0.7094 - val_loss: 0.5808
Epoch 470/500
10/10              0s 22ms/step -
accuracy: 0.6924 - loss: 0.5921 - val_accuracy: 0.7094 - val_loss: 0.5808
Epoch 471/500
10/10              0s 18ms/step -
accuracy: 0.7044 - loss: 0.5835 - val_accuracy: 0.7094 - val_loss: 0.5807
Epoch 472/500
10/10              0s 8ms/step -
accuracy: 0.7025 - loss: 0.5820 - val_accuracy: 0.7094 - val_loss: 0.5807
Epoch 473/500
10/10              0s 21ms/step -
accuracy: 0.7071 - loss: 0.5758 - val_accuracy: 0.7094 - val_loss: 0.5806
Epoch 474/500
10/10              0s 20ms/step -
accuracy: 0.7290 - loss: 0.5627 - val_accuracy: 0.7094 - val_loss: 0.5806
Epoch 475/500
10/10              0s 19ms/step -
accuracy: 0.7190 - loss: 0.5704 - val_accuracy: 0.7094 - val_loss: 0.5806
Epoch 476/500
10/10              0s 21ms/step -
accuracy: 0.6931 - loss: 0.5912 - val_accuracy: 0.7094 - val_loss: 0.5805
Epoch 477/500
10/10              0s 21ms/step -
accuracy: 0.7266 - loss: 0.5653 - val_accuracy: 0.7094 - val_loss: 0.5805
Epoch 478/500
10/10              0s 19ms/step -
accuracy: 0.7214 - loss: 0.5647 - val_accuracy: 0.7094 - val_loss: 0.5804
Epoch 479/500
10/10              0s 20ms/step -
accuracy: 0.7187 - loss: 0.5693 - val_accuracy: 0.7094 - val_loss: 0.5804
Epoch 480/500
10/10              0s 20ms/step -
accuracy: 0.7163 - loss: 0.5724 - val_accuracy: 0.7094 - val_loss: 0.5803
Epoch 481/500
10/10              0s 19ms/step -
accuracy: 0.7071 - loss: 0.5798 - val_accuracy: 0.7094 - val_loss: 0.5803
Epoch 482/500
10/10              0s 21ms/step -
accuracy: 0.7255 - loss: 0.5615 - val_accuracy: 0.7094 - val_loss: 0.5802
Epoch 483/500
```

```
10/10              0s 21ms/step -
accuracy: 0.7152 - loss: 0.5726 - val_accuracy: 0.7094 - val_loss: 0.5802
Epoch 484/500
10/10              0s 21ms/step -
accuracy: 0.7207 - loss: 0.5693 - val_accuracy: 0.7094 - val_loss: 0.5801
Epoch 485/500
10/10              0s 20ms/step -
accuracy: 0.7102 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5801
Epoch 486/500
10/10              0s 18ms/step -
accuracy: 0.6950 - loss: 0.5951 - val_accuracy: 0.7094 - val_loss: 0.5801
Epoch 487/500
10/10              0s 8ms/step -
accuracy: 0.7180 - loss: 0.5730 - val_accuracy: 0.7094 - val_loss: 0.5800
Epoch 488/500
10/10              0s 9ms/step -
accuracy: 0.7182 - loss: 0.5717 - val_accuracy: 0.7094 - val_loss: 0.5799
Epoch 489/500
10/10              0s 9ms/step -
accuracy: 0.6829 - loss: 0.6041 - val_accuracy: 0.7094 - val_loss: 0.5799
Epoch 490/500
10/10              0s 18ms/step -
accuracy: 0.7353 - loss: 0.5533 - val_accuracy: 0.7094 - val_loss: 0.5799
Epoch 491/500
10/10              0s 21ms/step -
accuracy: 0.7354 - loss: 0.5535 - val_accuracy: 0.7094 - val_loss: 0.5798
Epoch 492/500
10/10              0s 19ms/step -
accuracy: 0.7298 - loss: 0.5583 - val_accuracy: 0.7094 - val_loss: 0.5798
Epoch 493/500
10/10              0s 19ms/step -
accuracy: 0.6776 - loss: 0.6071 - val_accuracy: 0.7094 - val_loss: 0.5797
Epoch 494/500
10/10              0s 10ms/step -
accuracy: 0.7067 - loss: 0.5806 - val_accuracy: 0.7094 - val_loss: 0.5797
Epoch 495/500
10/10              0s 18ms/step -
accuracy: 0.7106 - loss: 0.5744 - val_accuracy: 0.7094 - val_loss: 0.5796
Epoch 496/500
10/10              0s 19ms/step -
accuracy: 0.7206 - loss: 0.5670 - val_accuracy: 0.7094 - val_loss: 0.5796
Epoch 497/500
10/10              0s 21ms/step -
accuracy: 0.7118 - loss: 0.5793 - val_accuracy: 0.7094 - val_loss: 0.5795
Epoch 498/500
10/10              0s 19ms/step -
accuracy: 0.7082 - loss: 0.5773 - val_accuracy: 0.7094 - val_loss: 0.5795
Epoch 499/500
```

```
10/10                 0s 20ms/step -
accuracy: 0.7136 - loss: 0.5759 - val_accuracy: 0.7094 - val_loss: 0.5794
Epoch 500/500
10/10                 0s 17ms/step -
accuracy: 0.7282 - loss: 0.5560 - val_accuracy: 0.7094 - val_loss: 0.5794
```

[10]:
```python
# Training accuracy over epochs
train_accuracies = history.history['accuracy']

# Validation accuracy over epochs
val_accuracies = history.history['val_accuracy']

# Final validation accuracy
print(f"Final Validation Accuracy: {val_accuracies[-1] * 100:.2f}%")
```

```
Final Validation Accuracy: 70.94%
```

0.1.7 Visualizing train and validation accuracy

[11]:
```python
import matplotlib.pyplot as plt

plt.plot(train_accuracies, label='Train Accuracy')
plt.plot(val_accuracies, label='Validation Accuracy')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.legend()
plt.title('Model Accuracy Over Epochs')
plt.show()
```
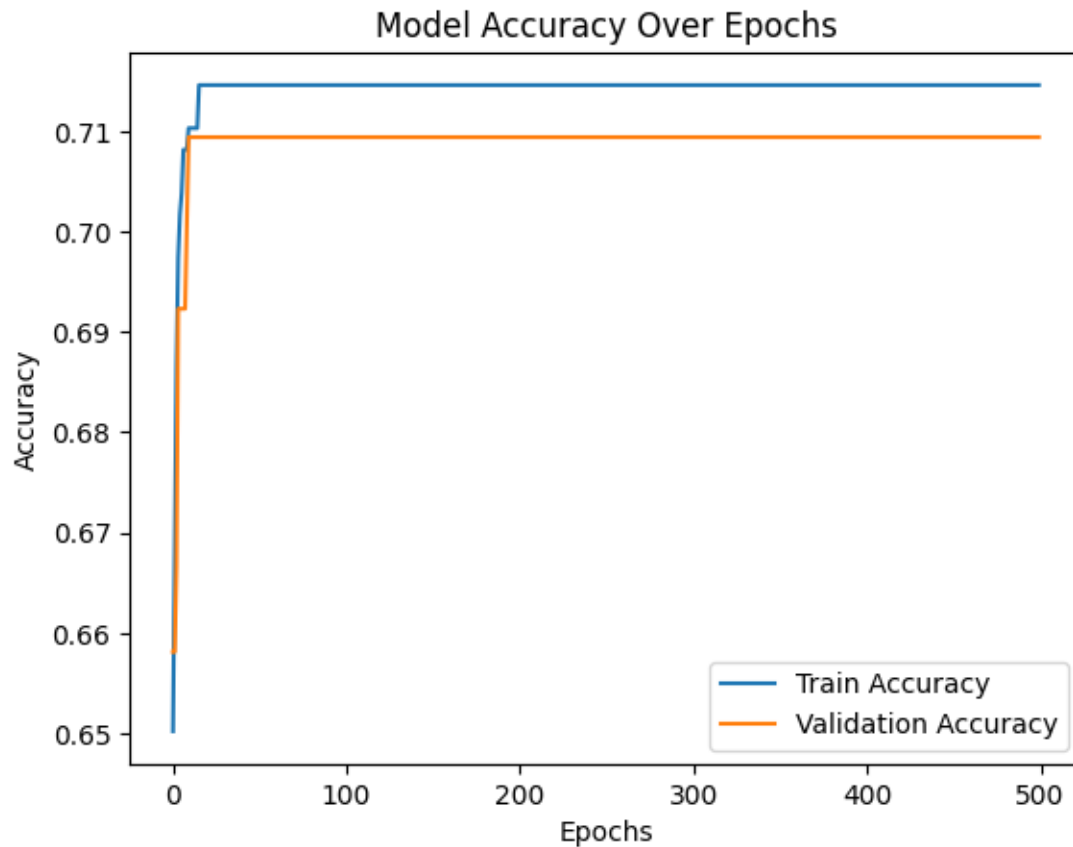
0.2 Adding 2 neurons in the output layer

```
[12]: ### This step does one hot encoding for the output variable
      y_train_2 = keras.utils.to_categorical(y_train,2)
      y_test_2 = keras.utils.to_categorical(y_test,2)
```

```
[13]: model = Sequential()
      model.add(Dense(2,activation = 'softmax', input_shape = (9,)))
      model.summary()
```

Model: "sequential_1"

Layer (type)	Output Shape	Param #
dense_1 (Dense)	(None, 2)	20

Total params: 20 (80.00 B)

Trainable params: 20 (80.00 B)

Non-trainable params: 0 (0.00 B)

```
[14]: model.compile(loss = "CategoricalCrossentropy", optimizer='SGD', metrics =␣
      ↪['accuracy'])
      history = model.fit(x_train, y_train_2, batch_size=50, epochs=500,
                          verbose=1, validation_data=(x_test, y_test_2))
```

```
Epoch 1/500
10/10              1s 59ms/step -
accuracy: 0.3976 - loss: 0.7431 - val_accuracy: 0.3761 - val_loss: 0.7263
Epoch 2/500
10/10              0s 21ms/step -
accuracy: 0.4320 - loss: 0.7200 - val_accuracy: 0.4786 - val_loss: 0.7077
Epoch 3/500
10/10              0s 17ms/step -
accuracy: 0.4700 - loss: 0.7083 - val_accuracy: 0.5812 - val_loss: 0.6934
Epoch 4/500
10/10              0s 19ms/step -
accuracy: 0.5106 - loss: 0.6994 - val_accuracy: 0.5983 - val_loss: 0.6805
Epoch 5/500
10/10              0s 21ms/step -
accuracy: 0.5784 - loss: 0.6747 - val_accuracy: 0.6410 - val_loss: 0.6698
Epoch 6/500
10/10              0s 21ms/step -
accuracy: 0.6253 - loss: 0.6709 - val_accuracy: 0.6496 - val_loss: 0.6618
Epoch 7/500
10/10              0s 19ms/step -
accuracy: 0.6164 - loss: 0.6684 - val_accuracy: 0.6581 - val_loss: 0.6543
Epoch 8/500
10/10              0s 21ms/step -
accuracy: 0.6291 - loss: 0.6635 - val_accuracy: 0.6581 - val_loss: 0.6478
Epoch 9/500
10/10              0s 20ms/step -
accuracy: 0.6680 - loss: 0.6471 - val_accuracy: 0.6923 - val_loss: 0.6427
Epoch 10/500
10/10              0s 21ms/step -
accuracy: 0.6493 - loss: 0.6548 - val_accuracy: 0.6923 - val_loss: 0.6380
Epoch 11/500
10/10              0s 22ms/step -
accuracy: 0.6864 - loss: 0.6396 - val_accuracy: 0.6923 - val_loss: 0.6343
Epoch 12/500
10/10              0s 22ms/step -
accuracy: 0.6729 - loss: 0.6444 - val_accuracy: 0.7009 - val_loss: 0.6314
```

```
Epoch 13/500
10/10              0s 20ms/step -
accuracy: 0.6801 - loss: 0.6370 - val_accuracy: 0.7009 - val_loss: 0.6283
Epoch 14/500
10/10              0s 22ms/step -
accuracy: 0.7037 - loss: 0.6156 - val_accuracy: 0.7009 - val_loss: 0.6260
Epoch 15/500
10/10              0s 21ms/step -
accuracy: 0.6680 - loss: 0.6426 - val_accuracy: 0.7009 - val_loss: 0.6237
Epoch 16/500
10/10              0s 19ms/step -
accuracy: 0.6985 - loss: 0.6224 - val_accuracy: 0.7009 - val_loss: 0.6220
Epoch 17/500
10/10              0s 22ms/step -
accuracy: 0.6735 - loss: 0.6424 - val_accuracy: 0.7009 - val_loss: 0.6205
Epoch 18/500
10/10              0s 21ms/step -
accuracy: 0.7011 - loss: 0.6222 - val_accuracy: 0.7009 - val_loss: 0.6192
Epoch 19/500
10/10              0s 21ms/step -
accuracy: 0.6963 - loss: 0.6342 - val_accuracy: 0.7009 - val_loss: 0.6179
Epoch 20/500
10/10              0s 22ms/step -
accuracy: 0.7237 - loss: 0.6075 - val_accuracy: 0.7094 - val_loss: 0.6168
Epoch 21/500
10/10              0s 17ms/step -
accuracy: 0.7202 - loss: 0.6055 - val_accuracy: 0.7094 - val_loss: 0.6159
Epoch 22/500
10/10              0s 21ms/step -
accuracy: 0.7237 - loss: 0.6047 - val_accuracy: 0.7094 - val_loss: 0.6152
Epoch 23/500
10/10              0s 21ms/step -
accuracy: 0.6733 - loss: 0.6428 - val_accuracy: 0.7094 - val_loss: 0.6145
Epoch 24/500
10/10              0s 20ms/step -
accuracy: 0.7061 - loss: 0.6117 - val_accuracy: 0.7094 - val_loss: 0.6141
Epoch 25/500
10/10              0s 21ms/step -
accuracy: 0.6938 - loss: 0.6210 - val_accuracy: 0.7094 - val_loss: 0.6136
Epoch 26/500
10/10              0s 21ms/step -
accuracy: 0.7055 - loss: 0.6189 - val_accuracy: 0.7094 - val_loss: 0.6132
Epoch 27/500
10/10              0s 21ms/step -
accuracy: 0.7249 - loss: 0.5969 - val_accuracy: 0.7094 - val_loss: 0.6127
Epoch 28/500
10/10              0s 20ms/step -
accuracy: 0.7327 - loss: 0.5941 - val_accuracy: 0.7094 - val_loss: 0.6124
```

```
Epoch 29/500
10/10            0s 21ms/step -
accuracy: 0.6963 - loss: 0.6244 - val_accuracy: 0.7094 - val_loss: 0.6120
Epoch 30/500
10/10            0s 21ms/step -
accuracy: 0.7065 - loss: 0.6128 - val_accuracy: 0.7094 - val_loss: 0.6117
Epoch 31/500
10/10            0s 19ms/step -
accuracy: 0.7125 - loss: 0.6136 - val_accuracy: 0.7094 - val_loss: 0.6113
Epoch 32/500
10/10            0s 21ms/step -
accuracy: 0.6994 - loss: 0.6239 - val_accuracy: 0.7094 - val_loss: 0.6110
Epoch 33/500
10/10            0s 21ms/step -
accuracy: 0.7406 - loss: 0.5906 - val_accuracy: 0.7094 - val_loss: 0.6108
Epoch 34/500
10/10            0s 21ms/step -
accuracy: 0.7237 - loss: 0.5974 - val_accuracy: 0.7094 - val_loss: 0.6104
Epoch 35/500
10/10            0s 17ms/step -
accuracy: 0.7216 - loss: 0.6074 - val_accuracy: 0.7094 - val_loss: 0.6102
Epoch 36/500
10/10            0s 21ms/step -
accuracy: 0.7141 - loss: 0.6109 - val_accuracy: 0.7094 - val_loss: 0.6099
Epoch 37/500
10/10            0s 23ms/step -
accuracy: 0.7164 - loss: 0.6050 - val_accuracy: 0.7094 - val_loss: 0.6096
Epoch 38/500
10/10            0s 10ms/step -
accuracy: 0.7047 - loss: 0.6111 - val_accuracy: 0.7094 - val_loss: 0.6093
Epoch 39/500
10/10            0s 21ms/step -
accuracy: 0.6816 - loss: 0.6342 - val_accuracy: 0.7094 - val_loss: 0.6090
Epoch 40/500
10/10            0s 20ms/step -
accuracy: 0.7289 - loss: 0.5846 - val_accuracy: 0.7094 - val_loss: 0.6088
Epoch 41/500
10/10            0s 19ms/step -
accuracy: 0.7058 - loss: 0.6106 - val_accuracy: 0.7094 - val_loss: 0.6085
Epoch 42/500
10/10            0s 23ms/step -
accuracy: 0.7175 - loss: 0.6045 - val_accuracy: 0.7094 - val_loss: 0.6083
Epoch 43/500
10/10            0s 22ms/step -
accuracy: 0.6942 - loss: 0.6269 - val_accuracy: 0.7094 - val_loss: 0.6081
Epoch 44/500
10/10            0s 21ms/step -
accuracy: 0.7088 - loss: 0.6117 - val_accuracy: 0.7094 - val_loss: 0.6078
```

```
Epoch 45/500
10/10          0s 23ms/step -
accuracy: 0.6928 - loss: 0.6170 - val_accuracy: 0.7094 - val_loss: 0.6076
Epoch 46/500
10/10          0s 22ms/step -
accuracy: 0.7313 - loss: 0.5820 - val_accuracy: 0.7094 - val_loss: 0.6074
Epoch 47/500
10/10          0s 23ms/step -
accuracy: 0.7135 - loss: 0.6008 - val_accuracy: 0.7094 - val_loss: 0.6072
Epoch 48/500
10/10          0s 16ms/step -
accuracy: 0.7013 - loss: 0.6161 - val_accuracy: 0.7094 - val_loss: 0.6069
Epoch 49/500
10/10          0s 19ms/step -
accuracy: 0.6909 - loss: 0.6269 - val_accuracy: 0.7094 - val_loss: 0.6067
Epoch 50/500
10/10          0s 20ms/step -
accuracy: 0.6976 - loss: 0.6160 - val_accuracy: 0.7094 - val_loss: 0.6065
Epoch 51/500
10/10          0s 21ms/step -
accuracy: 0.7149 - loss: 0.5998 - val_accuracy: 0.7094 - val_loss: 0.6063
Epoch 52/500
10/10          0s 19ms/step -
accuracy: 0.7073 - loss: 0.6086 - val_accuracy: 0.7094 - val_loss: 0.6061
Epoch 53/500
10/10          0s 19ms/step -
accuracy: 0.7327 - loss: 0.5873 - val_accuracy: 0.7094 - val_loss: 0.6059
Epoch 54/500
10/10          0s 22ms/step -
accuracy: 0.7153 - loss: 0.6034 - val_accuracy: 0.7094 - val_loss: 0.6056
Epoch 55/500
10/10          0s 22ms/step -
accuracy: 0.7035 - loss: 0.6074 - val_accuracy: 0.7094 - val_loss: 0.6054
Epoch 56/500
10/10          0s 10ms/step -
accuracy: 0.7002 - loss: 0.6114 - val_accuracy: 0.7094 - val_loss: 0.6052
Epoch 57/500
10/10          0s 21ms/step -
accuracy: 0.7105 - loss: 0.6015 - val_accuracy: 0.7094 - val_loss: 0.6050
Epoch 58/500
10/10          0s 27ms/step -
accuracy: 0.7279 - loss: 0.5901 - val_accuracy: 0.7094 - val_loss: 0.6048
Epoch 59/500
10/10          0s 21ms/step -
accuracy: 0.7020 - loss: 0.6101 - val_accuracy: 0.7094 - val_loss: 0.6046
Epoch 60/500
10/10          0s 22ms/step -
accuracy: 0.6904 - loss: 0.6223 - val_accuracy: 0.7094 - val_loss: 0.6043
```

```
Epoch 61/500
10/10              0s 23ms/step -
accuracy: 0.7122 - loss: 0.5961 - val_accuracy: 0.7094 - val_loss: 0.6041
Epoch 62/500
10/10              0s 22ms/step -
accuracy: 0.7237 - loss: 0.5956 - val_accuracy: 0.7094 - val_loss: 0.6039
Epoch 63/500
10/10              0s 25ms/step -
accuracy: 0.6650 - loss: 0.6442 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 64/500
10/10              0s 24ms/step -
accuracy: 0.7175 - loss: 0.6025 - val_accuracy: 0.7094 - val_loss: 0.6035
Epoch 65/500
10/10              0s 23ms/step -
accuracy: 0.6968 - loss: 0.6204 - val_accuracy: 0.7094 - val_loss: 0.6034
Epoch 66/500
10/10              0s 22ms/step -
accuracy: 0.6913 - loss: 0.6237 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 67/500
10/10              0s 23ms/step -
accuracy: 0.7090 - loss: 0.6057 - val_accuracy: 0.7094 - val_loss: 0.6029
Epoch 68/500
10/10              0s 23ms/step -
accuracy: 0.7030 - loss: 0.6095 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 69/500
10/10              0s 23ms/step -
accuracy: 0.6831 - loss: 0.6317 - val_accuracy: 0.7094 - val_loss: 0.6025
Epoch 70/500
10/10              0s 23ms/step -
accuracy: 0.7057 - loss: 0.6045 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 71/500
10/10              0s 23ms/step -
accuracy: 0.6990 - loss: 0.6146 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 72/500
10/10              0s 21ms/step -
accuracy: 0.6967 - loss: 0.6140 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 73/500
10/10              0s 23ms/step -
accuracy: 0.6912 - loss: 0.6170 - val_accuracy: 0.7094 - val_loss: 0.6017
Epoch 74/500
10/10              0s 23ms/step -
accuracy: 0.7348 - loss: 0.5771 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 75/500
10/10              0s 24ms/step -
accuracy: 0.6957 - loss: 0.6129 - val_accuracy: 0.7094 - val_loss: 0.6014
Epoch 76/500
10/10              0s 23ms/step -
accuracy: 0.6939 - loss: 0.6195 - val_accuracy: 0.7094 - val_loss: 0.6012
```

```
Epoch 77/500
10/10              0s 24ms/step -
accuracy: 0.7221 - loss: 0.5917 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 78/500
10/10              0s 23ms/step -
accuracy: 0.6774 - loss: 0.6236 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 79/500
10/10              0s 25ms/step -
accuracy: 0.7064 - loss: 0.6095 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 80/500
10/10              0s 22ms/step -
accuracy: 0.6767 - loss: 0.6335 - val_accuracy: 0.7094 - val_loss: 0.6004
Epoch 81/500
10/10              0s 23ms/step -
accuracy: 0.7016 - loss: 0.6046 - val_accuracy: 0.7094 - val_loss: 0.6002
Epoch 82/500
10/10              0s 23ms/step -
accuracy: 0.6975 - loss: 0.6175 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 83/500
10/10              0s 23ms/step -
accuracy: 0.7099 - loss: 0.6036 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 84/500
10/10              0s 25ms/step -
accuracy: 0.7148 - loss: 0.5940 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 85/500
10/10              0s 22ms/step -
accuracy: 0.7083 - loss: 0.6067 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 86/500
10/10              0s 22ms/step -
accuracy: 0.6940 - loss: 0.6204 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 87/500
10/10              0s 22ms/step -
accuracy: 0.7210 - loss: 0.5910 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 88/500
10/10              0s 28ms/step -
accuracy: 0.7142 - loss: 0.5953 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 89/500
10/10              0s 24ms/step -
accuracy: 0.6942 - loss: 0.6214 - val_accuracy: 0.7094 - val_loss: 0.5988
Epoch 90/500
10/10              0s 24ms/step -
accuracy: 0.7189 - loss: 0.5897 - val_accuracy: 0.7094 - val_loss: 0.5986
Epoch 91/500
10/10              0s 25ms/step -
accuracy: 0.7200 - loss: 0.5912 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 92/500
10/10              0s 26ms/step -
accuracy: 0.6894 - loss: 0.6158 - val_accuracy: 0.7094 - val_loss: 0.5982
```

```
Epoch 93/500
10/10              0s 23ms/step -
accuracy: 0.7072 - loss: 0.6044 - val_accuracy: 0.7094 - val_loss: 0.5980
Epoch 94/500
10/10              0s 24ms/step -
accuracy: 0.6995 - loss: 0.6087 - val_accuracy: 0.7094 - val_loss: 0.5978
Epoch 95/500
10/10              0s 23ms/step -
accuracy: 0.7151 - loss: 0.5950 - val_accuracy: 0.7094 - val_loss: 0.5977
Epoch 96/500
10/10              1s 50ms/step -
accuracy: 0.7122 - loss: 0.5955 - val_accuracy: 0.7094 - val_loss: 0.5975
Epoch 97/500
10/10              0s 21ms/step -
accuracy: 0.7136 - loss: 0.5946 - val_accuracy: 0.7094 - val_loss: 0.5973
Epoch 98/500
10/10              0s 24ms/step -
accuracy: 0.6968 - loss: 0.6152 - val_accuracy: 0.7094 - val_loss: 0.5972
Epoch 99/500
10/10              0s 23ms/step -
accuracy: 0.6801 - loss: 0.6285 - val_accuracy: 0.7094 - val_loss: 0.5970
Epoch 100/500
10/10              0s 31ms/step -
accuracy: 0.7090 - loss: 0.6019 - val_accuracy: 0.7094 - val_loss: 0.5968
Epoch 101/500
10/10              0s 19ms/step -
accuracy: 0.7123 - loss: 0.5994 - val_accuracy: 0.7094 - val_loss: 0.5967
Epoch 102/500
10/10              0s 27ms/step -
accuracy: 0.7239 - loss: 0.5862 - val_accuracy: 0.7094 - val_loss: 0.5965
Epoch 103/500
10/10              0s 24ms/step -
accuracy: 0.7036 - loss: 0.6069 - val_accuracy: 0.7094 - val_loss: 0.5963
Epoch 104/500
10/10              0s 28ms/step -
accuracy: 0.7183 - loss: 0.5943 - val_accuracy: 0.7094 - val_loss: 0.5961
Epoch 105/500
10/10              0s 29ms/step -
accuracy: 0.6849 - loss: 0.6228 - val_accuracy: 0.7094 - val_loss: 0.5960
Epoch 106/500
10/10              0s 24ms/step -
accuracy: 0.6941 - loss: 0.6217 - val_accuracy: 0.7094 - val_loss: 0.5958
Epoch 107/500
10/10              0s 25ms/step -
accuracy: 0.7256 - loss: 0.5876 - val_accuracy: 0.7094 - val_loss: 0.5957
Epoch 108/500
10/10              0s 26ms/step -
accuracy: 0.7476 - loss: 0.5688 - val_accuracy: 0.7094 - val_loss: 0.5955
```

```
Epoch 109/500
10/10            0s 23ms/step -
accuracy: 0.7472 - loss: 0.5655 - val_accuracy: 0.7094 - val_loss: 0.5953
Epoch 110/500
10/10            0s 24ms/step -
accuracy: 0.7037 - loss: 0.6059 - val_accuracy: 0.7094 - val_loss: 0.5952
Epoch 111/500
10/10            0s 23ms/step -
accuracy: 0.7182 - loss: 0.5907 - val_accuracy: 0.7094 - val_loss: 0.5950
Epoch 112/500
10/10            0s 22ms/step -
accuracy: 0.7132 - loss: 0.5944 - val_accuracy: 0.7094 - val_loss: 0.5949
Epoch 113/500
10/10            0s 21ms/step -
accuracy: 0.7037 - loss: 0.6063 - val_accuracy: 0.7094 - val_loss: 0.5947
Epoch 114/500
10/10            0s 22ms/step -
accuracy: 0.7283 - loss: 0.5825 - val_accuracy: 0.7094 - val_loss: 0.5946
Epoch 115/500
10/10            0s 22ms/step -
accuracy: 0.7068 - loss: 0.6021 - val_accuracy: 0.7094 - val_loss: 0.5944
Epoch 116/500
10/10            0s 23ms/step -
accuracy: 0.7071 - loss: 0.6063 - val_accuracy: 0.7094 - val_loss: 0.5942
Epoch 117/500
10/10            0s 18ms/step -
accuracy: 0.7154 - loss: 0.6003 - val_accuracy: 0.7094 - val_loss: 0.5940
Epoch 118/500
10/10            0s 22ms/step -
accuracy: 0.7181 - loss: 0.5899 - val_accuracy: 0.7094 - val_loss: 0.5939
Epoch 119/500
10/10            0s 19ms/step -
accuracy: 0.6952 - loss: 0.6106 - val_accuracy: 0.7094 - val_loss: 0.5937
Epoch 120/500
10/10            0s 22ms/step -
accuracy: 0.7183 - loss: 0.5884 - val_accuracy: 0.7094 - val_loss: 0.5935
Epoch 121/500
10/10            0s 21ms/step -
accuracy: 0.7449 - loss: 0.5660 - val_accuracy: 0.7094 - val_loss: 0.5934
Epoch 122/500
10/10            0s 21ms/step -
accuracy: 0.7275 - loss: 0.5815 - val_accuracy: 0.7094 - val_loss: 0.5932
Epoch 123/500
10/10            0s 22ms/step -
accuracy: 0.7107 - loss: 0.5992 - val_accuracy: 0.7094 - val_loss: 0.5930
Epoch 124/500
10/10            0s 22ms/step -
accuracy: 0.7232 - loss: 0.5843 - val_accuracy: 0.7094 - val_loss: 0.5928
```

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Epoch 125/500
10/10          0s 21ms/step -
accuracy: 0.7019 - loss: 0.6045 - val_accuracy: 0.7094 - val_loss: 0.5927
Epoch 126/500
10/10          0s 20ms/step -
accuracy: 0.6886 - loss: 0.6172 - val_accuracy: 0.7094 - val_loss: 0.5925
Epoch 127/500
10/10          0s 18ms/step -
accuracy: 0.7326 - loss: 0.5768 - val_accuracy: 0.7094 - val_loss: 0.5923
Epoch 128/500
10/10          0s 11ms/step -
accuracy: 0.7138 - loss: 0.5931 - val_accuracy: 0.7094 - val_loss: 0.5922
Epoch 129/500
10/10          0s 11ms/step -
accuracy: 0.7262 - loss: 0.5801 - val_accuracy: 0.7094 - val_loss: 0.5920
Epoch 130/500
10/10          0s 13ms/step -
accuracy: 0.6977 - loss: 0.6120 - val_accuracy: 0.7094 - val_loss: 0.5918
Epoch 131/500
10/10          0s 20ms/step -
accuracy: 0.7380 - loss: 0.5722 - val_accuracy: 0.7094 - val_loss: 0.5917
Epoch 132/500
10/10          0s 22ms/step -
accuracy: 0.7348 - loss: 0.5759 - val_accuracy: 0.7094 - val_loss: 0.5915
Epoch 133/500
10/10          0s 26ms/step -
accuracy: 0.7085 - loss: 0.5950 - val_accuracy: 0.7094 - val_loss: 0.5914
Epoch 134/500
10/10          0s 23ms/step -
accuracy: 0.7341 - loss: 0.5788 - val_accuracy: 0.7094 - val_loss: 0.5912
Epoch 135/500
10/10          0s 23ms/step -
accuracy: 0.7225 - loss: 0.5863 - val_accuracy: 0.7094 - val_loss: 0.5911
Epoch 136/500
10/10          0s 22ms/step -
accuracy: 0.6886 - loss: 0.6157 - val_accuracy: 0.7094 - val_loss: 0.5909
Epoch 137/500
10/10          0s 21ms/step -
accuracy: 0.7293 - loss: 0.5808 - val_accuracy: 0.7094 - val_loss: 0.5907
Epoch 138/500
10/10          0s 12ms/step -
accuracy: 0.7030 - loss: 0.5987 - val_accuracy: 0.7094 - val_loss: 0.5906
Epoch 139/500
10/10          0s 20ms/step -
accuracy: 0.6965 - loss: 0.6016 - val_accuracy: 0.7094 - val_loss: 0.5905
Epoch 140/500
10/10          0s 21ms/step -
accuracy: 0.7125 - loss: 0.5950 - val_accuracy: 0.7094 - val_loss: 0.5903
```

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Epoch 141/500
10/10              0s 23ms/step -
accuracy: 0.7102 - loss: 0.5947 - val_accuracy: 0.7094 - val_loss: 0.5902
Epoch 142/500
10/10              0s 22ms/step -
accuracy: 0.7311 - loss: 0.5731 - val_accuracy: 0.7094 - val_loss: 0.5900
Epoch 143/500
10/10              0s 21ms/step -
accuracy: 0.7069 - loss: 0.5917 - val_accuracy: 0.7094 - val_loss: 0.5899
Epoch 144/500
10/10              0s 21ms/step -
accuracy: 0.7135 - loss: 0.5945 - val_accuracy: 0.7094 - val_loss: 0.5898
Epoch 145/500
10/10              0s 21ms/step -
accuracy: 0.7014 - loss: 0.6026 - val_accuracy: 0.7094 - val_loss: 0.5896
Epoch 146/500
10/10              0s 23ms/step -
accuracy: 0.7062 - loss: 0.5962 - val_accuracy: 0.7094 - val_loss: 0.5895
Epoch 147/500
10/10              0s 23ms/step -
accuracy: 0.7265 - loss: 0.5801 - val_accuracy: 0.7094 - val_loss: 0.5894
Epoch 148/500
10/10              0s 23ms/step -
accuracy: 0.7092 - loss: 0.5948 - val_accuracy: 0.7094 - val_loss: 0.5892
Epoch 149/500
10/10              0s 24ms/step -
accuracy: 0.7313 - loss: 0.5766 - val_accuracy: 0.7094 - val_loss: 0.5890
Epoch 150/500
10/10              0s 23ms/step -
accuracy: 0.7160 - loss: 0.5875 - val_accuracy: 0.7094 - val_loss: 0.5889
Epoch 151/500
10/10              0s 23ms/step -
accuracy: 0.7171 - loss: 0.5866 - val_accuracy: 0.7094 - val_loss: 0.5887
Epoch 152/500
10/10              0s 21ms/step -
accuracy: 0.7326 - loss: 0.5736 - val_accuracy: 0.7094 - val_loss: 0.5886
Epoch 153/500
10/10              0s 23ms/step -
accuracy: 0.7063 - loss: 0.6012 - val_accuracy: 0.7094 - val_loss: 0.5884
Epoch 154/500
10/10              0s 22ms/step -
accuracy: 0.7303 - loss: 0.5771 - val_accuracy: 0.7094 - val_loss: 0.5883
Epoch 155/500
10/10              0s 21ms/step -
accuracy: 0.7088 - loss: 0.5946 - val_accuracy: 0.7094 - val_loss: 0.5882
Epoch 156/500
10/10              0s 22ms/step -
accuracy: 0.7160 - loss: 0.5872 - val_accuracy: 0.7094 - val_loss: 0.5880
```

```
Epoch 157/500
10/10              0s 23ms/step -
accuracy: 0.7439 - loss: 0.5629 - val_accuracy: 0.7094 - val_loss: 0.5879
Epoch 158/500
10/10              0s 22ms/step -
accuracy: 0.7191 - loss: 0.5851 - val_accuracy: 0.7094 - val_loss: 0.5877
Epoch 159/500
10/10              0s 22ms/step -
accuracy: 0.7244 - loss: 0.5761 - val_accuracy: 0.7094 - val_loss: 0.5876
Epoch 160/500
10/10              0s 21ms/step -
accuracy: 0.7302 - loss: 0.5744 - val_accuracy: 0.7094 - val_loss: 0.5875
Epoch 161/500
10/10              0s 23ms/step -
accuracy: 0.7161 - loss: 0.5915 - val_accuracy: 0.7094 - val_loss: 0.5874
Epoch 162/500
10/10              0s 21ms/step -
accuracy: 0.7334 - loss: 0.5728 - val_accuracy: 0.7094 - val_loss: 0.5872
Epoch 163/500
10/10              0s 22ms/step -
accuracy: 0.7200 - loss: 0.5817 - val_accuracy: 0.7094 - val_loss: 0.5871
Epoch 164/500
10/10              0s 22ms/step -
accuracy: 0.7207 - loss: 0.5835 - val_accuracy: 0.7094 - val_loss: 0.5870
Epoch 165/500
10/10              0s 24ms/step -
accuracy: 0.6878 - loss: 0.6126 - val_accuracy: 0.7094 - val_loss: 0.5868
Epoch 166/500
10/10              0s 22ms/step -
accuracy: 0.7054 - loss: 0.5958 - val_accuracy: 0.7094 - val_loss: 0.5867
Epoch 167/500
10/10              0s 22ms/step -
accuracy: 0.7217 - loss: 0.5813 - val_accuracy: 0.7094 - val_loss: 0.5866
Epoch 168/500
10/10              0s 29ms/step -
accuracy: 0.7245 - loss: 0.5787 - val_accuracy: 0.7094 - val_loss: 0.5865
Epoch 169/500
10/10              0s 22ms/step -
accuracy: 0.7120 - loss: 0.5939 - val_accuracy: 0.7094 - val_loss: 0.5863
Epoch 170/500
10/10              0s 22ms/step -
accuracy: 0.7046 - loss: 0.5986 - val_accuracy: 0.7094 - val_loss: 0.5862
Epoch 171/500
10/10              0s 22ms/step -
accuracy: 0.7194 - loss: 0.5847 - val_accuracy: 0.7094 - val_loss: 0.5861
Epoch 172/500
10/10              0s 21ms/step -
accuracy: 0.6862 - loss: 0.6120 - val_accuracy: 0.7094 - val_loss: 0.5860
```

```
Epoch 173/500
10/10          0s 22ms/step -
accuracy: 0.7072 - loss: 0.5926 - val_accuracy: 0.7094 - val_loss: 0.5858
Epoch 174/500
10/10          0s 22ms/step -
accuracy: 0.7098 - loss: 0.5872 - val_accuracy: 0.7094 - val_loss: 0.5857
Epoch 175/500
10/10          0s 23ms/step -
accuracy: 0.6860 - loss: 0.6144 - val_accuracy: 0.7094 - val_loss: 0.5855
Epoch 176/500
10/10          0s 22ms/step -
accuracy: 0.7195 - loss: 0.5824 - val_accuracy: 0.7094 - val_loss: 0.5854
Epoch 177/500
10/10          0s 22ms/step -
accuracy: 0.7070 - loss: 0.5885 - val_accuracy: 0.7094 - val_loss: 0.5853
Epoch 178/500
10/10          0s 22ms/step -
accuracy: 0.7400 - loss: 0.5649 - val_accuracy: 0.7094 - val_loss: 0.5851
Epoch 179/500
10/10          0s 22ms/step -
accuracy: 0.7125 - loss: 0.5879 - val_accuracy: 0.7094 - val_loss: 0.5850
Epoch 180/500
10/10          0s 21ms/step -
accuracy: 0.7150 - loss: 0.5826 - val_accuracy: 0.7094 - val_loss: 0.5849
Epoch 181/500
10/10          0s 23ms/step -
accuracy: 0.7407 - loss: 0.5603 - val_accuracy: 0.7094 - val_loss: 0.5848
Epoch 182/500
10/10          0s 22ms/step -
accuracy: 0.7212 - loss: 0.5767 - val_accuracy: 0.7094 - val_loss: 0.5847
Epoch 183/500
10/10          0s 23ms/step -
accuracy: 0.7238 - loss: 0.5748 - val_accuracy: 0.7094 - val_loss: 0.5846
Epoch 184/500
10/10          0s 24ms/step -
accuracy: 0.7231 - loss: 0.5766 - val_accuracy: 0.7094 - val_loss: 0.5845
Epoch 185/500
10/10          0s 22ms/step -
accuracy: 0.7165 - loss: 0.5842 - val_accuracy: 0.7094 - val_loss: 0.5843
Epoch 186/500
10/10          0s 22ms/step -
accuracy: 0.7358 - loss: 0.5646 - val_accuracy: 0.7094 - val_loss: 0.5842
Epoch 187/500
10/10          0s 22ms/step -
accuracy: 0.6925 - loss: 0.6035 - val_accuracy: 0.7094 - val_loss: 0.5841
Epoch 188/500
10/10          0s 23ms/step -
accuracy: 0.7349 - loss: 0.5621 - val_accuracy: 0.7094 - val_loss: 0.5839
```

```
Epoch 189/500
10/10              0s 24ms/step -
accuracy: 0.7396 - loss: 0.5611 - val_accuracy: 0.7094 - val_loss: 0.5838
Epoch 190/500
10/10              0s 22ms/step -
accuracy: 0.7096 - loss: 0.5892 - val_accuracy: 0.7094 - val_loss: 0.5837
Epoch 191/500
10/10              0s 21ms/step -
accuracy: 0.7141 - loss: 0.5796 - val_accuracy: 0.7094 - val_loss: 0.5835
Epoch 192/500
10/10              0s 23ms/step -
accuracy: 0.7192 - loss: 0.5802 - val_accuracy: 0.7094 - val_loss: 0.5834
Epoch 193/500
10/10              0s 21ms/step -
accuracy: 0.7056 - loss: 0.5913 - val_accuracy: 0.7094 - val_loss: 0.5833
Epoch 194/500
10/10              0s 23ms/step -
accuracy: 0.7040 - loss: 0.5950 - val_accuracy: 0.7094 - val_loss: 0.5832
Epoch 195/500
10/10              0s 22ms/step -
accuracy: 0.6848 - loss: 0.6114 - val_accuracy: 0.7094 - val_loss: 0.5830
Epoch 196/500
10/10              0s 22ms/step -
accuracy: 0.7173 - loss: 0.5795 - val_accuracy: 0.7094 - val_loss: 0.5829
Epoch 197/500
10/10              0s 22ms/step -
accuracy: 0.6928 - loss: 0.6006 - val_accuracy: 0.7094 - val_loss: 0.5828
Epoch 198/500
10/10              0s 22ms/step -
accuracy: 0.7230 - loss: 0.5761 - val_accuracy: 0.7094 - val_loss: 0.5827
Epoch 199/500
10/10              0s 22ms/step -
accuracy: 0.7464 - loss: 0.5541 - val_accuracy: 0.7094 - val_loss: 0.5826
Epoch 200/500
10/10              0s 24ms/step -
accuracy: 0.7115 - loss: 0.5849 - val_accuracy: 0.7094 - val_loss: 0.5825
Epoch 201/500
10/10              0s 26ms/step -
accuracy: 0.7202 - loss: 0.5817 - val_accuracy: 0.7094 - val_loss: 0.5824
Epoch 202/500
10/10              0s 22ms/step -
accuracy: 0.7103 - loss: 0.5874 - val_accuracy: 0.7094 - val_loss: 0.5823
Epoch 203/500
10/10              0s 22ms/step -
accuracy: 0.7053 - loss: 0.5906 - val_accuracy: 0.7094 - val_loss: 0.5822
Epoch 204/500
10/10              0s 22ms/step -
accuracy: 0.7152 - loss: 0.5855 - val_accuracy: 0.7094 - val_loss: 0.5820
```

```
Epoch 205/500
10/10            0s 22ms/step -
accuracy: 0.7018 - loss: 0.5938 - val_accuracy: 0.7094 - val_loss: 0.5819
Epoch 206/500
10/10            0s 23ms/step -
accuracy: 0.7517 - loss: 0.5476 - val_accuracy: 0.7094 - val_loss: 0.5818
Epoch 207/500
10/10            0s 22ms/step -
accuracy: 0.6924 - loss: 0.6032 - val_accuracy: 0.7094 - val_loss: 0.5817
Epoch 208/500
10/10            0s 24ms/step -
accuracy: 0.7277 - loss: 0.5706 - val_accuracy: 0.7094 - val_loss: 0.5816
Epoch 209/500
10/10            0s 22ms/step -
accuracy: 0.7133 - loss: 0.5834 - val_accuracy: 0.7094 - val_loss: 0.5815
Epoch 210/500
10/10            0s 22ms/step -
accuracy: 0.6805 - loss: 0.6072 - val_accuracy: 0.7094 - val_loss: 0.5814
Epoch 211/500
10/10            0s 22ms/step -
accuracy: 0.7270 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5813
Epoch 212/500
10/10            0s 23ms/step -
accuracy: 0.7106 - loss: 0.5872 - val_accuracy: 0.7094 - val_loss: 0.5812
Epoch 213/500
10/10            0s 22ms/step -
accuracy: 0.7255 - loss: 0.5682 - val_accuracy: 0.7094 - val_loss: 0.5810
Epoch 214/500
10/10            0s 22ms/step -
accuracy: 0.6924 - loss: 0.6012 - val_accuracy: 0.7094 - val_loss: 0.5809
Epoch 215/500
10/10            0s 24ms/step -
accuracy: 0.7265 - loss: 0.5706 - val_accuracy: 0.7094 - val_loss: 0.5808
Epoch 216/500
10/10            0s 22ms/step -
accuracy: 0.6875 - loss: 0.6017 - val_accuracy: 0.7094 - val_loss: 0.5807
Epoch 217/500
10/10            0s 22ms/step -
accuracy: 0.7277 - loss: 0.5687 - val_accuracy: 0.7094 - val_loss: 0.5806
Epoch 218/500
10/10            0s 22ms/step -
accuracy: 0.7054 - loss: 0.5892 - val_accuracy: 0.7094 - val_loss: 0.5805
Epoch 219/500
10/10            0s 22ms/step -
accuracy: 0.7042 - loss: 0.5874 - val_accuracy: 0.7094 - val_loss: 0.5804
Epoch 220/500
10/10            0s 23ms/step -
accuracy: 0.6825 - loss: 0.6096 - val_accuracy: 0.7094 - val_loss: 0.5803
```

```
Epoch 221/500
10/10             0s 22ms/step -
accuracy: 0.7497 - loss: 0.5479 - val_accuracy: 0.7094 - val_loss: 0.5802
Epoch 222/500
10/10             0s 22ms/step -
accuracy: 0.6825 - loss: 0.6099 - val_accuracy: 0.7094 - val_loss: 0.5801
Epoch 223/500
10/10             0s 21ms/step -
accuracy: 0.7134 - loss: 0.5798 - val_accuracy: 0.7094 - val_loss: 0.5800
Epoch 224/500
10/10             0s 23ms/step -
accuracy: 0.7087 - loss: 0.5876 - val_accuracy: 0.7094 - val_loss: 0.5799
Epoch 225/500
10/10             0s 21ms/step -
accuracy: 0.7109 - loss: 0.5797 - val_accuracy: 0.7094 - val_loss: 0.5798
Epoch 226/500
10/10             0s 22ms/step -
accuracy: 0.6991 - loss: 0.5942 - val_accuracy: 0.7094 - val_loss: 0.5797
Epoch 227/500
10/10             0s 22ms/step -
accuracy: 0.7250 - loss: 0.5725 - val_accuracy: 0.7094 - val_loss: 0.5795
Epoch 228/500
10/10             0s 23ms/step -
accuracy: 0.7296 - loss: 0.5700 - val_accuracy: 0.7094 - val_loss: 0.5794
Epoch 229/500
10/10             0s 22ms/step -
accuracy: 0.6942 - loss: 0.5956 - val_accuracy: 0.7094 - val_loss: 0.5793
Epoch 230/500
10/10             0s 22ms/step -
accuracy: 0.7076 - loss: 0.5833 - val_accuracy: 0.7094 - val_loss: 0.5792
Epoch 231/500
10/10             0s 29ms/step -
accuracy: 0.6990 - loss: 0.5934 - val_accuracy: 0.7094 - val_loss: 0.5792
Epoch 232/500
10/10             0s 21ms/step -
accuracy: 0.7038 - loss: 0.5886 - val_accuracy: 0.7094 - val_loss: 0.5791
Epoch 233/500
10/10             0s 21ms/step -
accuracy: 0.6982 - loss: 0.5952 - val_accuracy: 0.7094 - val_loss: 0.5789
Epoch 234/500
10/10             0s 21ms/step -
accuracy: 0.7122 - loss: 0.5827 - val_accuracy: 0.7094 - val_loss: 0.5789
Epoch 235/500
10/10             0s 23ms/step -
accuracy: 0.7159 - loss: 0.5795 - val_accuracy: 0.7094 - val_loss: 0.5787
Epoch 236/500
10/10             0s 23ms/step -
accuracy: 0.7188 - loss: 0.5728 - val_accuracy: 0.7094 - val_loss: 0.5786
```

```
Epoch 237/500
10/10              0s 22ms/step -
accuracy: 0.7246 - loss: 0.5682 - val_accuracy: 0.7094 - val_loss: 0.5785
Epoch 238/500
10/10              0s 22ms/step -
accuracy: 0.7247 - loss: 0.5687 - val_accuracy: 0.7094 - val_loss: 0.5784
Epoch 239/500
10/10              0s 22ms/step -
accuracy: 0.7104 - loss: 0.5847 - val_accuracy: 0.7094 - val_loss: 0.5783
Epoch 240/500
10/10              0s 22ms/step -
accuracy: 0.7292 - loss: 0.5685 - val_accuracy: 0.7094 - val_loss: 0.5782
Epoch 241/500
10/10              0s 22ms/step -
accuracy: 0.7007 - loss: 0.5891 - val_accuracy: 0.7094 - val_loss: 0.5781
Epoch 242/500
10/10              0s 22ms/step -
accuracy: 0.7287 - loss: 0.5613 - val_accuracy: 0.7094 - val_loss: 0.5780
Epoch 243/500
10/10              0s 23ms/step -
accuracy: 0.7332 - loss: 0.5581 - val_accuracy: 0.7094 - val_loss: 0.5779
Epoch 244/500
10/10              0s 22ms/step -
accuracy: 0.7307 - loss: 0.5650 - val_accuracy: 0.7094 - val_loss: 0.5778
Epoch 245/500
10/10              0s 22ms/step -
accuracy: 0.7096 - loss: 0.5783 - val_accuracy: 0.7094 - val_loss: 0.5777
Epoch 246/500
10/10              0s 23ms/step -
accuracy: 0.7273 - loss: 0.5699 - val_accuracy: 0.7094 - val_loss: 0.5777
Epoch 247/500
10/10              0s 23ms/step -
accuracy: 0.6945 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.5776
Epoch 248/500
10/10              0s 22ms/step -
accuracy: 0.7032 - loss: 0.5896 - val_accuracy: 0.7094 - val_loss: 0.5774
Epoch 249/500
10/10              0s 22ms/step -
accuracy: 0.7135 - loss: 0.5779 - val_accuracy: 0.7094 - val_loss: 0.5773
Epoch 250/500
10/10              0s 22ms/step -
accuracy: 0.6909 - loss: 0.5968 - val_accuracy: 0.7094 - val_loss: 0.5772
Epoch 251/500
10/10              0s 23ms/step -
accuracy: 0.7059 - loss: 0.5832 - val_accuracy: 0.7094 - val_loss: 0.5772
Epoch 252/500
10/10              0s 21ms/step -
accuracy: 0.7177 - loss: 0.5721 - val_accuracy: 0.7094 - val_loss: 0.5771
```

```
Epoch 253/500
10/10              0s 23ms/step -
accuracy: 0.7025 - loss: 0.5854 - val_accuracy: 0.7094 - val_loss: 0.5770
Epoch 254/500
10/10              0s 22ms/step -
accuracy: 0.7241 - loss: 0.5670 - val_accuracy: 0.7094 - val_loss: 0.5769
Epoch 255/500
10/10              0s 22ms/step -
accuracy: 0.7180 - loss: 0.5742 - val_accuracy: 0.7094 - val_loss: 0.5768
Epoch 256/500
10/10              0s 23ms/step -
accuracy: 0.7223 - loss: 0.5686 - val_accuracy: 0.7094 - val_loss: 0.5767
Epoch 257/500
10/10              0s 22ms/step -
accuracy: 0.7015 - loss: 0.5871 - val_accuracy: 0.7094 - val_loss: 0.5766
Epoch 258/500
10/10              0s 20ms/step -
accuracy: 0.7025 - loss: 0.5857 - val_accuracy: 0.7094 - val_loss: 0.5765
Epoch 259/500
10/10              0s 22ms/step -
accuracy: 0.7188 - loss: 0.5713 - val_accuracy: 0.7094 - val_loss: 0.5764
Epoch 260/500
10/10              0s 22ms/step -
accuracy: 0.7067 - loss: 0.5860 - val_accuracy: 0.7094 - val_loss: 0.5763
Epoch 261/500
10/10              0s 24ms/step -
accuracy: 0.7095 - loss: 0.5838 - val_accuracy: 0.7094 - val_loss: 0.5762
Epoch 262/500
10/10              0s 20ms/step -
accuracy: 0.7163 - loss: 0.5756 - val_accuracy: 0.7094 - val_loss: 0.5762
Epoch 263/500
10/10              0s 22ms/step -
accuracy: 0.7008 - loss: 0.5863 - val_accuracy: 0.7094 - val_loss: 0.5761
Epoch 264/500
10/10              0s 24ms/step -
accuracy: 0.7116 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5759
Epoch 265/500
10/10              1s 24ms/step -
accuracy: 0.7050 - loss: 0.5811 - val_accuracy: 0.7094 - val_loss: 0.5758
Epoch 266/500
10/10              0s 22ms/step -
accuracy: 0.7176 - loss: 0.5749 - val_accuracy: 0.7094 - val_loss: 0.5757
Epoch 267/500
10/10              0s 23ms/step -
accuracy: 0.7082 - loss: 0.5802 - val_accuracy: 0.7094 - val_loss: 0.5756
Epoch 268/500
10/10              0s 24ms/step -
accuracy: 0.7366 - loss: 0.5569 - val_accuracy: 0.7094 - val_loss: 0.5755
```

```
Epoch 269/500
10/10            0s 23ms/step -
accuracy: 0.7075 - loss: 0.5807 - val_accuracy: 0.7094 - val_loss: 0.5755
Epoch 270/500
10/10            0s 24ms/step -
accuracy: 0.7119 - loss: 0.5802 - val_accuracy: 0.7094 - val_loss: 0.5754
Epoch 271/500
10/10            0s 21ms/step -
accuracy: 0.6886 - loss: 0.6008 - val_accuracy: 0.7094 - val_loss: 0.5753
Epoch 272/500
10/10            0s 26ms/step -
accuracy: 0.6840 - loss: 0.6007 - val_accuracy: 0.7094 - val_loss: 0.5752
Epoch 273/500
10/10            0s 19ms/step -
accuracy: 0.7446 - loss: 0.5478 - val_accuracy: 0.7094 - val_loss: 0.5751
Epoch 274/500
10/10            0s 22ms/step -
accuracy: 0.7079 - loss: 0.5788 - val_accuracy: 0.7094 - val_loss: 0.5750
Epoch 275/500
10/10            0s 23ms/step -
accuracy: 0.7354 - loss: 0.5540 - val_accuracy: 0.7094 - val_loss: 0.5749
Epoch 276/500
10/10            0s 23ms/step -
accuracy: 0.6806 - loss: 0.6031 - val_accuracy: 0.7094 - val_loss: 0.5748
Epoch 277/500
10/10            0s 22ms/step -
accuracy: 0.7262 - loss: 0.5618 - val_accuracy: 0.7094 - val_loss: 0.5747
Epoch 278/500
10/10            0s 22ms/step -
accuracy: 0.7190 - loss: 0.5681 - val_accuracy: 0.7094 - val_loss: 0.5746
Epoch 279/500
10/10            0s 23ms/step -
accuracy: 0.7099 - loss: 0.5814 - val_accuracy: 0.7094 - val_loss: 0.5745
Epoch 280/500
10/10            0s 23ms/step -
accuracy: 0.6981 - loss: 0.5877 - val_accuracy: 0.7094 - val_loss: 0.5744
Epoch 281/500
10/10            0s 23ms/step -
accuracy: 0.6907 - loss: 0.5941 - val_accuracy: 0.7094 - val_loss: 0.5743
Epoch 282/500
10/10            0s 22ms/step -
accuracy: 0.7162 - loss: 0.5651 - val_accuracy: 0.7094 - val_loss: 0.5742
Epoch 283/500
10/10            0s 22ms/step -
accuracy: 0.6907 - loss: 0.5947 - val_accuracy: 0.7094 - val_loss: 0.5742
Epoch 284/500
10/10            0s 28ms/step -
accuracy: 0.6829 - loss: 0.5992 - val_accuracy: 0.7094 - val_loss: 0.5741
```

```
Epoch 285/500
10/10              0s 22ms/step -
accuracy: 0.7012 - loss: 0.5831 - val_accuracy: 0.7094 - val_loss: 0.5740
Epoch 286/500
10/10              0s 23ms/step -
accuracy: 0.7237 - loss: 0.5682 - val_accuracy: 0.7094 - val_loss: 0.5739
Epoch 287/500
10/10              0s 23ms/step -
accuracy: 0.7187 - loss: 0.5682 - val_accuracy: 0.7094 - val_loss: 0.5738
Epoch 288/500
10/10              0s 24ms/step -
accuracy: 0.7395 - loss: 0.5518 - val_accuracy: 0.7094 - val_loss: 0.5737
Epoch 289/500
10/10              0s 23ms/step -
accuracy: 0.6927 - loss: 0.5909 - val_accuracy: 0.7094 - val_loss: 0.5736
Epoch 290/500
10/10              0s 23ms/step -
accuracy: 0.7316 - loss: 0.5599 - val_accuracy: 0.7094 - val_loss: 0.5735
Epoch 291/500
10/10              0s 22ms/step -
accuracy: 0.6951 - loss: 0.5884 - val_accuracy: 0.7094 - val_loss: 0.5735
Epoch 292/500
10/10              0s 23ms/step -
accuracy: 0.7156 - loss: 0.5718 - val_accuracy: 0.7094 - val_loss: 0.5734
Epoch 293/500
10/10              0s 22ms/step -
accuracy: 0.7114 - loss: 0.5727 - val_accuracy: 0.7094 - val_loss: 0.5733
Epoch 294/500
10/10              0s 22ms/step -
accuracy: 0.7070 - loss: 0.5823 - val_accuracy: 0.7094 - val_loss: 0.5733
Epoch 295/500
10/10              0s 21ms/step -
accuracy: 0.7210 - loss: 0.5632 - val_accuracy: 0.7094 - val_loss: 0.5732
Epoch 296/500
10/10              0s 23ms/step -
accuracy: 0.7117 - loss: 0.5706 - val_accuracy: 0.7094 - val_loss: 0.5731
Epoch 297/500
10/10              0s 22ms/step -
accuracy: 0.7243 - loss: 0.5600 - val_accuracy: 0.7094 - val_loss: 0.5731
Epoch 298/500
10/10              0s 22ms/step -
accuracy: 0.7458 - loss: 0.5409 - val_accuracy: 0.7094 - val_loss: 0.5729
Epoch 299/500
10/10              0s 23ms/step -
accuracy: 0.7097 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5729
Epoch 300/500
10/10              0s 22ms/step -
accuracy: 0.6923 - loss: 0.5948 - val_accuracy: 0.7094 - val_loss: 0.5728
```

```
Epoch 301/500
10/10                0s 22ms/step -
accuracy: 0.7318 - loss: 0.5590 - val_accuracy: 0.7094 - val_loss: 0.5727
Epoch 302/500
10/10                0s 23ms/step -
accuracy: 0.7313 - loss: 0.5591 - val_accuracy: 0.7094 - val_loss: 0.5726
Epoch 303/500
10/10                0s 22ms/step -
accuracy: 0.7090 - loss: 0.5754 - val_accuracy: 0.7094 - val_loss: 0.5725
Epoch 304/500
10/10                0s 22ms/step -
accuracy: 0.7265 - loss: 0.5625 - val_accuracy: 0.7094 - val_loss: 0.5724
Epoch 305/500
10/10                0s 22ms/step -
accuracy: 0.7169 - loss: 0.5673 - val_accuracy: 0.7094 - val_loss: 0.5723
Epoch 306/500
10/10                0s 22ms/step -
accuracy: 0.7315 - loss: 0.5541 - val_accuracy: 0.7094 - val_loss: 0.5723
Epoch 307/500
10/10                0s 24ms/step -
accuracy: 0.7250 - loss: 0.5637 - val_accuracy: 0.7094 - val_loss: 0.5722
Epoch 308/500
10/10                0s 32ms/step -
accuracy: 0.7024 - loss: 0.5806 - val_accuracy: 0.7094 - val_loss: 0.5721
Epoch 309/500
10/10                0s 22ms/step -
accuracy: 0.7130 - loss: 0.5707 - val_accuracy: 0.7094 - val_loss: 0.5721
Epoch 310/500
10/10                0s 21ms/step -
accuracy: 0.7338 - loss: 0.5552 - val_accuracy: 0.7094 - val_loss: 0.5720
Epoch 311/500
10/10                0s 24ms/step -
accuracy: 0.7279 - loss: 0.5608 - val_accuracy: 0.7094 - val_loss: 0.5719
Epoch 312/500
10/10                0s 23ms/step -
accuracy: 0.7290 - loss: 0.5567 - val_accuracy: 0.7094 - val_loss: 0.5718
Epoch 313/500
10/10                0s 22ms/step -
accuracy: 0.7246 - loss: 0.5627 - val_accuracy: 0.7094 - val_loss: 0.5717
Epoch 314/500
10/10                0s 23ms/step -
accuracy: 0.6984 - loss: 0.5816 - val_accuracy: 0.7094 - val_loss: 0.5716
Epoch 315/500
10/10                0s 22ms/step -
accuracy: 0.7233 - loss: 0.5601 - val_accuracy: 0.7094 - val_loss: 0.5715
Epoch 316/500
10/10                0s 22ms/step -
accuracy: 0.7258 - loss: 0.5582 - val_accuracy: 0.7094 - val_loss: 0.5715
```

```
Epoch 317/500
10/10              0s 22ms/step -
accuracy: 0.6862 - loss: 0.5940 - val_accuracy: 0.7094 - val_loss: 0.5714
Epoch 318/500
10/10              0s 22ms/step -
accuracy: 0.7077 - loss: 0.5725 - val_accuracy: 0.7094 - val_loss: 0.5713
Epoch 319/500
10/10              0s 23ms/step -
accuracy: 0.7018 - loss: 0.5796 - val_accuracy: 0.7094 - val_loss: 0.5713
Epoch 320/500
10/10              0s 24ms/step -
accuracy: 0.7297 - loss: 0.5566 - val_accuracy: 0.7094 - val_loss: 0.5711
Epoch 321/500
10/10              0s 25ms/step -
accuracy: 0.7189 - loss: 0.5670 - val_accuracy: 0.7094 - val_loss: 0.5711
Epoch 322/500
10/10              0s 22ms/step -
accuracy: 0.7106 - loss: 0.5744 - val_accuracy: 0.7094 - val_loss: 0.5710
Epoch 323/500
10/10              0s 23ms/step -
accuracy: 0.6997 - loss: 0.5793 - val_accuracy: 0.7094 - val_loss: 0.5710
Epoch 324/500
10/10              0s 22ms/step -
accuracy: 0.7120 - loss: 0.5721 - val_accuracy: 0.7094 - val_loss: 0.5709
Epoch 325/500
10/10              0s 22ms/step -
accuracy: 0.6941 - loss: 0.5864 - val_accuracy: 0.7094 - val_loss: 0.5709
Epoch 326/500
10/10              0s 24ms/step -
accuracy: 0.6824 - loss: 0.6000 - val_accuracy: 0.7094 - val_loss: 0.5708
Epoch 327/500
10/10              0s 24ms/step -
accuracy: 0.7169 - loss: 0.5674 - val_accuracy: 0.7094 - val_loss: 0.5707
Epoch 328/500
10/10              0s 22ms/step -
accuracy: 0.7164 - loss: 0.5665 - val_accuracy: 0.7094 - val_loss: 0.5707
Epoch 329/500
10/10              0s 22ms/step -
accuracy: 0.7042 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5706
Epoch 330/500
10/10              0s 24ms/step -
accuracy: 0.7459 - loss: 0.5458 - val_accuracy: 0.7094 - val_loss: 0.5705
Epoch 331/500
10/10              0s 25ms/step -
accuracy: 0.7162 - loss: 0.5662 - val_accuracy: 0.7094 - val_loss: 0.5704
Epoch 332/500
10/10              0s 22ms/step -
accuracy: 0.6915 - loss: 0.5857 - val_accuracy: 0.7094 - val_loss: 0.5704
```

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Epoch 333/500
10/10          0s 23ms/step -
accuracy: 0.7300 - loss: 0.5551 - val_accuracy: 0.7094 - val_loss: 0.5703
Epoch 334/500
10/10          0s 23ms/step -
accuracy: 0.7044 - loss: 0.5756 - val_accuracy: 0.7094 - val_loss: 0.5703
Epoch 335/500
10/10          0s 21ms/step -
accuracy: 0.7270 - loss: 0.5539 - val_accuracy: 0.7094 - val_loss: 0.5702
Epoch 336/500
10/10          0s 22ms/step -
accuracy: 0.7233 - loss: 0.5598 - val_accuracy: 0.7094 - val_loss: 0.5701
Epoch 337/500
10/10          0s 25ms/step -
accuracy: 0.7107 - loss: 0.5730 - val_accuracy: 0.7094 - val_loss: 0.5700
Epoch 338/500
10/10          0s 24ms/step -
accuracy: 0.7054 - loss: 0.5781 - val_accuracy: 0.7094 - val_loss: 0.5699
Epoch 339/500
10/10          0s 23ms/step -
accuracy: 0.7106 - loss: 0.5698 - val_accuracy: 0.7094 - val_loss: 0.5698
Epoch 340/500
10/10          0s 24ms/step -
accuracy: 0.7420 - loss: 0.5420 - val_accuracy: 0.7094 - val_loss: 0.5697
Epoch 341/500
10/10          0s 22ms/step -
accuracy: 0.7271 - loss: 0.5556 - val_accuracy: 0.7094 - val_loss: 0.5696
Epoch 342/500
10/10          0s 22ms/step -
accuracy: 0.7214 - loss: 0.5639 - val_accuracy: 0.7094 - val_loss: 0.5696
Epoch 343/500
10/10          0s 24ms/step -
accuracy: 0.7384 - loss: 0.5453 - val_accuracy: 0.7094 - val_loss: 0.5695
Epoch 344/500
10/10          0s 23ms/step -
accuracy: 0.7365 - loss: 0.5558 - val_accuracy: 0.7094 - val_loss: 0.5694
Epoch 345/500
10/10          0s 23ms/step -
accuracy: 0.7258 - loss: 0.5597 - val_accuracy: 0.7094 - val_loss: 0.5693
Epoch 346/500
10/10          0s 22ms/step -
accuracy: 0.7014 - loss: 0.5812 - val_accuracy: 0.7094 - val_loss: 0.5692
Epoch 347/500
10/10          0s 21ms/step -
accuracy: 0.7146 - loss: 0.5641 - val_accuracy: 0.7094 - val_loss: 0.5692
Epoch 348/500
10/10          0s 22ms/step -
accuracy: 0.7078 - loss: 0.5754 - val_accuracy: 0.7094 - val_loss: 0.5691
```

```
Epoch 349/500
10/10              0s 23ms/step -
accuracy: 0.7322 - loss: 0.5580 - val_accuracy: 0.7094 - val_loss: 0.5690
Epoch 350/500
10/10              0s 22ms/step -
accuracy: 0.7406 - loss: 0.5431 - val_accuracy: 0.7094 - val_loss: 0.5690
Epoch 351/500
10/10              0s 22ms/step -
accuracy: 0.7170 - loss: 0.5653 - val_accuracy: 0.7094 - val_loss: 0.5689
Epoch 352/500
10/10              0s 23ms/step -
accuracy: 0.7254 - loss: 0.5596 - val_accuracy: 0.7094 - val_loss: 0.5688
Epoch 353/500
10/10              0s 24ms/step -
accuracy: 0.7274 - loss: 0.5500 - val_accuracy: 0.7094 - val_loss: 0.5688
Epoch 354/500
10/10              0s 21ms/step -
accuracy: 0.7286 - loss: 0.5555 - val_accuracy: 0.7094 - val_loss: 0.5687
Epoch 355/500
10/10              0s 21ms/step -
accuracy: 0.7185 - loss: 0.5612 - val_accuracy: 0.7094 - val_loss: 0.5686
Epoch 356/500
10/10              0s 23ms/step -
accuracy: 0.7007 - loss: 0.5750 - val_accuracy: 0.7094 - val_loss: 0.5686
Epoch 357/500
10/10              0s 23ms/step -
accuracy: 0.6913 - loss: 0.5845 - val_accuracy: 0.7094 - val_loss: 0.5685
Epoch 358/500
10/10              0s 24ms/step -
accuracy: 0.6885 - loss: 0.5936 - val_accuracy: 0.7094 - val_loss: 0.5685
Epoch 359/500
10/10              0s 23ms/step -
accuracy: 0.7134 - loss: 0.5676 - val_accuracy: 0.7094 - val_loss: 0.5684
Epoch 360/500
10/10              0s 22ms/step -
accuracy: 0.7349 - loss: 0.5456 - val_accuracy: 0.7094 - val_loss: 0.5683
Epoch 361/500
10/10              0s 22ms/step -
accuracy: 0.7304 - loss: 0.5533 - val_accuracy: 0.7094 - val_loss: 0.5682
Epoch 362/500
10/10              0s 22ms/step -
accuracy: 0.7202 - loss: 0.5620 - val_accuracy: 0.7094 - val_loss: 0.5682
Epoch 363/500
10/10              0s 23ms/step -
accuracy: 0.7103 - loss: 0.5703 - val_accuracy: 0.7094 - val_loss: 0.5681
Epoch 364/500
10/10              0s 23ms/step -
accuracy: 0.7062 - loss: 0.5713 - val_accuracy: 0.7094 - val_loss: 0.5680
```

```
Epoch 365/500
10/10          0s 22ms/step -
accuracy: 0.7146 - loss: 0.5650 - val_accuracy: 0.7094 - val_loss: 0.5679
Epoch 366/500
10/10          0s 22ms/step -
accuracy: 0.6915 - loss: 0.5873 - val_accuracy: 0.7094 - val_loss: 0.5679
Epoch 367/500
10/10          0s 22ms/step -
accuracy: 0.6991 - loss: 0.5828 - val_accuracy: 0.7094 - val_loss: 0.5678
Epoch 368/500
10/10          0s 22ms/step -
accuracy: 0.7237 - loss: 0.5586 - val_accuracy: 0.7094 - val_loss: 0.5678
Epoch 369/500
10/10          0s 22ms/step -
accuracy: 0.7180 - loss: 0.5655 - val_accuracy: 0.7094 - val_loss: 0.5677
Epoch 370/500
10/10          0s 22ms/step -
accuracy: 0.7061 - loss: 0.5739 - val_accuracy: 0.7094 - val_loss: 0.5677
Epoch 371/500
10/10          0s 23ms/step -
accuracy: 0.7350 - loss: 0.5461 - val_accuracy: 0.7094 - val_loss: 0.5676
Epoch 372/500
10/10          0s 22ms/step -
accuracy: 0.7060 - loss: 0.5669 - val_accuracy: 0.7094 - val_loss: 0.5675
Epoch 373/500
10/10          0s 22ms/step -
accuracy: 0.7199 - loss: 0.5570 - val_accuracy: 0.7094 - val_loss: 0.5675
Epoch 374/500
10/10          0s 32ms/step -
accuracy: 0.7044 - loss: 0.5794 - val_accuracy: 0.7094 - val_loss: 0.5675
Epoch 375/500
10/10          0s 24ms/step -
accuracy: 0.7032 - loss: 0.5734 - val_accuracy: 0.7094 - val_loss: 0.5674
Epoch 376/500
10/10          0s 25ms/step -
accuracy: 0.7110 - loss: 0.5690 - val_accuracy: 0.7094 - val_loss: 0.5674
Epoch 377/500
10/10          0s 21ms/step -
accuracy: 0.7055 - loss: 0.5733 - val_accuracy: 0.7094 - val_loss: 0.5673
Epoch 378/500
10/10          0s 23ms/step -
accuracy: 0.6976 - loss: 0.5756 - val_accuracy: 0.7094 - val_loss: 0.5673
Epoch 379/500
10/10          0s 23ms/step -
accuracy: 0.6918 - loss: 0.5832 - val_accuracy: 0.7094 - val_loss: 0.5672
Epoch 380/500
10/10          0s 23ms/step -
accuracy: 0.7501 - loss: 0.5354 - val_accuracy: 0.7094 - val_loss: 0.5671
```

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Epoch 381/500
10/10          0s 22ms/step -
accuracy: 0.7186 - loss: 0.5646 - val_accuracy: 0.7094 - val_loss: 0.5671
Epoch 382/500
10/10          0s 23ms/step -
accuracy: 0.7468 - loss: 0.5315 - val_accuracy: 0.7094 - val_loss: 0.5671
Epoch 383/500
10/10          0s 23ms/step -
accuracy: 0.7086 - loss: 0.5720 - val_accuracy: 0.7094 - val_loss: 0.5670
Epoch 384/500
10/10          0s 21ms/step -
accuracy: 0.7018 - loss: 0.5746 - val_accuracy: 0.7094 - val_loss: 0.5669
Epoch 385/500
10/10          0s 22ms/step -
accuracy: 0.6887 - loss: 0.5899 - val_accuracy: 0.7094 - val_loss: 0.5668
Epoch 386/500
10/10          0s 22ms/step -
accuracy: 0.7030 - loss: 0.5667 - val_accuracy: 0.7094 - val_loss: 0.5668
Epoch 387/500
10/10          0s 23ms/step -
accuracy: 0.6977 - loss: 0.5753 - val_accuracy: 0.7094 - val_loss: 0.5668
Epoch 388/500
10/10          0s 22ms/step -
accuracy: 0.7263 - loss: 0.5579 - val_accuracy: 0.7094 - val_loss: 0.5667
Epoch 389/500
10/10          0s 21ms/step -
accuracy: 0.7258 - loss: 0.5548 - val_accuracy: 0.7094 - val_loss: 0.5666
Epoch 390/500
10/10          0s 22ms/step -
accuracy: 0.7224 - loss: 0.5591 - val_accuracy: 0.7094 - val_loss: 0.5666
Epoch 391/500
10/10          0s 24ms/step -
accuracy: 0.7170 - loss: 0.5615 - val_accuracy: 0.7094 - val_loss: 0.5665
Epoch 392/500
10/10          0s 22ms/step -
accuracy: 0.6943 - loss: 0.5840 - val_accuracy: 0.7094 - val_loss: 0.5665
Epoch 393/500
10/10          0s 23ms/step -
accuracy: 0.7127 - loss: 0.5637 - val_accuracy: 0.7094 - val_loss: 0.5664
Epoch 394/500
10/10          0s 23ms/step -
accuracy: 0.7186 - loss: 0.5592 - val_accuracy: 0.7094 - val_loss: 0.5663
Epoch 395/500
10/10          0s 23ms/step -
accuracy: 0.7143 - loss: 0.5569 - val_accuracy: 0.7094 - val_loss: 0.5662
Epoch 396/500
10/10          0s 24ms/step -
accuracy: 0.7152 - loss: 0.5622 - val_accuracy: 0.7094 - val_loss: 0.5662
```

```
Epoch 397/500
10/10              0s 23ms/step -
accuracy: 0.7283 - loss: 0.5514 - val_accuracy: 0.7094 - val_loss: 0.5661
Epoch 398/500
10/10              0s 22ms/step -
accuracy: 0.7254 - loss: 0.5522 - val_accuracy: 0.7094 - val_loss: 0.5661
Epoch 399/500
10/10              0s 22ms/step -
accuracy: 0.7157 - loss: 0.5629 - val_accuracy: 0.7094 - val_loss: 0.5660
Epoch 400/500
10/10              0s 21ms/step -
accuracy: 0.6914 - loss: 0.5766 - val_accuracy: 0.7094 - val_loss: 0.5659
Epoch 401/500
10/10              0s 21ms/step -
accuracy: 0.7166 - loss: 0.5629 - val_accuracy: 0.7094 - val_loss: 0.5659
Epoch 402/500
10/10              0s 21ms/step -
accuracy: 0.6922 - loss: 0.5842 - val_accuracy: 0.7094 - val_loss: 0.5658
Epoch 403/500
10/10              0s 22ms/step -
accuracy: 0.7015 - loss: 0.5703 - val_accuracy: 0.7094 - val_loss: 0.5658
Epoch 404/500
10/10              0s 23ms/step -
accuracy: 0.7108 - loss: 0.5668 - val_accuracy: 0.7094 - val_loss: 0.5657
Epoch 405/500
10/10              0s 23ms/step -
accuracy: 0.7011 - loss: 0.5761 - val_accuracy: 0.7094 - val_loss: 0.5657
Epoch 406/500
10/10              0s 23ms/step -
accuracy: 0.7296 - loss: 0.5465 - val_accuracy: 0.7094 - val_loss: 0.5656
Epoch 407/500
10/10              0s 22ms/step -
accuracy: 0.7170 - loss: 0.5599 - val_accuracy: 0.7094 - val_loss: 0.5656
Epoch 408/500
10/10              0s 22ms/step -
accuracy: 0.7333 - loss: 0.5462 - val_accuracy: 0.7094 - val_loss: 0.5655
Epoch 409/500
10/10              0s 23ms/step -
accuracy: 0.7011 - loss: 0.5700 - val_accuracy: 0.7094 - val_loss: 0.5655
Epoch 410/500
10/10              0s 23ms/step -
accuracy: 0.7406 - loss: 0.5436 - val_accuracy: 0.7094 - val_loss: 0.5654
Epoch 411/500
10/10              0s 22ms/step -
accuracy: 0.7277 - loss: 0.5523 - val_accuracy: 0.7094 - val_loss: 0.5654
Epoch 412/500
10/10              0s 23ms/step -
accuracy: 0.7120 - loss: 0.5642 - val_accuracy: 0.7094 - val_loss: 0.5653
```

```
Epoch 413/500
10/10             0s 24ms/step -
accuracy: 0.7069 - loss: 0.5715 - val_accuracy: 0.7094 - val_loss: 0.5653
Epoch 414/500
10/10             0s 23ms/step -
accuracy: 0.7108 - loss: 0.5661 - val_accuracy: 0.7094 - val_loss: 0.5652
Epoch 415/500
10/10             0s 23ms/step -
accuracy: 0.7124 - loss: 0.5629 - val_accuracy: 0.7094 - val_loss: 0.5651
Epoch 416/500
10/10             0s 23ms/step -
accuracy: 0.6984 - loss: 0.5762 - val_accuracy: 0.7094 - val_loss: 0.5651
Epoch 417/500
10/10             0s 22ms/step -
accuracy: 0.6982 - loss: 0.5717 - val_accuracy: 0.7094 - val_loss: 0.5650
Epoch 418/500
10/10             0s 21ms/step -
accuracy: 0.7113 - loss: 0.5623 - val_accuracy: 0.7094 - val_loss: 0.5649
Epoch 419/500
10/10             0s 22ms/step -
accuracy: 0.7257 - loss: 0.5487 - val_accuracy: 0.7094 - val_loss: 0.5649
Epoch 420/500
10/10             0s 22ms/step -
accuracy: 0.7314 - loss: 0.5512 - val_accuracy: 0.7094 - val_loss: 0.5648
Epoch 421/500
10/10             0s 24ms/step -
accuracy: 0.7156 - loss: 0.5629 - val_accuracy: 0.7094 - val_loss: 0.5648
Epoch 422/500
10/10             0s 23ms/step -
accuracy: 0.6995 - loss: 0.5696 - val_accuracy: 0.7094 - val_loss: 0.5648
Epoch 423/500
10/10             0s 20ms/step -
accuracy: 0.7229 - loss: 0.5584 - val_accuracy: 0.7094 - val_loss: 0.5647
Epoch 424/500
10/10             0s 23ms/step -
accuracy: 0.7335 - loss: 0.5450 - val_accuracy: 0.7094 - val_loss: 0.5647
Epoch 425/500
10/10             0s 23ms/step -
accuracy: 0.7008 - loss: 0.5753 - val_accuracy: 0.7094 - val_loss: 0.5646
Epoch 426/500
10/10             0s 22ms/step -
accuracy: 0.7282 - loss: 0.5554 - val_accuracy: 0.7094 - val_loss: 0.5646
Epoch 427/500
10/10             0s 23ms/step -
accuracy: 0.7067 - loss: 0.5715 - val_accuracy: 0.7094 - val_loss: 0.5645
Epoch 428/500
10/10             0s 23ms/step -
accuracy: 0.7134 - loss: 0.5641 - val_accuracy: 0.7094 - val_loss: 0.5645
```

```
Epoch 429/500
10/10              0s 24ms/step -
accuracy: 0.7216 - loss: 0.5580 - val_accuracy: 0.7094 - val_loss: 0.5645
Epoch 430/500
10/10              0s 23ms/step -
accuracy: 0.7202 - loss: 0.5542 - val_accuracy: 0.7094 - val_loss: 0.5645
Epoch 431/500
10/10              0s 23ms/step -
accuracy: 0.7018 - loss: 0.5676 - val_accuracy: 0.7094 - val_loss: 0.5644
Epoch 432/500
10/10              0s 22ms/step -
accuracy: 0.7198 - loss: 0.5601 - val_accuracy: 0.7094 - val_loss: 0.5644
Epoch 433/500
10/10              0s 22ms/step -
accuracy: 0.7093 - loss: 0.5593 - val_accuracy: 0.7094 - val_loss: 0.5643
Epoch 434/500
10/10              0s 30ms/step -
accuracy: 0.7255 - loss: 0.5581 - val_accuracy: 0.7094 - val_loss: 0.5642
Epoch 435/500
10/10              0s 22ms/step -
accuracy: 0.7179 - loss: 0.5590 - val_accuracy: 0.7094 - val_loss: 0.5641
Epoch 436/500
10/10              0s 23ms/step -
accuracy: 0.6841 - loss: 0.5850 - val_accuracy: 0.7094 - val_loss: 0.5641
Epoch 437/500
10/10              0s 22ms/step -
accuracy: 0.7049 - loss: 0.5690 - val_accuracy: 0.7094 - val_loss: 0.5640
Epoch 438/500
10/10              0s 23ms/step -
accuracy: 0.7128 - loss: 0.5670 - val_accuracy: 0.7094 - val_loss: 0.5640
Epoch 439/500
10/10              0s 22ms/step -
accuracy: 0.6979 - loss: 0.5746 - val_accuracy: 0.7094 - val_loss: 0.5639
Epoch 440/500
10/10              0s 23ms/step -
accuracy: 0.7120 - loss: 0.5622 - val_accuracy: 0.7094 - val_loss: 0.5639
Epoch 441/500
10/10              0s 22ms/step -
accuracy: 0.7146 - loss: 0.5612 - val_accuracy: 0.7094 - val_loss: 0.5638
Epoch 442/500
10/10              0s 22ms/step -
accuracy: 0.7224 - loss: 0.5558 - val_accuracy: 0.7094 - val_loss: 0.5638
Epoch 443/500
10/10              0s 22ms/step -
accuracy: 0.7287 - loss: 0.5533 - val_accuracy: 0.7094 - val_loss: 0.5638
Epoch 444/500
10/10              0s 23ms/step -
accuracy: 0.7358 - loss: 0.5399 - val_accuracy: 0.7094 - val_loss: 0.5638
```

```
Epoch 445/500
10/10              0s 21ms/step -
accuracy: 0.7333 - loss: 0.5446 - val_accuracy: 0.7094 - val_loss: 0.5638
Epoch 446/500
10/10              0s 22ms/step -
accuracy: 0.7003 - loss: 0.5698 - val_accuracy: 0.7094 - val_loss: 0.5637
Epoch 447/500
10/10              0s 23ms/step -
accuracy: 0.7509 - loss: 0.5299 - val_accuracy: 0.7094 - val_loss: 0.5636
Epoch 448/500
10/10              0s 24ms/step -
accuracy: 0.7071 - loss: 0.5705 - val_accuracy: 0.7094 - val_loss: 0.5635
Epoch 449/500
10/10              0s 23ms/step -
accuracy: 0.7193 - loss: 0.5550 - val_accuracy: 0.7094 - val_loss: 0.5634
Epoch 450/500
10/10              0s 23ms/step -
accuracy: 0.7220 - loss: 0.5594 - val_accuracy: 0.7094 - val_loss: 0.5634
Epoch 451/500
10/10              0s 29ms/step -
accuracy: 0.7349 - loss: 0.5420 - val_accuracy: 0.7094 - val_loss: 0.5633
Epoch 452/500
10/10              0s 22ms/step -
accuracy: 0.7211 - loss: 0.5567 - val_accuracy: 0.7094 - val_loss: 0.5632
Epoch 453/500
10/10              0s 22ms/step -
accuracy: 0.7156 - loss: 0.5609 - val_accuracy: 0.7094 - val_loss: 0.5632
Epoch 454/500
10/10              0s 24ms/step -
accuracy: 0.6973 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5632
Epoch 455/500
10/10              0s 28ms/step -
accuracy: 0.6852 - loss: 0.5865 - val_accuracy: 0.7094 - val_loss: 0.5631
Epoch 456/500
10/10              0s 22ms/step -
accuracy: 0.7396 - loss: 0.5387 - val_accuracy: 0.7094 - val_loss: 0.5630
Epoch 457/500
10/10              0s 23ms/step -
accuracy: 0.6987 - loss: 0.5699 - val_accuracy: 0.7094 - val_loss: 0.5630
Epoch 458/500
10/10              0s 23ms/step -
accuracy: 0.7040 - loss: 0.5674 - val_accuracy: 0.7094 - val_loss: 0.5629
Epoch 459/500
10/10              0s 24ms/step -
accuracy: 0.7169 - loss: 0.5587 - val_accuracy: 0.7094 - val_loss: 0.5629
Epoch 460/500
10/10              0s 23ms/step -
accuracy: 0.7049 - loss: 0.5718 - val_accuracy: 0.7094 - val_loss: 0.5629
```

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Epoch 461/500
10/10              0s 22ms/step -
accuracy: 0.6987 - loss: 0.5719 - val_accuracy: 0.7094 - val_loss: 0.5628
Epoch 462/500
10/10              0s 23ms/step -
accuracy: 0.7069 - loss: 0.5679 - val_accuracy: 0.7094 - val_loss: 0.5628
Epoch 463/500
10/10              0s 24ms/step -
accuracy: 0.7369 - loss: 0.5333 - val_accuracy: 0.7094 - val_loss: 0.5628
Epoch 464/500
10/10              0s 22ms/step -
accuracy: 0.7293 - loss: 0.5476 - val_accuracy: 0.7094 - val_loss: 0.5627
Epoch 465/500
10/10              0s 23ms/step -
accuracy: 0.7329 - loss: 0.5510 - val_accuracy: 0.7094 - val_loss: 0.5627
Epoch 466/500
10/10              0s 25ms/step -
accuracy: 0.7402 - loss: 0.5383 - val_accuracy: 0.7094 - val_loss: 0.5626
Epoch 467/500
10/10              0s 22ms/step -
accuracy: 0.7040 - loss: 0.5720 - val_accuracy: 0.7094 - val_loss: 0.5625
Epoch 468/500
10/10              0s 25ms/step -
accuracy: 0.7179 - loss: 0.5569 - val_accuracy: 0.7094 - val_loss: 0.5625
Epoch 469/500
10/10              0s 33ms/step -
accuracy: 0.7243 - loss: 0.5513 - val_accuracy: 0.7094 - val_loss: 0.5624
Epoch 470/500
10/10              0s 20ms/step -
accuracy: 0.7242 - loss: 0.5444 - val_accuracy: 0.7094 - val_loss: 0.5624
Epoch 471/500
10/10              0s 22ms/step -
accuracy: 0.7331 - loss: 0.5450 - val_accuracy: 0.7094 - val_loss: 0.5623
Epoch 472/500
10/10              0s 23ms/step -
accuracy: 0.7120 - loss: 0.5648 - val_accuracy: 0.7094 - val_loss: 0.5623
Epoch 473/500
10/10              0s 19ms/step -
accuracy: 0.7229 - loss: 0.5524 - val_accuracy: 0.7094 - val_loss: 0.5623
Epoch 474/500
10/10              0s 23ms/step -
accuracy: 0.7002 - loss: 0.5657 - val_accuracy: 0.7094 - val_loss: 0.5622
Epoch 475/500
10/10              0s 32ms/step -
accuracy: 0.7355 - loss: 0.5415 - val_accuracy: 0.7094 - val_loss: 0.5621
Epoch 476/500
10/10              0s 19ms/step -
accuracy: 0.7081 - loss: 0.5625 - val_accuracy: 0.7094 - val_loss: 0.5621
```

```
Epoch 477/500
10/10              0s 21ms/step -
accuracy: 0.7158 - loss: 0.5545 - val_accuracy: 0.7094 - val_loss: 0.5620
Epoch 478/500
10/10              0s 23ms/step -
accuracy: 0.7343 - loss: 0.5407 - val_accuracy: 0.7094 - val_loss: 0.5619
Epoch 479/500
10/10              0s 22ms/step -
accuracy: 0.7076 - loss: 0.5645 - val_accuracy: 0.7094 - val_loss: 0.5619
Epoch 480/500
10/10              0s 24ms/step -
accuracy: 0.7117 - loss: 0.5677 - val_accuracy: 0.7094 - val_loss: 0.5618
Epoch 481/500
10/10              0s 22ms/step -
accuracy: 0.6994 - loss: 0.5728 - val_accuracy: 0.7094 - val_loss: 0.5618
Epoch 482/500
10/10              0s 22ms/step -
accuracy: 0.6907 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5618
Epoch 483/500
10/10              0s 22ms/step -
accuracy: 0.7127 - loss: 0.5598 - val_accuracy: 0.7094 - val_loss: 0.5618
Epoch 484/500
10/10              0s 23ms/step -
accuracy: 0.7119 - loss: 0.5540 - val_accuracy: 0.7094 - val_loss: 0.5618
Epoch 485/500
10/10              0s 23ms/step -
accuracy: 0.7047 - loss: 0.5699 - val_accuracy: 0.7094 - val_loss: 0.5617
Epoch 486/500
10/10              0s 22ms/step -
accuracy: 0.7076 - loss: 0.5624 - val_accuracy: 0.7094 - val_loss: 0.5617
Epoch 487/500
10/10              0s 21ms/step -
accuracy: 0.7123 - loss: 0.5541 - val_accuracy: 0.7094 - val_loss: 0.5616
Epoch 488/500
10/10              0s 23ms/step -
accuracy: 0.7118 - loss: 0.5640 - val_accuracy: 0.7094 - val_loss: 0.5616
Epoch 489/500
10/10              0s 25ms/step -
accuracy: 0.7065 - loss: 0.5693 - val_accuracy: 0.7094 - val_loss: 0.5615
Epoch 490/500
10/10              0s 22ms/step -
accuracy: 0.6935 - loss: 0.5736 - val_accuracy: 0.7094 - val_loss: 0.5614
Epoch 491/500
10/10              0s 21ms/step -
accuracy: 0.7164 - loss: 0.5652 - val_accuracy: 0.7094 - val_loss: 0.5614
Epoch 492/500
10/10              0s 21ms/step -
accuracy: 0.7322 - loss: 0.5434 - val_accuracy: 0.7094 - val_loss: 0.5614
```

```
Epoch 493/500
10/10                0s 23ms/step -
accuracy: 0.7334 - loss: 0.5412 - val_accuracy: 0.7094 - val_loss: 0.5614
Epoch 494/500
10/10                0s 21ms/step -
accuracy: 0.7171 - loss: 0.5614 - val_accuracy: 0.7094 - val_loss: 0.5613
Epoch 495/500
10/10                0s 22ms/step -
accuracy: 0.7227 - loss: 0.5526 - val_accuracy: 0.7094 - val_loss: 0.5613
Epoch 496/500
10/10                0s 30ms/step -
accuracy: 0.7098 - loss: 0.5578 - val_accuracy: 0.7094 - val_loss: 0.5613
Epoch 497/500
10/10                0s 20ms/step -
accuracy: 0.7074 - loss: 0.5593 - val_accuracy: 0.7094 - val_loss: 0.5612
Epoch 498/500
10/10                0s 25ms/step -
accuracy: 0.7122 - loss: 0.5568 - val_accuracy: 0.7094 - val_loss: 0.5612
Epoch 499/500
10/10                0s 23ms/step -
accuracy: 0.7102 - loss: 0.5611 - val_accuracy: 0.7094 - val_loss: 0.5612
Epoch 500/500
10/10                0s 23ms/step -
accuracy: 0.7041 - loss: 0.5712 - val_accuracy: 0.7094 - val_loss: 0.5611
```

```python
[15]: final_val_accuracy = history.history['val_accuracy'][-1]
      print(f"Final Validation Accuracy: {final_val_accuracy * 100:.2f}%")
```

```
Final Validation Accuracy: 70.94%
```

```python
[16]: plt.plot(history.history['accuracy'], label='Train Accuracy')
      plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
      plt.xlabel('Epochs')
      plt.ylabel('Accuracy')
      plt.title('Model Accuracy Over Epochs')
      plt.legend()
      plt.show()
```

Model Accuracy Over Epochs
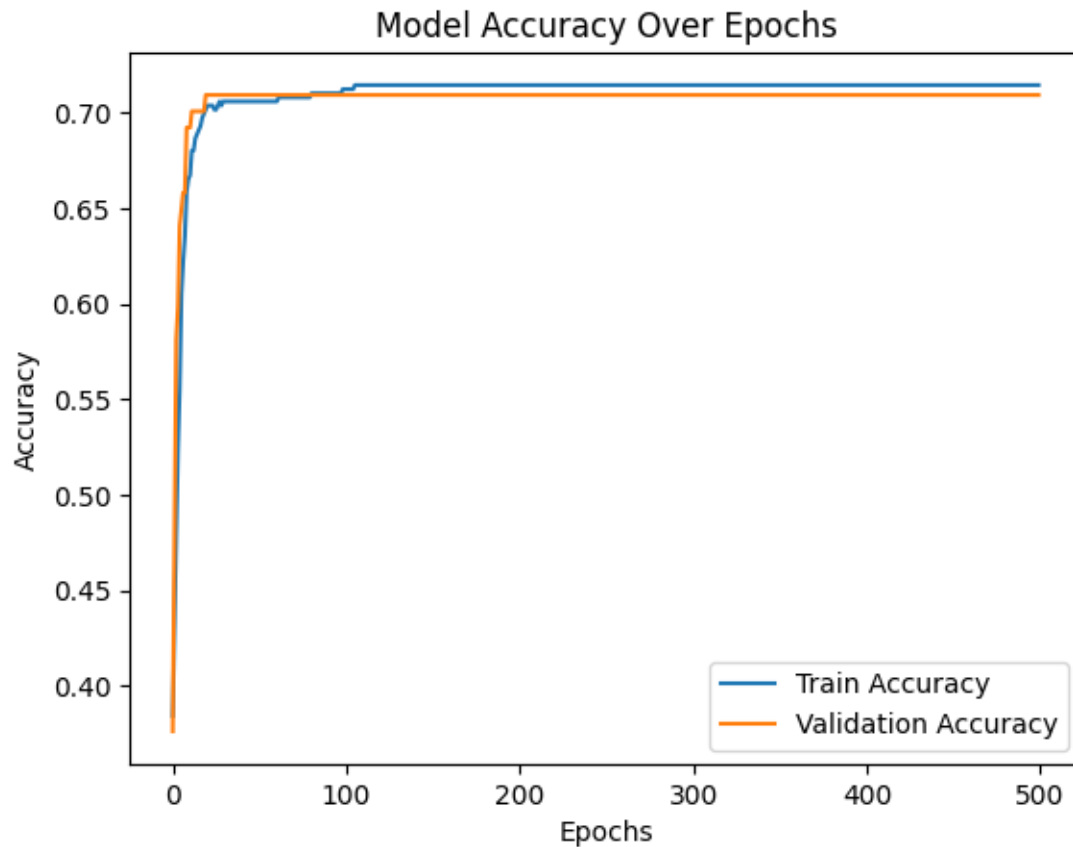
0.2.1 Model with 9 neurons in the input layer, 10 neurons in the hidden layer and 2 neurons in the output layer

```
[17]: model = Sequential()
      model.add(Dense(10, activation = 'sigmoid', input_shape = (9,)))
      model.add(Dense(1,activation = 'sigmoid'))
      model.summary()
```

Model: "sequential_2"

Layer (type)	Output Shape	Param #
dense_2 (Dense)	(None, 10)	100
dense_3 (Dense)	(None, 1)	11

Total params: 111 (444.00 B)

```
Trainable params: 111 (444.00 B)

Non-trainable params: 0 (0.00 B)
```

```python
[18]: model.compile(loss = "BinaryCrossentropy", optimizer = "SGD", metrics =␣
      ↪["accuracy"])
      history = model.fit(x_train,y_train, batch_size=50, epochs = 500, verbose=1,␣
      ↪validation_data=(x_test,y_test))
```

```
Epoch 1/500
10/10            2s 59ms/step -
accuracy: 0.2962 - loss: 0.8416 - val_accuracy: 0.2906 - val_loss: 0.8108
Epoch 2/500
10/10            0s 21ms/step -
accuracy: 0.2898 - loss: 0.8043 - val_accuracy: 0.2906 - val_loss: 0.7735
Epoch 3/500
10/10            0s 22ms/step -
accuracy: 0.2934 - loss: 0.7660 - val_accuracy: 0.2906 - val_loss: 0.7425
Epoch 4/500
10/10            0s 21ms/step -
accuracy: 0.2869 - loss: 0.7364 - val_accuracy: 0.2906 - val_loss: 0.7165
Epoch 5/500
10/10            0s 22ms/step -
accuracy: 0.2889 - loss: 0.7137 - val_accuracy: 0.4359 - val_loss: 0.6950
Epoch 6/500
10/10            0s 23ms/step -
accuracy: 0.5092 - loss: 0.6917 - val_accuracy: 0.7265 - val_loss: 0.6772
Epoch 7/500
10/10            0s 22ms/step -
accuracy: 0.6820 - loss: 0.6766 - val_accuracy: 0.7094 - val_loss: 0.6635
Epoch 8/500
10/10            0s 21ms/step -
accuracy: 0.6651 - loss: 0.6715 - val_accuracy: 0.7094 - val_loss: 0.6520
Epoch 9/500
10/10            0s 23ms/step -
accuracy: 0.7415 - loss: 0.6442 - val_accuracy: 0.7094 - val_loss: 0.6440
Epoch 10/500
10/10            0s 22ms/step -
accuracy: 0.7042 - loss: 0.6462 - val_accuracy: 0.7094 - val_loss: 0.6367
Epoch 11/500
10/10            0s 20ms/step -
accuracy: 0.6989 - loss: 0.6408 - val_accuracy: 0.7094 - val_loss: 0.6306
Epoch 12/500
10/10            0s 22ms/step -
accuracy: 0.7162 - loss: 0.6272 - val_accuracy: 0.7094 - val_loss: 0.6263
```

```
Epoch 13/500
10/10              0s 26ms/step -
accuracy: 0.7429 - loss: 0.6107 - val_accuracy: 0.7094 - val_loss: 0.6233
Epoch 14/500
10/10              0s 21ms/step -
accuracy: 0.7381 - loss: 0.6092 - val_accuracy: 0.7094 - val_loss: 0.6200
Epoch 15/500
10/10              0s 20ms/step -
accuracy: 0.7159 - loss: 0.6165 - val_accuracy: 0.7094 - val_loss: 0.6167
Epoch 16/500
10/10              0s 22ms/step -
accuracy: 0.7040 - loss: 0.6203 - val_accuracy: 0.7094 - val_loss: 0.6148
Epoch 17/500
10/10              0s 21ms/step -
accuracy: 0.7328 - loss: 0.6019 - val_accuracy: 0.7094 - val_loss: 0.6131
Epoch 18/500
10/10              0s 29ms/step -
accuracy: 0.7075 - loss: 0.6141 - val_accuracy: 0.7094 - val_loss: 0.6115
Epoch 19/500
10/10              0s 21ms/step -
accuracy: 0.6981 - loss: 0.6186 - val_accuracy: 0.7094 - val_loss: 0.6102
Epoch 20/500
10/10              0s 20ms/step -
accuracy: 0.7075 - loss: 0.6120 - val_accuracy: 0.7094 - val_loss: 0.6089
Epoch 21/500
10/10              0s 21ms/step -
accuracy: 0.7150 - loss: 0.6055 - val_accuracy: 0.7094 - val_loss: 0.6081
Epoch 22/500
10/10              0s 22ms/step -
accuracy: 0.6890 - loss: 0.6218 - val_accuracy: 0.7094 - val_loss: 0.6072
Epoch 23/500
10/10              0s 21ms/step -
accuracy: 0.7227 - loss: 0.5977 - val_accuracy: 0.7094 - val_loss: 0.6067
Epoch 24/500
10/10              0s 21ms/step -
accuracy: 0.7146 - loss: 0.6038 - val_accuracy: 0.7094 - val_loss: 0.6062
Epoch 25/500
10/10              0s 21ms/step -
accuracy: 0.7111 - loss: 0.6048 - val_accuracy: 0.7094 - val_loss: 0.6059
Epoch 26/500
10/10              0s 21ms/step -
accuracy: 0.7187 - loss: 0.5994 - val_accuracy: 0.7094 - val_loss: 0.6056
Epoch 27/500
10/10              0s 23ms/step -
accuracy: 0.6973 - loss: 0.6157 - val_accuracy: 0.7094 - val_loss: 0.6053
Epoch 28/500
10/10              0s 23ms/step -
accuracy: 0.6884 - loss: 0.6221 - val_accuracy: 0.7094 - val_loss: 0.6050
```

```
Epoch 29/500
10/10              0s 21ms/step -
accuracy: 0.7342 - loss: 0.5859 - val_accuracy: 0.7094 - val_loss: 0.6048
Epoch 30/500
10/10              0s 23ms/step -
accuracy: 0.7206 - loss: 0.5971 - val_accuracy: 0.7094 - val_loss: 0.6047
Epoch 31/500
10/10              0s 22ms/step -
accuracy: 0.7363 - loss: 0.5826 - val_accuracy: 0.7094 - val_loss: 0.6046
Epoch 32/500
10/10              0s 23ms/step -
accuracy: 0.7053 - loss: 0.6077 - val_accuracy: 0.7094 - val_loss: 0.6045
Epoch 33/500
10/10              0s 23ms/step -
accuracy: 0.6982 - loss: 0.6139 - val_accuracy: 0.7094 - val_loss: 0.6044
Epoch 34/500
10/10              0s 22ms/step -
accuracy: 0.7171 - loss: 0.5980 - val_accuracy: 0.7094 - val_loss: 0.6044
Epoch 35/500
10/10              0s 22ms/step -
accuracy: 0.7283 - loss: 0.5882 - val_accuracy: 0.7094 - val_loss: 0.6043
Epoch 36/500
10/10              0s 21ms/step -
accuracy: 0.7145 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.6042
Epoch 37/500
10/10              0s 21ms/step -
accuracy: 0.7234 - loss: 0.5925 - val_accuracy: 0.7094 - val_loss: 0.6041
Epoch 38/500
10/10              0s 23ms/step -
accuracy: 0.7214 - loss: 0.5940 - val_accuracy: 0.7094 - val_loss: 0.6041
Epoch 39/500
10/10              0s 22ms/step -
accuracy: 0.7065 - loss: 0.6067 - val_accuracy: 0.7094 - val_loss: 0.6041
Epoch 40/500
10/10              0s 21ms/step -
accuracy: 0.7164 - loss: 0.5987 - val_accuracy: 0.7094 - val_loss: 0.6041
Epoch 41/500
10/10              0s 21ms/step -
accuracy: 0.7136 - loss: 0.6012 - val_accuracy: 0.7094 - val_loss: 0.6041
Epoch 42/500
10/10              0s 22ms/step -
accuracy: 0.7454 - loss: 0.5709 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 43/500
10/10              0s 21ms/step -
accuracy: 0.7271 - loss: 0.5898 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 44/500
10/10              0s 21ms/step -
accuracy: 0.6891 - loss: 0.6236 - val_accuracy: 0.7094 - val_loss: 0.6040
```

```
Epoch 45/500
10/10              0s 23ms/step -
accuracy: 0.7018 - loss: 0.6119 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 46/500
10/10              0s 22ms/step -
accuracy: 0.7184 - loss: 0.5961 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 47/500
10/10              0s 20ms/step -
accuracy: 0.7201 - loss: 0.5939 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 48/500
10/10              0s 21ms/step -
accuracy: 0.6946 - loss: 0.6184 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 49/500
10/10              0s 21ms/step -
accuracy: 0.6945 - loss: 0.6180 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 50/500
10/10              0s 22ms/step -
accuracy: 0.7184 - loss: 0.5957 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 51/500
10/10              0s 21ms/step -
accuracy: 0.7011 - loss: 0.6118 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 52/500
10/10              0s 22ms/step -
accuracy: 0.7014 - loss: 0.6132 - val_accuracy: 0.7094 - val_loss: 0.6040
Epoch 53/500
10/10              0s 22ms/step -
accuracy: 0.7299 - loss: 0.5856 - val_accuracy: 0.7094 - val_loss: 0.6039
Epoch 54/500
10/10              0s 20ms/step -
accuracy: 0.7245 - loss: 0.5914 - val_accuracy: 0.7094 - val_loss: 0.6039
Epoch 55/500
10/10              0s 26ms/step -
accuracy: 0.7408 - loss: 0.5753 - val_accuracy: 0.7094 - val_loss: 0.6039
Epoch 56/500
10/10              0s 21ms/step -
accuracy: 0.7131 - loss: 0.6011 - val_accuracy: 0.7094 - val_loss: 0.6039
Epoch 57/500
10/10              0s 19ms/step -
accuracy: 0.7366 - loss: 0.5794 - val_accuracy: 0.7094 - val_loss: 0.6039
Epoch 58/500
10/10              0s 27ms/step -
accuracy: 0.7004 - loss: 0.6130 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 59/500
10/10              0s 23ms/step -
accuracy: 0.7051 - loss: 0.6091 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 60/500
10/10              0s 28ms/step -
accuracy: 0.6837 - loss: 0.6276 - val_accuracy: 0.7094 - val_loss: 0.6038
```

```
Epoch 61/500
10/10              0s 29ms/step -
accuracy: 0.7121 - loss: 0.6024 - val_accuracy: 0.7094 - val_loss: 0.6039
Epoch 62/500
10/10              0s 21ms/step -
accuracy: 0.7143 - loss: 0.6001 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 63/500
10/10              0s 23ms/step -
accuracy: 0.7068 - loss: 0.6061 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 64/500
10/10              0s 27ms/step -
accuracy: 0.7336 - loss: 0.5816 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 65/500
10/10              0s 23ms/step -
accuracy: 0.7235 - loss: 0.5910 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 66/500
10/10              0s 23ms/step -
accuracy: 0.7286 - loss: 0.5853 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 67/500
10/10              0s 20ms/step -
accuracy: 0.7103 - loss: 0.6035 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 68/500
10/10              0s 21ms/step -
accuracy: 0.7109 - loss: 0.6021 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 69/500
10/10              0s 29ms/step -
accuracy: 0.7118 - loss: 0.6022 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 70/500
10/10              0s 35ms/step -
accuracy: 0.7151 - loss: 0.5979 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 71/500
10/10              1s 24ms/step -
accuracy: 0.6834 - loss: 0.6285 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 72/500
10/10              0s 22ms/step -
accuracy: 0.7184 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 73/500
10/10              0s 24ms/step -
accuracy: 0.7192 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 74/500
10/10              0s 20ms/step -
accuracy: 0.7369 - loss: 0.5784 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 75/500
10/10              0s 22ms/step -
accuracy: 0.7052 - loss: 0.6079 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 76/500
10/10              0s 19ms/step -
accuracy: 0.7231 - loss: 0.5913 - val_accuracy: 0.7094 - val_loss: 0.6038
```

```
Epoch 77/500
10/10            0s 21ms/step -
accuracy: 0.7348 - loss: 0.5799 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 78/500
10/10            0s 15ms/step -
accuracy: 0.7348 - loss: 0.5805 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 79/500
10/10            0s 22ms/step -
accuracy: 0.7209 - loss: 0.5940 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 80/500
10/10            0s 15ms/step -
accuracy: 0.7126 - loss: 0.6013 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 81/500
10/10            0s 18ms/step -
accuracy: 0.7080 - loss: 0.6050 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 82/500
10/10            0s 18ms/step -
accuracy: 0.7319 - loss: 0.5830 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 83/500
10/10            0s 10ms/step -
accuracy: 0.7166 - loss: 0.5959 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 84/500
10/10            0s 9ms/step -
accuracy: 0.7346 - loss: 0.5797 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 85/500
10/10            0s 19ms/step -
accuracy: 0.7270 - loss: 0.5865 - val_accuracy: 0.7094 - val_loss: 0.6037
Epoch 86/500
10/10            0s 22ms/step -
accuracy: 0.7339 - loss: 0.5810 - val_accuracy: 0.7094 - val_loss: 0.6036
Epoch 87/500
10/10            0s 25ms/step -
accuracy: 0.7215 - loss: 0.5943 - val_accuracy: 0.7094 - val_loss: 0.6036
Epoch 88/500
10/10            0s 10ms/step -
accuracy: 0.6922 - loss: 0.6211 - val_accuracy: 0.7094 - val_loss: 0.6036
Epoch 89/500
10/10            0s 21ms/step -
accuracy: 0.7176 - loss: 0.5974 - val_accuracy: 0.7094 - val_loss: 0.6036
Epoch 90/500
10/10            0s 30ms/step -
accuracy: 0.7162 - loss: 0.5971 - val_accuracy: 0.7094 - val_loss: 0.6035
Epoch 91/500
10/10            0s 17ms/step -
accuracy: 0.7519 - loss: 0.5641 - val_accuracy: 0.7094 - val_loss: 0.6035
Epoch 92/500
10/10            0s 13ms/step -
accuracy: 0.7189 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.6035
```

```
Epoch 93/500
10/10              0s 13ms/step -
accuracy: 0.7267 - loss: 0.5875 - val_accuracy: 0.7094 - val_loss: 0.6035
Epoch 94/500
10/10              0s 9ms/step -
accuracy: 0.7209 - loss: 0.5928 - val_accuracy: 0.7094 - val_loss: 0.6035
Epoch 95/500
10/10              0s 10ms/step -
accuracy: 0.7169 - loss: 0.5972 - val_accuracy: 0.7094 - val_loss: 0.6034
Epoch 96/500
10/10              0s 11ms/step -
accuracy: 0.7099 - loss: 0.6030 - val_accuracy: 0.7094 - val_loss: 0.6034
Epoch 97/500
10/10              0s 20ms/step -
accuracy: 0.7101 - loss: 0.6016 - val_accuracy: 0.7094 - val_loss: 0.6034
Epoch 98/500
10/10              0s 11ms/step -
accuracy: 0.6990 - loss: 0.6142 - val_accuracy: 0.7094 - val_loss: 0.6033
Epoch 99/500
10/10              0s 10ms/step -
accuracy: 0.6945 - loss: 0.6178 - val_accuracy: 0.7094 - val_loss: 0.6033
Epoch 100/500
10/10              0s 21ms/step -
accuracy: 0.7171 - loss: 0.5975 - val_accuracy: 0.7094 - val_loss: 0.6033
Epoch 101/500
10/10              0s 22ms/step -
accuracy: 0.7036 - loss: 0.6095 - val_accuracy: 0.7094 - val_loss: 0.6033
Epoch 102/500
10/10              0s 21ms/step -
accuracy: 0.7214 - loss: 0.5926 - val_accuracy: 0.7094 - val_loss: 0.6033
Epoch 103/500
10/10              0s 11ms/step -
accuracy: 0.7185 - loss: 0.5945 - val_accuracy: 0.7094 - val_loss: 0.6033
Epoch 104/500
10/10              0s 20ms/step -
accuracy: 0.6905 - loss: 0.6208 - val_accuracy: 0.7094 - val_loss: 0.6033
Epoch 105/500
10/10              0s 22ms/step -
accuracy: 0.7279 - loss: 0.5868 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 106/500
10/10              0s 10ms/step -
accuracy: 0.7154 - loss: 0.5992 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 107/500
10/10              0s 13ms/step -
accuracy: 0.7181 - loss: 0.5953 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 108/500
10/10              0s 17ms/step -
accuracy: 0.7064 - loss: 0.6068 - val_accuracy: 0.7094 - val_loss: 0.6032
```

```
Epoch 109/500
10/10              0s 25ms/step -
accuracy: 0.6951 - loss: 0.6172 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 110/500
10/10              0s 16ms/step -
accuracy: 0.6736 - loss: 0.6367 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 111/500
10/10              0s 30ms/step -
accuracy: 0.7190 - loss: 0.5947 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 112/500
10/10              1s 22ms/step -
accuracy: 0.6995 - loss: 0.6113 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 113/500
10/10              0s 23ms/step -
accuracy: 0.7310 - loss: 0.5840 - val_accuracy: 0.7094 - val_loss: 0.6031
Epoch 114/500
10/10              0s 22ms/step -
accuracy: 0.6883 - loss: 0.6232 - val_accuracy: 0.7094 - val_loss: 0.6031
Epoch 115/500
10/10              0s 23ms/step -
accuracy: 0.6901 - loss: 0.6209 - val_accuracy: 0.7094 - val_loss: 0.6031
Epoch 116/500
10/10              0s 21ms/step -
accuracy: 0.7137 - loss: 0.5996 - val_accuracy: 0.7094 - val_loss: 0.6031
Epoch 117/500
10/10              0s 21ms/step -
accuracy: 0.7062 - loss: 0.6072 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 118/500
10/10              0s 21ms/step -
accuracy: 0.7075 - loss: 0.6056 - val_accuracy: 0.7094 - val_loss: 0.6031
Epoch 119/500
10/10              0s 22ms/step -
accuracy: 0.7260 - loss: 0.5881 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 120/500
10/10              0s 22ms/step -
accuracy: 0.6906 - loss: 0.6215 - val_accuracy: 0.7094 - val_loss: 0.6031
Epoch 121/500
10/10              0s 23ms/step -
accuracy: 0.7159 - loss: 0.5979 - val_accuracy: 0.7094 - val_loss: 0.6030
Epoch 122/500
10/10              0s 23ms/step -
accuracy: 0.7067 - loss: 0.6058 - val_accuracy: 0.7094 - val_loss: 0.6031
Epoch 123/500
10/10              0s 24ms/step -
accuracy: 0.7215 - loss: 0.5922 - val_accuracy: 0.7094 - val_loss: 0.6030
Epoch 124/500
10/10              0s 34ms/step -
accuracy: 0.7239 - loss: 0.5897 - val_accuracy: 0.7094 - val_loss: 0.6030
```

```
Epoch 125/500
10/10              0s 23ms/step -
accuracy: 0.6939 - loss: 0.6176 - val_accuracy: 0.7094 - val_loss: 0.6030
Epoch 126/500
10/10              0s 21ms/step -
accuracy: 0.7277 - loss: 0.5863 - val_accuracy: 0.7094 - val_loss: 0.6030
Epoch 127/500
10/10              0s 21ms/step -
accuracy: 0.6879 - loss: 0.6232 - val_accuracy: 0.7094 - val_loss: 0.6030
Epoch 128/500
10/10              0s 22ms/step -
accuracy: 0.7152 - loss: 0.5987 - val_accuracy: 0.7094 - val_loss: 0.6030
Epoch 129/500
10/10              0s 22ms/step -
accuracy: 0.6908 - loss: 0.6201 - val_accuracy: 0.7094 - val_loss: 0.6030
Epoch 130/500
10/10              0s 22ms/step -
accuracy: 0.7279 - loss: 0.5863 - val_accuracy: 0.7094 - val_loss: 0.6029
Epoch 131/500
10/10              0s 23ms/step -
accuracy: 0.7276 - loss: 0.5873 - val_accuracy: 0.7094 - val_loss: 0.6029
Epoch 132/500
10/10              0s 23ms/step -
accuracy: 0.7137 - loss: 0.6003 - val_accuracy: 0.7094 - val_loss: 0.6029
Epoch 133/500
10/10              0s 23ms/step -
accuracy: 0.7247 - loss: 0.5884 - val_accuracy: 0.7094 - val_loss: 0.6029
Epoch 134/500
10/10              0s 22ms/step -
accuracy: 0.7460 - loss: 0.5702 - val_accuracy: 0.7094 - val_loss: 0.6029
Epoch 135/500
10/10              0s 22ms/step -
accuracy: 0.7113 - loss: 0.6013 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 136/500
10/10              0s 22ms/step -
accuracy: 0.7221 - loss: 0.5916 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 137/500
10/10              0s 22ms/step -
accuracy: 0.7240 - loss: 0.5892 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 138/500
10/10              0s 22ms/step -
accuracy: 0.7142 - loss: 0.5995 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 139/500
10/10              0s 22ms/step -
accuracy: 0.7164 - loss: 0.5975 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 140/500
10/10              0s 23ms/step -
accuracy: 0.7232 - loss: 0.5909 - val_accuracy: 0.7094 - val_loss: 0.6028
```

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Epoch 141/500
10/10              0s 22ms/step -
accuracy: 0.7258 - loss: 0.5882 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 142/500
10/10              0s 22ms/step -
accuracy: 0.7204 - loss: 0.5938 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 143/500
10/10              0s 23ms/step -
accuracy: 0.7101 - loss: 0.6028 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 144/500
10/10              0s 23ms/step -
accuracy: 0.7228 - loss: 0.5910 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 145/500
10/10              0s 23ms/step -
accuracy: 0.7108 - loss: 0.6012 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 146/500
10/10              0s 22ms/step -
accuracy: 0.7113 - loss: 0.6006 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 147/500
10/10              0s 22ms/step -
accuracy: 0.7330 - loss: 0.5800 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 148/500
10/10              0s 24ms/step -
accuracy: 0.7104 - loss: 0.6013 - val_accuracy: 0.7094 - val_loss: 0.6028
Epoch 149/500
10/10              0s 22ms/step -
accuracy: 0.7079 - loss: 0.6050 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 150/500
10/10              0s 22ms/step -
accuracy: 0.7138 - loss: 0.5995 - val_accuracy: 0.7094 - val_loss: 0.6027
Epoch 151/500
10/10              0s 22ms/step -
accuracy: 0.7181 - loss: 0.5951 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 152/500
10/10              0s 21ms/step -
accuracy: 0.6957 - loss: 0.6165 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 153/500
10/10              0s 21ms/step -
accuracy: 0.6967 - loss: 0.6140 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 154/500
10/10              0s 23ms/step -
accuracy: 0.7179 - loss: 0.5960 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 155/500
10/10              0s 21ms/step -
accuracy: 0.7120 - loss: 0.6000 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 156/500
10/10              0s 22ms/step -
accuracy: 0.6949 - loss: 0.6157 - val_accuracy: 0.7094 - val_loss: 0.6026
```

```
Epoch 157/500
10/10              0s 23ms/step -
accuracy: 0.7098 - loss: 0.6023 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 158/500
10/10              0s 23ms/step -
accuracy: 0.7217 - loss: 0.5917 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 159/500
10/10              0s 24ms/step -
accuracy: 0.7290 - loss: 0.5852 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 160/500
10/10              0s 21ms/step -
accuracy: 0.7144 - loss: 0.5978 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 161/500
10/10              0s 22ms/step -
accuracy: 0.7163 - loss: 0.5969 - val_accuracy: 0.7094 - val_loss: 0.6025
Epoch 162/500
10/10              0s 22ms/step -
accuracy: 0.7143 - loss: 0.5979 - val_accuracy: 0.7094 - val_loss: 0.6025
Epoch 163/500
10/10              0s 22ms/step -
accuracy: 0.7165 - loss: 0.5963 - val_accuracy: 0.7094 - val_loss: 0.6025
Epoch 164/500
10/10              0s 21ms/step -
accuracy: 0.7294 - loss: 0.5850 - val_accuracy: 0.7094 - val_loss: 0.6024
Epoch 165/500
10/10              0s 22ms/step -
accuracy: 0.7052 - loss: 0.6062 - val_accuracy: 0.7094 - val_loss: 0.6024
Epoch 166/500
10/10              0s 23ms/step -
accuracy: 0.7202 - loss: 0.5931 - val_accuracy: 0.7094 - val_loss: 0.6024
Epoch 167/500
10/10              0s 22ms/step -
accuracy: 0.7335 - loss: 0.5815 - val_accuracy: 0.7094 - val_loss: 0.6024
Epoch 168/500
10/10              0s 23ms/step -
accuracy: 0.7128 - loss: 0.5999 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 169/500
10/10              0s 23ms/step -
accuracy: 0.7168 - loss: 0.5956 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 170/500
10/10              0s 21ms/step -
accuracy: 0.6952 - loss: 0.6148 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 171/500
10/10              0s 24ms/step -
accuracy: 0.7129 - loss: 0.5984 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 172/500
10/10              0s 22ms/step -
accuracy: 0.7123 - loss: 0.5991 - val_accuracy: 0.7094 - val_loss: 0.6023
```

```
Epoch 173/500
10/10              0s 23ms/step -
accuracy: 0.7029 - loss: 0.6079 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 174/500
10/10              0s 22ms/step -
accuracy: 0.7175 - loss: 0.5951 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 175/500
10/10              0s 23ms/step -
accuracy: 0.6921 - loss: 0.6174 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 176/500
10/10              0s 20ms/step -
accuracy: 0.7055 - loss: 0.6062 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 177/500
10/10              0s 23ms/step -
accuracy: 0.7204 - loss: 0.5926 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 178/500
10/10              0s 21ms/step -
accuracy: 0.7559 - loss: 0.5602 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 179/500
10/10              0s 27ms/step -
accuracy: 0.7137 - loss: 0.5989 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 180/500
10/10              0s 20ms/step -
accuracy: 0.7230 - loss: 0.5907 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 181/500
10/10              0s 23ms/step -
accuracy: 0.7111 - loss: 0.6011 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 182/500
10/10              0s 23ms/step -
accuracy: 0.7051 - loss: 0.6057 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 183/500
10/10              0s 25ms/step -
accuracy: 0.6885 - loss: 0.6222 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 184/500
10/10              0s 23ms/step -
accuracy: 0.7237 - loss: 0.5892 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 185/500
10/10              0s 21ms/step -
accuracy: 0.7303 - loss: 0.5840 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 186/500
10/10              0s 22ms/step -
accuracy: 0.6985 - loss: 0.6122 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 187/500
10/10              0s 19ms/step -
accuracy: 0.7250 - loss: 0.5885 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 188/500
10/10              0s 22ms/step -
accuracy: 0.7100 - loss: 0.6019 - val_accuracy: 0.7094 - val_loss: 0.6021
```

```
Epoch 189/500
10/10              0s 23ms/step -
accuracy: 0.7242 - loss: 0.5886 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 190/500
10/10              0s 23ms/step -
accuracy: 0.6855 - loss: 0.6248 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 191/500
10/10              0s 23ms/step -
accuracy: 0.7344 - loss: 0.5790 - val_accuracy: 0.7094 - val_loss: 0.6022
Epoch 192/500
10/10              0s 26ms/step -
accuracy: 0.7089 - loss: 0.6033 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 193/500
10/10              0s 33ms/step -
accuracy: 0.7270 - loss: 0.5864 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 194/500
10/10              0s 25ms/step -
accuracy: 0.7046 - loss: 0.6061 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 195/500
10/10              0s 23ms/step -
accuracy: 0.7207 - loss: 0.5928 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 196/500
10/10              0s 23ms/step -
accuracy: 0.6860 - loss: 0.6232 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 197/500
10/10              0s 23ms/step -
accuracy: 0.7228 - loss: 0.5904 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 198/500
10/10              0s 26ms/step -
accuracy: 0.7040 - loss: 0.6072 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 199/500
10/10              0s 23ms/step -
accuracy: 0.7095 - loss: 0.6019 - val_accuracy: 0.7094 - val_loss: 0.6020
Epoch 200/500
10/10              0s 27ms/step -
accuracy: 0.7065 - loss: 0.6043 - val_accuracy: 0.7094 - val_loss: 0.6020
Epoch 201/500
10/10              0s 24ms/step -
accuracy: 0.6858 - loss: 0.6241 - val_accuracy: 0.7094 - val_loss: 0.6020
Epoch 202/500
10/10              0s 26ms/step -
accuracy: 0.6927 - loss: 0.6177 - val_accuracy: 0.7094 - val_loss: 0.6020
Epoch 203/500
10/10              0s 24ms/step -
accuracy: 0.7232 - loss: 0.5888 - val_accuracy: 0.7094 - val_loss: 0.6020
Epoch 204/500
10/10              0s 25ms/step -
accuracy: 0.7080 - loss: 0.6041 - val_accuracy: 0.7094 - val_loss: 0.6020
```

```
Epoch 205/500
10/10              0s 23ms/step -
accuracy: 0.7091 - loss: 0.6014 - val_accuracy: 0.7094 - val_loss: 0.6020
Epoch 206/500
10/10              0s 24ms/step -
accuracy: 0.6918 - loss: 0.6172 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 207/500
10/10              0s 28ms/step -
accuracy: 0.7061 - loss: 0.6051 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 208/500
10/10              0s 34ms/step -
accuracy: 0.7027 - loss: 0.6091 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 209/500
10/10              0s 25ms/step -
accuracy: 0.7312 - loss: 0.5823 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 210/500
10/10              0s 24ms/step -
accuracy: 0.7053 - loss: 0.6060 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 211/500
10/10              0s 26ms/step -
accuracy: 0.7212 - loss: 0.5920 - val_accuracy: 0.7094 - val_loss: 0.6019
Epoch 212/500
10/10              0s 23ms/step -
accuracy: 0.7214 - loss: 0.5918 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 213/500
10/10              0s 27ms/step -
accuracy: 0.7130 - loss: 0.5991 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 214/500
10/10              0s 29ms/step -
accuracy: 0.7209 - loss: 0.5912 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 215/500
10/10              0s 23ms/step -
accuracy: 0.7081 - loss: 0.6023 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 216/500
10/10              0s 28ms/step -
accuracy: 0.6860 - loss: 0.6231 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 217/500
10/10              0s 21ms/step -
accuracy: 0.6875 - loss: 0.6220 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 218/500
10/10              0s 23ms/step -
accuracy: 0.7117 - loss: 0.5998 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 219/500
10/10              0s 24ms/step -
accuracy: 0.7353 - loss: 0.5787 - val_accuracy: 0.7094 - val_loss: 0.6017
Epoch 220/500
10/10              0s 24ms/step -
accuracy: 0.6983 - loss: 0.6128 - val_accuracy: 0.7094 - val_loss: 0.6017
```

```
Epoch 221/500
10/10              0s 26ms/step -
accuracy: 0.7163 - loss: 0.5961 - val_accuracy: 0.7094 - val_loss: 0.6017
Epoch 222/500
10/10              0s 24ms/step -
accuracy: 0.6981 - loss: 0.6115 - val_accuracy: 0.7094 - val_loss: 0.6017
Epoch 223/500
10/10              0s 22ms/step -
accuracy: 0.7277 - loss: 0.5852 - val_accuracy: 0.7094 - val_loss: 0.6017
Epoch 224/500
10/10              0s 24ms/step -
accuracy: 0.7477 - loss: 0.5665 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 225/500
10/10              0s 22ms/step -
accuracy: 0.7251 - loss: 0.5877 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 226/500
10/10              0s 23ms/step -
accuracy: 0.6795 - loss: 0.6282 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 227/500
10/10              0s 21ms/step -
accuracy: 0.7056 - loss: 0.6057 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 228/500
10/10              0s 21ms/step -
accuracy: 0.7291 - loss: 0.5829 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 229/500
10/10              0s 22ms/step -
accuracy: 0.6976 - loss: 0.6124 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 230/500
10/10              0s 22ms/step -
accuracy: 0.7211 - loss: 0.5906 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 231/500
10/10              0s 22ms/step -
accuracy: 0.7229 - loss: 0.5901 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 232/500
10/10              0s 22ms/step -
accuracy: 0.7136 - loss: 0.5969 - val_accuracy: 0.7094 - val_loss: 0.6016
Epoch 233/500
10/10              0s 21ms/step -
accuracy: 0.7220 - loss: 0.5902 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 234/500
10/10              0s 22ms/step -
accuracy: 0.7058 - loss: 0.6059 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 235/500
10/10              0s 21ms/step -
accuracy: 0.6923 - loss: 0.6179 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 236/500
10/10              0s 22ms/step -
accuracy: 0.7289 - loss: 0.5831 - val_accuracy: 0.7094 - val_loss: 0.6015
```

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Epoch 237/500
10/10              0s 21ms/step -
accuracy: 0.7037 - loss: 0.6063 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 238/500
10/10              0s 20ms/step -
accuracy: 0.7291 - loss: 0.5837 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 239/500
10/10              0s 14ms/step -
accuracy: 0.6906 - loss: 0.6188 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 240/500
10/10              0s 10ms/step -
accuracy: 0.7140 - loss: 0.5982 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 241/500
10/10              0s 16ms/step -
accuracy: 0.7084 - loss: 0.6017 - val_accuracy: 0.7094 - val_loss: 0.6014
Epoch 242/500
10/10              0s 18ms/step -
accuracy: 0.7190 - loss: 0.5926 - val_accuracy: 0.7094 - val_loss: 0.6014
Epoch 243/500
10/10              0s 15ms/step -
accuracy: 0.6874 - loss: 0.6222 - val_accuracy: 0.7094 - val_loss: 0.6014
Epoch 244/500
10/10              0s 18ms/step -
accuracy: 0.7043 - loss: 0.6055 - val_accuracy: 0.7094 - val_loss: 0.6014
Epoch 245/500
10/10              0s 11ms/step -
accuracy: 0.7216 - loss: 0.5907 - val_accuracy: 0.7094 - val_loss: 0.6014
Epoch 246/500
10/10              0s 12ms/step -
accuracy: 0.7055 - loss: 0.6045 - val_accuracy: 0.7094 - val_loss: 0.6014
Epoch 247/500
10/10              0s 10ms/step -
accuracy: 0.7131 - loss: 0.5976 - val_accuracy: 0.7094 - val_loss: 0.6013
Epoch 248/500
10/10              0s 12ms/step -
accuracy: 0.7347 - loss: 0.5789 - val_accuracy: 0.7094 - val_loss: 0.6013
Epoch 249/500
10/10              0s 11ms/step -
accuracy: 0.7384 - loss: 0.5754 - val_accuracy: 0.7094 - val_loss: 0.6013
Epoch 250/500
10/10              0s 12ms/step -
accuracy: 0.7350 - loss: 0.5783 - val_accuracy: 0.7094 - val_loss: 0.6013
Epoch 251/500
10/10              0s 12ms/step -
accuracy: 0.7157 - loss: 0.5955 - val_accuracy: 0.7094 - val_loss: 0.6013
Epoch 252/500
10/10              0s 13ms/step -
accuracy: 0.7204 - loss: 0.5913 - val_accuracy: 0.7094 - val_loss: 0.6012
```

```
Epoch 253/500
10/10              0s 13ms/step -
accuracy: 0.7145 - loss: 0.5962 - val_accuracy: 0.7094 - val_loss: 0.6012
Epoch 254/500
10/10              0s 18ms/step -
accuracy: 0.7339 - loss: 0.5795 - val_accuracy: 0.7094 - val_loss: 0.6012
Epoch 255/500
10/10              0s 10ms/step -
accuracy: 0.7006 - loss: 0.6088 - val_accuracy: 0.7094 - val_loss: 0.6012
Epoch 256/500
10/10              0s 20ms/step -
accuracy: 0.6944 - loss: 0.6145 - val_accuracy: 0.7094 - val_loss: 0.6012
Epoch 257/500
10/10              0s 23ms/step -
accuracy: 0.7234 - loss: 0.5892 - val_accuracy: 0.7094 - val_loss: 0.6012
Epoch 258/500
10/10              0s 22ms/step -
accuracy: 0.7113 - loss: 0.5998 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 259/500
10/10              0s 22ms/step -
accuracy: 0.7179 - loss: 0.5926 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 260/500
10/10              0s 24ms/step -
accuracy: 0.7000 - loss: 0.6102 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 261/500
10/10              0s 21ms/step -
accuracy: 0.7249 - loss: 0.5874 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 262/500
10/10              0s 23ms/step -
accuracy: 0.7142 - loss: 0.5972 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 263/500
10/10              0s 24ms/step -
accuracy: 0.7164 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 264/500
10/10              0s 21ms/step -
accuracy: 0.7204 - loss: 0.5909 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 265/500
10/10              0s 20ms/step -
accuracy: 0.6894 - loss: 0.6203 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 266/500
10/10              0s 19ms/step -
accuracy: 0.6938 - loss: 0.6156 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 267/500
10/10              0s 25ms/step -
accuracy: 0.6910 - loss: 0.6181 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 268/500
10/10              0s 22ms/step -
accuracy: 0.7099 - loss: 0.6008 - val_accuracy: 0.7094 - val_loss: 0.6011
```

```
Epoch 269/500
10/10              0s 17ms/step -
accuracy: 0.7068 - loss: 0.6032 - val_accuracy: 0.7094 - val_loss: 0.6011
Epoch 270/500
10/10              0s 13ms/step -
accuracy: 0.6964 - loss: 0.6129 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 271/500
10/10              0s 9ms/step -
accuracy: 0.7033 - loss: 0.6064 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 272/500
10/10              0s 21ms/step -
accuracy: 0.7255 - loss: 0.5866 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 273/500
10/10              0s 19ms/step -
accuracy: 0.7133 - loss: 0.5968 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 274/500
10/10              0s 19ms/step -
accuracy: 0.7417 - loss: 0.5711 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 275/500
10/10              0s 23ms/step -
accuracy: 0.7070 - loss: 0.6024 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 276/500
10/10              0s 22ms/step -
accuracy: 0.7239 - loss: 0.5876 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 277/500
10/10              0s 23ms/step -
accuracy: 0.7111 - loss: 0.5989 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 278/500
10/10              0s 20ms/step -
accuracy: 0.7045 - loss: 0.6058 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 279/500
10/10              0s 23ms/step -
accuracy: 0.7109 - loss: 0.5998 - val_accuracy: 0.7094 - val_loss: 0.6010
Epoch 280/500
10/10              0s 21ms/step -
accuracy: 0.7331 - loss: 0.5788 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 281/500
10/10              0s 21ms/step -
accuracy: 0.6948 - loss: 0.6141 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 282/500
10/10              0s 22ms/step -
accuracy: 0.7183 - loss: 0.5934 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 283/500
10/10              0s 23ms/step -
accuracy: 0.6945 - loss: 0.6138 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 284/500
10/10              0s 22ms/step -
accuracy: 0.7275 - loss: 0.5840 - val_accuracy: 0.7094 - val_loss: 0.6009
```

```
Epoch 285/500
10/10            0s 22ms/step -
accuracy: 0.7287 - loss: 0.5851 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 286/500
10/10            0s 23ms/step -
accuracy: 0.7018 - loss: 0.6082 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 287/500
10/10            0s 22ms/step -
accuracy: 0.7108 - loss: 0.6001 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 288/500
10/10            0s 22ms/step -
accuracy: 0.7369 - loss: 0.5771 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 289/500
10/10            0s 23ms/step -
accuracy: 0.7341 - loss: 0.5771 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 290/500
10/10            0s 21ms/step -
accuracy: 0.7322 - loss: 0.5791 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 291/500
10/10            0s 23ms/step -
accuracy: 0.7314 - loss: 0.5812 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 292/500
10/10            0s 22ms/step -
accuracy: 0.7058 - loss: 0.6043 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 293/500
10/10            0s 21ms/step -
accuracy: 0.7191 - loss: 0.5927 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 294/500
10/10            0s 21ms/step -
accuracy: 0.7089 - loss: 0.6021 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 295/500
10/10            0s 20ms/step -
accuracy: 0.7176 - loss: 0.5938 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 296/500
10/10            0s 22ms/step -
accuracy: 0.7038 - loss: 0.6049 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 297/500
10/10            0s 20ms/step -
accuracy: 0.7213 - loss: 0.5895 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 298/500
10/10            0s 15ms/step -
accuracy: 0.7184 - loss: 0.5929 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 299/500
10/10            0s 29ms/step -
accuracy: 0.7148 - loss: 0.5961 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 300/500
10/10            0s 9ms/step -
accuracy: 0.7115 - loss: 0.6003 - val_accuracy: 0.7094 - val_loss: 0.6007
```

```
Epoch 301/500
10/10                0s 21ms/step -
accuracy: 0.7104 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.6008
Epoch 302/500
10/10                0s 22ms/step -
accuracy: 0.7296 - loss: 0.5823 - val_accuracy: 0.7094 - val_loss: 0.6007
Epoch 303/500
10/10                0s 10ms/step -
accuracy: 0.7367 - loss: 0.5752 - val_accuracy: 0.7094 - val_loss: 0.6007
Epoch 304/500
10/10                0s 23ms/step -
accuracy: 0.7229 - loss: 0.5887 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 305/500
10/10                0s 19ms/step -
accuracy: 0.7195 - loss: 0.5912 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 306/500
10/10                0s 21ms/step -
accuracy: 0.7099 - loss: 0.6014 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 307/500
10/10                0s 20ms/step -
accuracy: 0.7050 - loss: 0.6048 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 308/500
10/10                0s 21ms/step -
accuracy: 0.7107 - loss: 0.5997 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 309/500
10/10                0s 21ms/step -
accuracy: 0.7151 - loss: 0.5949 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 310/500
10/10                0s 21ms/step -
accuracy: 0.7206 - loss: 0.5903 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 311/500
10/10                0s 21ms/step -
accuracy: 0.7019 - loss: 0.6074 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 312/500
10/10                0s 23ms/step -
accuracy: 0.7171 - loss: 0.5924 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 313/500
10/10                0s 21ms/step -
accuracy: 0.7044 - loss: 0.6058 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 314/500
10/10                0s 22ms/step -
accuracy: 0.7468 - loss: 0.5661 - val_accuracy: 0.7094 - val_loss: 0.6005
Epoch 315/500
10/10                0s 22ms/step -
accuracy: 0.7144 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.6005
Epoch 316/500
10/10                0s 22ms/step -
accuracy: 0.7322 - loss: 0.5800 - val_accuracy: 0.7094 - val_loss: 0.6005
```

```
Epoch 317/500
10/10              0s 20ms/step -
accuracy: 0.7103 - loss: 0.6003 - val_accuracy: 0.7094 - val_loss: 0.6005
Epoch 318/500
10/10              0s 22ms/step -
accuracy: 0.7256 - loss: 0.5850 - val_accuracy: 0.7094 - val_loss: 0.6004
Epoch 319/500
10/10              0s 21ms/step -
accuracy: 0.7372 - loss: 0.5754 - val_accuracy: 0.7094 - val_loss: 0.6004
Epoch 320/500
10/10              0s 21ms/step -
accuracy: 0.7283 - loss: 0.5845 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 321/500
10/10              0s 20ms/step -
accuracy: 0.7144 - loss: 0.5962 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 322/500
10/10              0s 22ms/step -
accuracy: 0.7342 - loss: 0.5783 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 323/500
10/10              0s 21ms/step -
accuracy: 0.7110 - loss: 0.5989 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 324/500
10/10              0s 21ms/step -
accuracy: 0.7113 - loss: 0.5984 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 325/500
10/10              0s 22ms/step -
accuracy: 0.7005 - loss: 0.6097 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 326/500
10/10              0s 21ms/step -
accuracy: 0.6983 - loss: 0.6105 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 327/500
10/10              0s 21ms/step -
accuracy: 0.7170 - loss: 0.5928 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 328/500
10/10              0s 23ms/step -
accuracy: 0.7410 - loss: 0.5714 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 329/500
10/10              0s 20ms/step -
accuracy: 0.7013 - loss: 0.6072 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 330/500
10/10              0s 22ms/step -
accuracy: 0.7133 - loss: 0.5977 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 331/500
10/10              0s 21ms/step -
accuracy: 0.7155 - loss: 0.5947 - val_accuracy: 0.7094 - val_loss: 0.6002
Epoch 332/500
10/10              0s 22ms/step -
accuracy: 0.7045 - loss: 0.6039 - val_accuracy: 0.7094 - val_loss: 0.6002
```

```
Epoch 333/500
10/10              0s 20ms/step -
accuracy: 0.7401 - loss: 0.5734 - val_accuracy: 0.7094 - val_loss: 0.6002
Epoch 334/500
10/10              0s 21ms/step -
accuracy: 0.6903 - loss: 0.6182 - val_accuracy: 0.7094 - val_loss: 0.6002
Epoch 335/500
10/10              0s 21ms/step -
accuracy: 0.6974 - loss: 0.6113 - val_accuracy: 0.7094 - val_loss: 0.6002
Epoch 336/500
10/10              0s 20ms/step -
accuracy: 0.7194 - loss: 0.5910 - val_accuracy: 0.7094 - val_loss: 0.6002
Epoch 337/500
10/10              0s 22ms/step -
accuracy: 0.7450 - loss: 0.5677 - val_accuracy: 0.7094 - val_loss: 0.6001
Epoch 338/500
10/10              0s 21ms/step -
accuracy: 0.7246 - loss: 0.5865 - val_accuracy: 0.7094 - val_loss: 0.6001
Epoch 339/500
10/10              0s 21ms/step -
accuracy: 0.7192 - loss: 0.5907 - val_accuracy: 0.7094 - val_loss: 0.6001
Epoch 340/500
10/10              0s 21ms/step -
accuracy: 0.7090 - loss: 0.6005 - val_accuracy: 0.7094 - val_loss: 0.6001
Epoch 341/500
10/10              0s 21ms/step -
accuracy: 0.7302 - loss: 0.5821 - val_accuracy: 0.7094 - val_loss: 0.6001
Epoch 342/500
10/10              0s 21ms/step -
accuracy: 0.7197 - loss: 0.5896 - val_accuracy: 0.7094 - val_loss: 0.6001
Epoch 343/500
10/10              0s 21ms/step -
accuracy: 0.7305 - loss: 0.5817 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 344/500
10/10              0s 23ms/step -
accuracy: 0.7287 - loss: 0.5820 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 345/500
10/10              0s 21ms/step -
accuracy: 0.7589 - loss: 0.5555 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 346/500
10/10              0s 19ms/step -
accuracy: 0.7095 - loss: 0.5997 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 347/500
10/10              0s 31ms/step -
accuracy: 0.7024 - loss: 0.6058 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 348/500
10/10              0s 22ms/step -
accuracy: 0.7217 - loss: 0.5894 - val_accuracy: 0.7094 - val_loss: 0.6000
```

```
Epoch 349/500
10/10          0s 22ms/step -
accuracy: 0.6910 - loss: 0.6169 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 350/500
10/10          0s 22ms/step -
accuracy: 0.7331 - loss: 0.5786 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 351/500
10/10          0s 22ms/step -
accuracy: 0.7198 - loss: 0.5913 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 352/500
10/10          0s 22ms/step -
accuracy: 0.7149 - loss: 0.5961 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 353/500
10/10          0s 22ms/step -
accuracy: 0.6943 - loss: 0.6122 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 354/500
10/10          0s 21ms/step -
accuracy: 0.7091 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 355/500
10/10          0s 22ms/step -
accuracy: 0.7319 - loss: 0.5793 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 356/500
10/10          0s 22ms/step -
accuracy: 0.7236 - loss: 0.5877 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 357/500
10/10          0s 22ms/step -
accuracy: 0.7036 - loss: 0.6053 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 358/500
10/10          0s 24ms/step -
accuracy: 0.7286 - loss: 0.5835 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 359/500
10/10          0s 22ms/step -
accuracy: 0.7234 - loss: 0.5868 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 360/500
10/10          0s 23ms/step -
accuracy: 0.7499 - loss: 0.5629 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 361/500
10/10          0s 21ms/step -
accuracy: 0.7285 - loss: 0.5828 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 362/500
10/10          0s 21ms/step -
accuracy: 0.6943 - loss: 0.6135 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 363/500
10/10          0s 23ms/step -
accuracy: 0.7034 - loss: 0.6047 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 364/500
10/10          0s 23ms/step -
accuracy: 0.7355 - loss: 0.5764 - val_accuracy: 0.7094 - val_loss: 0.5998
```

```
Epoch 365/500
10/10              0s 21ms/step -
accuracy: 0.7062 - loss: 0.6028 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 366/500
10/10              0s 22ms/step -
accuracy: 0.7131 - loss: 0.5956 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 367/500
10/10              0s 21ms/step -
accuracy: 0.6825 - loss: 0.6255 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 368/500
10/10              0s 22ms/step -
accuracy: 0.7159 - loss: 0.5938 - val_accuracy: 0.7094 - val_loss: 0.5999
Epoch 369/500
10/10              0s 22ms/step -
accuracy: 0.7127 - loss: 0.5965 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 370/500
10/10              0s 22ms/step -
accuracy: 0.7201 - loss: 0.5896 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 371/500
10/10              0s 23ms/step -
accuracy: 0.7166 - loss: 0.5926 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 372/500
10/10              0s 22ms/step -
accuracy: 0.7008 - loss: 0.6080 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 373/500
10/10              0s 22ms/step -
accuracy: 0.7126 - loss: 0.5956 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 374/500
10/10              0s 21ms/step -
accuracy: 0.6858 - loss: 0.6217 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 375/500
10/10              0s 23ms/step -
accuracy: 0.7096 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 376/500
10/10              0s 22ms/step -
accuracy: 0.7034 - loss: 0.6057 - val_accuracy: 0.7094 - val_loss: 0.5998
Epoch 377/500
10/10              0s 22ms/step -
accuracy: 0.7357 - loss: 0.5754 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 378/500
10/10              0s 22ms/step -
accuracy: 0.7397 - loss: 0.5708 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 379/500
10/10              0s 22ms/step -
accuracy: 0.6878 - loss: 0.6188 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 380/500
10/10              0s 22ms/step -
accuracy: 0.7279 - loss: 0.5836 - val_accuracy: 0.7094 - val_loss: 0.5997
```

```
Epoch 381/500
10/10              0s 21ms/step -
accuracy: 0.7308 - loss: 0.5793 - val_accuracy: 0.7094 - val_loss: 0.5996
Epoch 382/500
10/10              0s 22ms/step -
accuracy: 0.7088 - loss: 0.6006 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 383/500
10/10              0s 23ms/step -
accuracy: 0.7178 - loss: 0.5921 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 384/500
10/10              0s 21ms/step -
accuracy: 0.7367 - loss: 0.5745 - val_accuracy: 0.7094 - val_loss: 0.5996
Epoch 385/500
10/10              0s 22ms/step -
accuracy: 0.7207 - loss: 0.5893 - val_accuracy: 0.7094 - val_loss: 0.5996
Epoch 386/500
10/10              0s 22ms/step -
accuracy: 0.7290 - loss: 0.5824 - val_accuracy: 0.7094 - val_loss: 0.5996
Epoch 387/500
10/10              0s 22ms/step -
accuracy: 0.7190 - loss: 0.5896 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 388/500
10/10              0s 23ms/step -
accuracy: 0.7242 - loss: 0.5867 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 389/500
10/10              0s 23ms/step -
accuracy: 0.7114 - loss: 0.5971 - val_accuracy: 0.7094 - val_loss: 0.5996
Epoch 390/500
10/10              0s 22ms/step -
accuracy: 0.7024 - loss: 0.6066 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 391/500
10/10              0s 22ms/step -
accuracy: 0.7082 - loss: 0.5994 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 392/500
10/10              0s 22ms/step -
accuracy: 0.7015 - loss: 0.6069 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 393/500
10/10              0s 22ms/step -
accuracy: 0.7098 - loss: 0.5988 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 394/500
10/10              0s 22ms/step -
accuracy: 0.7127 - loss: 0.5950 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 395/500
10/10              0s 22ms/step -
accuracy: 0.7022 - loss: 0.6066 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 396/500
10/10              0s 22ms/step -
accuracy: 0.7185 - loss: 0.5924 - val_accuracy: 0.7094 - val_loss: 0.5995
```

```
Epoch 397/500
10/10              0s 22ms/step -
accuracy: 0.7125 - loss: 0.5968 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 398/500
10/10              0s 22ms/step -
accuracy: 0.7065 - loss: 0.6020 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 399/500
10/10              0s 24ms/step -
accuracy: 0.6977 - loss: 0.6082 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 400/500
10/10              0s 23ms/step -
accuracy: 0.7125 - loss: 0.5964 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 401/500
10/10              0s 22ms/step -
accuracy: 0.7237 - loss: 0.5859 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 402/500
10/10              0s 21ms/step -
accuracy: 0.7030 - loss: 0.6041 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 403/500
10/10              0s 21ms/step -
accuracy: 0.6897 - loss: 0.6187 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 404/500
10/10              0s 21ms/step -
accuracy: 0.7191 - loss: 0.5891 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 405/500
10/10              0s 22ms/step -
accuracy: 0.7218 - loss: 0.5883 - val_accuracy: 0.7094 - val_loss: 0.5994
Epoch 406/500
10/10              0s 22ms/step -
accuracy: 0.7117 - loss: 0.5976 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 407/500
10/10              0s 23ms/step -
accuracy: 0.7118 - loss: 0.5957 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 408/500
10/10              0s 21ms/step -
accuracy: 0.7156 - loss: 0.5937 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 409/500
10/10              0s 23ms/step -
accuracy: 0.6980 - loss: 0.6089 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 410/500
10/10              0s 23ms/step -
accuracy: 0.6990 - loss: 0.6092 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 411/500
10/10              0s 23ms/step -
accuracy: 0.7198 - loss: 0.5901 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 412/500
10/10              0s 28ms/step -
accuracy: 0.7447 - loss: 0.5663 - val_accuracy: 0.7094 - val_loss: 0.5993
```

```
Epoch 413/500
10/10              0s 23ms/step -
accuracy: 0.7434 - loss: 0.5672 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 414/500
10/10              0s 23ms/step -
accuracy: 0.7026 - loss: 0.6057 - val_accuracy: 0.7094 - val_loss: 0.5993
Epoch 415/500
10/10              0s 25ms/step -
accuracy: 0.7160 - loss: 0.5934 - val_accuracy: 0.7094 - val_loss: 0.5992
Epoch 416/500
10/10              0s 24ms/step -
accuracy: 0.7328 - loss: 0.5768 - val_accuracy: 0.7094 - val_loss: 0.5992
Epoch 417/500
10/10              0s 25ms/step -
accuracy: 0.7213 - loss: 0.5881 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 418/500
10/10              0s 22ms/step -
accuracy: 0.7051 - loss: 0.6023 - val_accuracy: 0.7094 - val_loss: 0.5992
Epoch 419/500
10/10              0s 25ms/step -
accuracy: 0.7233 - loss: 0.5858 - val_accuracy: 0.7094 - val_loss: 0.5992
Epoch 420/500
10/10              0s 23ms/step -
accuracy: 0.7141 - loss: 0.5940 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 421/500
10/10              0s 22ms/step -
accuracy: 0.7089 - loss: 0.6011 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 422/500
10/10              0s 21ms/step -
accuracy: 0.7113 - loss: 0.5980 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 423/500
10/10              0s 21ms/step -
accuracy: 0.7358 - loss: 0.5741 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 424/500
10/10              0s 22ms/step -
accuracy: 0.7147 - loss: 0.5936 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 425/500
10/10              0s 23ms/step -
accuracy: 0.7417 - loss: 0.5690 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 426/500
10/10              0s 22ms/step -
accuracy: 0.7091 - loss: 0.5992 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 427/500
10/10              0s 23ms/step -
accuracy: 0.7029 - loss: 0.6043 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 428/500
10/10              0s 23ms/step -
accuracy: 0.7182 - loss: 0.5908 - val_accuracy: 0.7094 - val_loss: 0.5991
```

```
Epoch 429/500
10/10              0s 24ms/step -
accuracy: 0.7063 - loss: 0.6024 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 430/500
10/10              0s 30ms/step -
accuracy: 0.7162 - loss: 0.5921 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 431/500
10/10              0s 22ms/step -
accuracy: 0.6799 - loss: 0.6259 - val_accuracy: 0.7094 - val_loss: 0.5991
Epoch 432/500
10/10              0s 22ms/step -
accuracy: 0.7191 - loss: 0.5909 - val_accuracy: 0.7094 - val_loss: 0.5990
Epoch 433/500
10/10              0s 23ms/step -
accuracy: 0.7254 - loss: 0.5834 - val_accuracy: 0.7094 - val_loss: 0.5990
Epoch 434/500
10/10              0s 23ms/step -
accuracy: 0.7381 - loss: 0.5722 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 435/500
10/10              0s 23ms/step -
accuracy: 0.7043 - loss: 0.6032 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 436/500
10/10              0s 22ms/step -
accuracy: 0.7089 - loss: 0.5995 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 437/500
10/10              0s 23ms/step -
accuracy: 0.7019 - loss: 0.6049 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 438/500
10/10              0s 23ms/step -
accuracy: 0.7299 - loss: 0.5803 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 439/500
10/10              0s 23ms/step -
accuracy: 0.7004 - loss: 0.6071 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 440/500
10/10              0s 22ms/step -
accuracy: 0.7126 - loss: 0.5953 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 441/500
10/10              0s 23ms/step -
accuracy: 0.7031 - loss: 0.6046 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 442/500
10/10              0s 23ms/step -
accuracy: 0.7310 - loss: 0.5784 - val_accuracy: 0.7094 - val_loss: 0.5989
Epoch 443/500
10/10              0s 22ms/step -
accuracy: 0.7232 - loss: 0.5857 - val_accuracy: 0.7094 - val_loss: 0.5988
Epoch 444/500
10/10              0s 23ms/step -
accuracy: 0.7048 - loss: 0.6028 - val_accuracy: 0.7094 - val_loss: 0.5988
```

```
Epoch 445/500
10/10                0s 21ms/step -
accuracy: 0.7130 - loss: 0.5959 - val_accuracy: 0.7094 - val_loss: 0.5988
Epoch 446/500
10/10                0s 23ms/step -
accuracy: 0.6901 - loss: 0.6161 - val_accuracy: 0.7094 - val_loss: 0.5988
Epoch 447/500
10/10                0s 27ms/step -
accuracy: 0.7350 - loss: 0.5763 - val_accuracy: 0.7094 - val_loss: 0.5988
Epoch 448/500
10/10                0s 23ms/step -
accuracy: 0.6984 - loss: 0.6081 - val_accuracy: 0.7094 - val_loss: 0.5988
Epoch 449/500
10/10                0s 25ms/step -
accuracy: 0.7036 - loss: 0.6043 - val_accuracy: 0.7094 - val_loss: 0.5987
Epoch 450/500
10/10                0s 22ms/step -
accuracy: 0.7200 - loss: 0.5896 - val_accuracy: 0.7094 - val_loss: 0.5987
Epoch 451/500
10/10                0s 21ms/step -
accuracy: 0.7209 - loss: 0.5872 - val_accuracy: 0.7094 - val_loss: 0.5987
Epoch 452/500
10/10                0s 24ms/step -
accuracy: 0.7458 - loss: 0.5652 - val_accuracy: 0.7094 - val_loss: 0.5987
Epoch 453/500
10/10                0s 25ms/step -
accuracy: 0.7182 - loss: 0.5901 - val_accuracy: 0.7094 - val_loss: 0.5987
Epoch 454/500
10/10                0s 24ms/step -
accuracy: 0.7242 - loss: 0.5858 - val_accuracy: 0.7094 - val_loss: 0.5986
Epoch 455/500
10/10                0s 23ms/step -
accuracy: 0.7183 - loss: 0.5909 - val_accuracy: 0.7094 - val_loss: 0.5986
Epoch 456/500
10/10                0s 24ms/step -
accuracy: 0.7394 - loss: 0.5711 - val_accuracy: 0.7094 - val_loss: 0.5986
Epoch 457/500
10/10                0s 22ms/step -
accuracy: 0.7114 - loss: 0.5970 - val_accuracy: 0.7094 - val_loss: 0.5986
Epoch 458/500
10/10                0s 22ms/step -
accuracy: 0.7170 - loss: 0.5904 - val_accuracy: 0.7094 - val_loss: 0.5986
Epoch 459/500
10/10                0s 23ms/step -
accuracy: 0.7302 - loss: 0.5796 - val_accuracy: 0.7094 - val_loss: 0.5986
Epoch 460/500
10/10                0s 23ms/step -
accuracy: 0.7106 - loss: 0.5979 - val_accuracy: 0.7094 - val_loss: 0.5985
```

```
Epoch 461/500
10/10              0s 22ms/step -
accuracy: 0.7433 - loss: 0.5679 - val_accuracy: 0.7094 - val_loss: 0.5985
Epoch 462/500
10/10              0s 27ms/step -
accuracy: 0.7372 - loss: 0.5736 - val_accuracy: 0.7094 - val_loss: 0.5985
Epoch 463/500
10/10              0s 25ms/step -
accuracy: 0.6978 - loss: 0.6096 - val_accuracy: 0.7094 - val_loss: 0.5985
Epoch 464/500
10/10              0s 23ms/step -
accuracy: 0.7169 - loss: 0.5915 - val_accuracy: 0.7094 - val_loss: 0.5985
Epoch 465/500
10/10              0s 22ms/step -
accuracy: 0.7086 - loss: 0.5999 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 466/500
10/10              0s 22ms/step -
accuracy: 0.7243 - loss: 0.5848 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 467/500
10/10              0s 24ms/step -
accuracy: 0.6935 - loss: 0.6120 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 468/500
10/10              0s 21ms/step -
accuracy: 0.7150 - loss: 0.5933 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 469/500
10/10              0s 23ms/step -
accuracy: 0.7340 - loss: 0.5756 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 470/500
10/10              0s 21ms/step -
accuracy: 0.7177 - loss: 0.5901 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 471/500
10/10              0s 22ms/step -
accuracy: 0.7278 - loss: 0.5812 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 472/500
10/10              0s 22ms/step -
accuracy: 0.7359 - loss: 0.5745 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 473/500
10/10              0s 22ms/step -
accuracy: 0.7132 - loss: 0.5946 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 474/500
10/10              0s 21ms/step -
accuracy: 0.7506 - loss: 0.5611 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 475/500
10/10              0s 23ms/step -
accuracy: 0.7198 - loss: 0.5895 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 476/500
10/10              0s 22ms/step -
accuracy: 0.7187 - loss: 0.5896 - val_accuracy: 0.7094 - val_loss: 0.5984
```

```
Epoch 477/500
10/10              0s 22ms/step -
accuracy: 0.7034 - loss: 0.6040 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 478/500
10/10              0s 21ms/step -
accuracy: 0.7072 - loss: 0.6010 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 479/500
10/10              0s 22ms/step -
accuracy: 0.6957 - loss: 0.6107 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 480/500
10/10              0s 22ms/step -
accuracy: 0.7051 - loss: 0.6019 - val_accuracy: 0.7094 - val_loss: 0.5984
Epoch 481/500
10/10              0s 24ms/step -
accuracy: 0.7119 - loss: 0.5962 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 482/500
10/10              0s 25ms/step -
accuracy: 0.7113 - loss: 0.5963 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 483/500
10/10              0s 25ms/step -
accuracy: 0.7255 - loss: 0.5843 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 484/500
10/10              0s 22ms/step -
accuracy: 0.7252 - loss: 0.5824 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 485/500
10/10              0s 22ms/step -
accuracy: 0.7056 - loss: 0.6021 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 486/500
10/10              0s 22ms/step -
accuracy: 0.7175 - loss: 0.5912 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 487/500
10/10              0s 22ms/step -
accuracy: 0.6937 - loss: 0.6128 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 488/500
10/10              0s 22ms/step -
accuracy: 0.6994 - loss: 0.6072 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 489/500
10/10              0s 27ms/step -
accuracy: 0.7017 - loss: 0.6050 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 490/500
10/10              0s 31ms/step -
accuracy: 0.7203 - loss: 0.5892 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 491/500
10/10              0s 22ms/step -
accuracy: 0.6961 - loss: 0.6109 - val_accuracy: 0.7094 - val_loss: 0.5983
Epoch 492/500
10/10              0s 22ms/step -
accuracy: 0.6835 - loss: 0.6211 - val_accuracy: 0.7094 - val_loss: 0.5982
```

```
Epoch 493/500
10/10                0s 25ms/step -
accuracy: 0.7026 - loss: 0.6045 - val_accuracy: 0.7094 - val_loss: 0.5982
Epoch 494/500
10/10                0s 26ms/step -
accuracy: 0.7076 - loss: 0.5999 - val_accuracy: 0.7094 - val_loss: 0.5982
Epoch 495/500
10/10                0s 25ms/step -
accuracy: 0.7267 - loss: 0.5809 - val_accuracy: 0.7094 - val_loss: 0.5982
Epoch 496/500
10/10                1s 24ms/step -
accuracy: 0.7167 - loss: 0.5914 - val_accuracy: 0.7094 - val_loss: 0.5981
Epoch 497/500
10/10                0s 26ms/step -
accuracy: 0.7283 - loss: 0.5803 - val_accuracy: 0.7094 - val_loss: 0.5981
Epoch 498/500
10/10                0s 21ms/step -
accuracy: 0.7088 - loss: 0.5993 - val_accuracy: 0.7094 - val_loss: 0.5981
Epoch 499/500
10/10                0s 22ms/step -
accuracy: 0.6988 - loss: 0.6070 - val_accuracy: 0.7094 - val_loss: 0.5980
Epoch 500/500
10/10                0s 22ms/step -
accuracy: 0.7054 - loss: 0.6019 - val_accuracy: 0.7094 - val_loss: 0.5980
```

[19]:
```python
final_val_accuracy = history.history['val_accuracy'][-1]
print(f"Final Validation Accuracy: {final_val_accuracy * 100:.2f}%")
```

```
Final Validation Accuracy: 70.94%
```

[20]:
```python
plt.plot(history.history['accuracy'], label='Train Accuracy')
plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.title('Model Accuracy Over Epochs')
plt.legend()
plt.show()
```

Model Accuracy Over Epochs
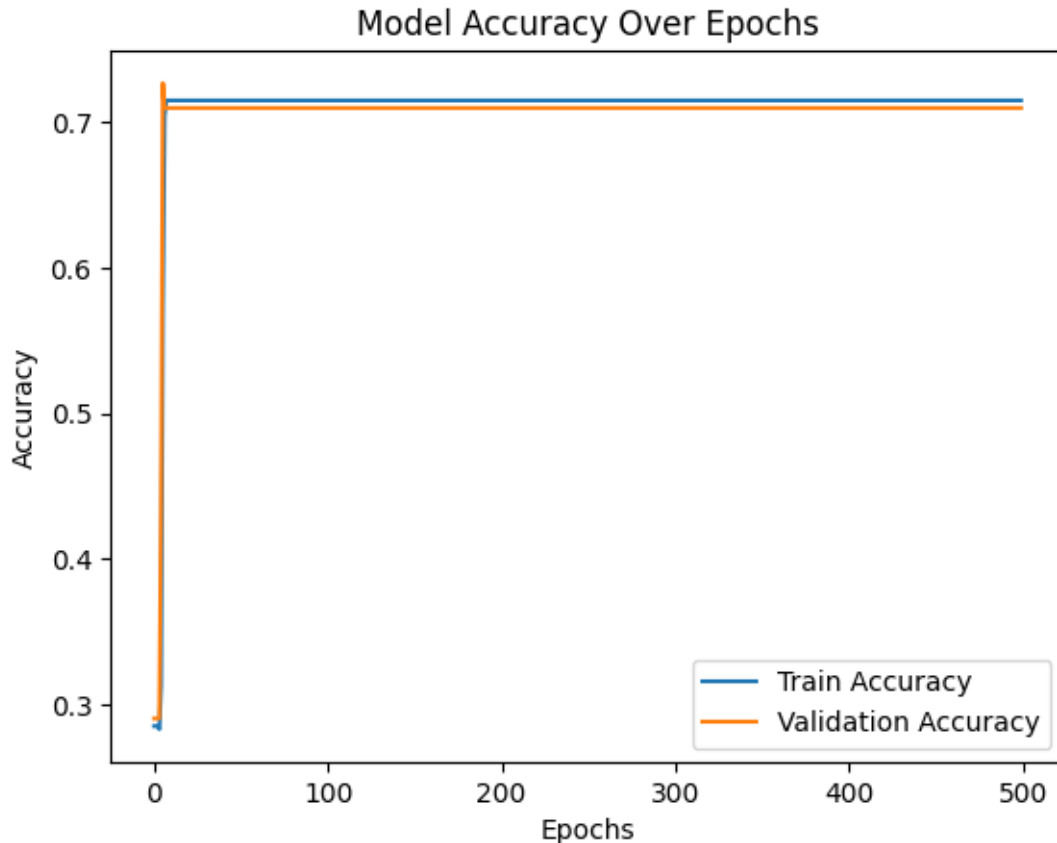
0.3 Question:2 There are many activation function we can use in out process of creating models. Appart from the sigmoid activation function one can also use activation function like relu (which is defined as relu(z) = max(0,z)) in the intermediate layer neurons. Try to create a model which gives a better accuracy than the above ones you had by altering the architecture and activation functions. You can also try to change the batch size in your training process.

0.3.1 Using relu activation, batch_size = 25 and 1000 epochs

```
[21]: model = Sequential()
      model.add(Dense(10, activation = 'relu',input_shape = (9,)))
      model.add(Dense(1,activation = 'sigmoid'))
      model.summary()
      model.compile(loss = "BinaryCrossentropy", optimizer = "SGD", metrics =␣
      ↪["accuracy"])
      history = model.fit(x_train,y_train, batch_size=25, epochs = 1000, verbose=1,␣
      ↪validation_data=(x_test,y_test))
```

Model: "sequential_3"

```
Layer (type)                    Output Shape               Param #

dense_4 (Dense)                 (None, 10)                     100

dense_5 (Dense)                 (None, 1)                       11


Total params: 111 (444.00 B)

Trainable params: 111 (444.00 B)

Non-trainable params: 0 (0.00 B)


Epoch 1/1000
19/19              2s 36ms/step -
accuracy: 0.3690 - loss: 0.7095 - val_accuracy: 0.4786 - val_loss: 0.6981
Epoch 2/1000
19/19              0s 13ms/step -
accuracy: 0.5532 - loss: 0.6935 - val_accuracy: 0.6496 - val_loss: 0.6796
Epoch 3/1000
19/19              0s 13ms/step -
accuracy: 0.7083 - loss: 0.6704 - val_accuracy: 0.6838 - val_loss: 0.6663
Epoch 4/1000
19/19              0s 13ms/step -
accuracy: 0.7244 - loss: 0.6542 - val_accuracy: 0.7009 - val_loss: 0.6567
Epoch 5/1000
19/19              0s 13ms/step -
accuracy: 0.6949 - loss: 0.6536 - val_accuracy: 0.7009 - val_loss: 0.6489
Epoch 6/1000
19/19              0s 13ms/step -
accuracy: 0.7095 - loss: 0.6433 - val_accuracy: 0.7009 - val_loss: 0.6430
Epoch 7/1000
19/19              0s 13ms/step -
accuracy: 0.7155 - loss: 0.6378 - val_accuracy: 0.7009 - val_loss: 0.6384
Epoch 8/1000
19/19              0s 14ms/step -
accuracy: 0.6991 - loss: 0.6446 - val_accuracy: 0.7009 - val_loss: 0.6351
Epoch 9/1000
19/19              0s 13ms/step -
accuracy: 0.7104 - loss: 0.6338 - val_accuracy: 0.7009 - val_loss: 0.6327
Epoch 10/1000
19/19              0s 13ms/step -
accuracy: 0.7438 - loss: 0.6076 - val_accuracy: 0.7009 - val_loss: 0.6305
```

```
Epoch 11/1000
19/19              0s 12ms/step -
accuracy: 0.7539 - loss: 0.5982 - val_accuracy: 0.7094 - val_loss: 0.6287
Epoch 12/1000
19/19              0s 13ms/step -
accuracy: 0.7130 - loss: 0.6267 - val_accuracy: 0.7094 - val_loss: 0.6273
Epoch 13/1000
19/19              0s 13ms/step -
accuracy: 0.7274 - loss: 0.6155 - val_accuracy: 0.7094 - val_loss: 0.6261
Epoch 14/1000
19/19              0s 13ms/step -
accuracy: 0.7050 - loss: 0.6313 - val_accuracy: 0.7094 - val_loss: 0.6250
Epoch 15/1000
19/19              0s 13ms/step -
accuracy: 0.7477 - loss: 0.5953 - val_accuracy: 0.7094 - val_loss: 0.6240
Epoch 16/1000
19/19              0s 13ms/step -
accuracy: 0.7148 - loss: 0.6183 - val_accuracy: 0.7094 - val_loss: 0.6232
Epoch 17/1000
19/19              0s 13ms/step -
accuracy: 0.7128 - loss: 0.6208 - val_accuracy: 0.7094 - val_loss: 0.6224
Epoch 18/1000
19/19              0s 13ms/step -
accuracy: 0.6941 - loss: 0.6354 - val_accuracy: 0.7094 - val_loss: 0.6216
Epoch 19/1000
19/19              0s 13ms/step -
accuracy: 0.7389 - loss: 0.5977 - val_accuracy: 0.7094 - val_loss: 0.6209
Epoch 20/1000
19/19              0s 13ms/step -
accuracy: 0.7001 - loss: 0.6271 - val_accuracy: 0.7094 - val_loss: 0.6203
Epoch 21/1000
19/19              0s 13ms/step -
accuracy: 0.7081 - loss: 0.6247 - val_accuracy: 0.7094 - val_loss: 0.6197
Epoch 22/1000
19/19              0s 14ms/step -
accuracy: 0.7263 - loss: 0.6062 - val_accuracy: 0.7094 - val_loss: 0.6191
Epoch 23/1000
19/19              0s 13ms/step -
accuracy: 0.7241 - loss: 0.6053 - val_accuracy: 0.7094 - val_loss: 0.6186
Epoch 24/1000
19/19              0s 12ms/step -
accuracy: 0.6923 - loss: 0.6367 - val_accuracy: 0.7094 - val_loss: 0.6181
Epoch 25/1000
19/19              0s 13ms/step -
accuracy: 0.7290 - loss: 0.6020 - val_accuracy: 0.7094 - val_loss: 0.6176
Epoch 26/1000
19/19              0s 13ms/step -
accuracy: 0.7268 - loss: 0.6011 - val_accuracy: 0.7094 - val_loss: 0.6172
```

```
Epoch 27/1000
19/19              0s 13ms/step -
accuracy: 0.7039 - loss: 0.6238 - val_accuracy: 0.7094 - val_loss: 0.6167
Epoch 28/1000
19/19              0s 13ms/step -
accuracy: 0.7116 - loss: 0.6179 - val_accuracy: 0.7094 - val_loss: 0.6163
Epoch 29/1000
19/19              0s 13ms/step -
accuracy: 0.7007 - loss: 0.6220 - val_accuracy: 0.7094 - val_loss: 0.6159
Epoch 30/1000
19/19              0s 13ms/step -
accuracy: 0.7329 - loss: 0.5935 - val_accuracy: 0.7094 - val_loss: 0.6155
Epoch 31/1000
19/19              0s 13ms/step -
accuracy: 0.6839 - loss: 0.6406 - val_accuracy: 0.7094 - val_loss: 0.6151
Epoch 32/1000
19/19              0s 13ms/step -
accuracy: 0.7063 - loss: 0.6192 - val_accuracy: 0.7094 - val_loss: 0.6147
Epoch 33/1000
19/19              0s 13ms/step -
accuracy: 0.6963 - loss: 0.6269 - val_accuracy: 0.7094 - val_loss: 0.6144
Epoch 34/1000
19/19              0s 14ms/step -
accuracy: 0.7363 - loss: 0.5912 - val_accuracy: 0.7094 - val_loss: 0.6140
Epoch 35/1000
19/19              0s 12ms/step -
accuracy: 0.6860 - loss: 0.6361 - val_accuracy: 0.7094 - val_loss: 0.6136
Epoch 36/1000
19/19              0s 13ms/step -
accuracy: 0.7155 - loss: 0.6149 - val_accuracy: 0.7094 - val_loss: 0.6133
Epoch 37/1000
19/19              0s 14ms/step -
accuracy: 0.7165 - loss: 0.6069 - val_accuracy: 0.7094 - val_loss: 0.6129
Epoch 38/1000
19/19              0s 13ms/step -
accuracy: 0.7155 - loss: 0.6094 - val_accuracy: 0.7094 - val_loss: 0.6126
Epoch 39/1000
19/19              0s 13ms/step -
accuracy: 0.7048 - loss: 0.6175 - val_accuracy: 0.7094 - val_loss: 0.6122
Epoch 40/1000
19/19              0s 13ms/step -
accuracy: 0.7274 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.6119
Epoch 41/1000
19/19              0s 13ms/step -
accuracy: 0.7105 - loss: 0.6085 - val_accuracy: 0.7094 - val_loss: 0.6116
Epoch 42/1000
19/19              0s 13ms/step -
accuracy: 0.7248 - loss: 0.5975 - val_accuracy: 0.7094 - val_loss: 0.6112
```

```
Epoch 43/1000
19/19              0s 13ms/step -
accuracy: 0.7348 - loss: 0.5893 - val_accuracy: 0.7094 - val_loss: 0.6109
Epoch 44/1000
19/19              0s 13ms/step -
accuracy: 0.7038 - loss: 0.6151 - val_accuracy: 0.7094 - val_loss: 0.6106
Epoch 45/1000
19/19              0s 13ms/step -
accuracy: 0.7020 - loss: 0.6193 - val_accuracy: 0.7094 - val_loss: 0.6102
Epoch 46/1000
19/19              0s 13ms/step -
accuracy: 0.6954 - loss: 0.6203 - val_accuracy: 0.7094 - val_loss: 0.6099
Epoch 47/1000
19/19              0s 13ms/step -
accuracy: 0.7458 - loss: 0.5766 - val_accuracy: 0.7094 - val_loss: 0.6095
Epoch 48/1000
19/19              0s 7ms/step -
accuracy: 0.6958 - loss: 0.6227 - val_accuracy: 0.7094 - val_loss: 0.6091
Epoch 49/1000
19/19              0s 13ms/step -
accuracy: 0.6931 - loss: 0.6240 - val_accuracy: 0.7094 - val_loss: 0.6088
Epoch 50/1000
19/19              0s 13ms/step -
accuracy: 0.7057 - loss: 0.6109 - val_accuracy: 0.7094 - val_loss: 0.6084
Epoch 51/1000
19/19              0s 13ms/step -
accuracy: 0.7450 - loss: 0.5766 - val_accuracy: 0.7094 - val_loss: 0.6081
Epoch 52/1000
19/19              0s 13ms/step -
accuracy: 0.7166 - loss: 0.6007 - val_accuracy: 0.7094 - val_loss: 0.6078
Epoch 53/1000
19/19              0s 13ms/step -
accuracy: 0.7334 - loss: 0.5861 - val_accuracy: 0.7094 - val_loss: 0.6075
Epoch 54/1000
19/19              0s 14ms/step -
accuracy: 0.6941 - loss: 0.6212 - val_accuracy: 0.7094 - val_loss: 0.6072
Epoch 55/1000
19/19              0s 13ms/step -
accuracy: 0.7324 - loss: 0.5884 - val_accuracy: 0.7094 - val_loss: 0.6069
Epoch 56/1000
19/19              0s 14ms/step -
accuracy: 0.7175 - loss: 0.5990 - val_accuracy: 0.7094 - val_loss: 0.6066
Epoch 57/1000
19/19              0s 13ms/step -
accuracy: 0.6937 - loss: 0.6214 - val_accuracy: 0.7094 - val_loss: 0.6062
Epoch 58/1000
19/19              0s 13ms/step -
accuracy: 0.7035 - loss: 0.6105 - val_accuracy: 0.7094 - val_loss: 0.6059
```

```
Epoch 59/1000
19/19          0s 13ms/step -
accuracy: 0.7240 - loss: 0.5916 - val_accuracy: 0.7094 - val_loss: 0.6056
Epoch 60/1000
19/19          0s 13ms/step -
accuracy: 0.7295 - loss: 0.5865 - val_accuracy: 0.7094 - val_loss: 0.6053
Epoch 61/1000
19/19          0s 13ms/step -
accuracy: 0.7045 - loss: 0.6090 - val_accuracy: 0.7094 - val_loss: 0.6050
Epoch 62/1000
19/19          0s 14ms/step -
accuracy: 0.7053 - loss: 0.6080 - val_accuracy: 0.7094 - val_loss: 0.6046
Epoch 63/1000
19/19          0s 14ms/step -
accuracy: 0.7003 - loss: 0.6142 - val_accuracy: 0.7094 - val_loss: 0.6044
Epoch 64/1000
19/19          0s 13ms/step -
accuracy: 0.7421 - loss: 0.5759 - val_accuracy: 0.7094 - val_loss: 0.6041
Epoch 65/1000
19/19          0s 13ms/step -
accuracy: 0.7053 - loss: 0.6080 - val_accuracy: 0.7094 - val_loss: 0.6038
Epoch 66/1000
19/19          0s 12ms/step -
accuracy: 0.7236 - loss: 0.5916 - val_accuracy: 0.7094 - val_loss: 0.6035
Epoch 67/1000
19/19          0s 12ms/step -
accuracy: 0.7040 - loss: 0.6071 - val_accuracy: 0.7094 - val_loss: 0.6032
Epoch 68/1000
19/19          0s 13ms/step -
accuracy: 0.7340 - loss: 0.5823 - val_accuracy: 0.7094 - val_loss: 0.6029
Epoch 69/1000
19/19          0s 13ms/step -
accuracy: 0.6986 - loss: 0.6114 - val_accuracy: 0.7094 - val_loss: 0.6026
Epoch 70/1000
19/19          0s 13ms/step -
accuracy: 0.6825 - loss: 0.6257 - val_accuracy: 0.7094 - val_loss: 0.6023
Epoch 71/1000
19/19          0s 13ms/step -
accuracy: 0.6823 - loss: 0.6266 - val_accuracy: 0.7094 - val_loss: 0.6021
Epoch 72/1000
19/19          0s 14ms/step -
accuracy: 0.7332 - loss: 0.5828 - val_accuracy: 0.7094 - val_loss: 0.6018
Epoch 73/1000
19/19          0s 13ms/step -
accuracy: 0.6932 - loss: 0.6162 - val_accuracy: 0.7094 - val_loss: 0.6015
Epoch 74/1000
19/19          0s 13ms/step -
accuracy: 0.7170 - loss: 0.5951 - val_accuracy: 0.7094 - val_loss: 0.6012
```

```
Epoch 75/1000
19/19              0s 13ms/step -
accuracy: 0.7107 - loss: 0.6004 - val_accuracy: 0.7094 - val_loss: 0.6009
Epoch 76/1000
19/19              0s 13ms/step -
accuracy: 0.7207 - loss: 0.5911 - val_accuracy: 0.7094 - val_loss: 0.6006
Epoch 77/1000
19/19              0s 13ms/step -
accuracy: 0.7075 - loss: 0.6031 - val_accuracy: 0.7094 - val_loss: 0.6003
Epoch 78/1000
19/19              0s 13ms/step -
accuracy: 0.7188 - loss: 0.5909 - val_accuracy: 0.7094 - val_loss: 0.6000
Epoch 79/1000
19/19              0s 13ms/step -
accuracy: 0.6879 - loss: 0.6167 - val_accuracy: 0.7094 - val_loss: 0.5997
Epoch 80/1000
19/19              0s 14ms/step -
accuracy: 0.7154 - loss: 0.5935 - val_accuracy: 0.7094 - val_loss: 0.5995
Epoch 81/1000
19/19              0s 13ms/step -
accuracy: 0.7127 - loss: 0.5983 - val_accuracy: 0.7094 - val_loss: 0.5992
Epoch 82/1000
19/19              0s 16ms/step -
accuracy: 0.7340 - loss: 0.5767 - val_accuracy: 0.7094 - val_loss: 0.5990
Epoch 83/1000
19/19              0s 8ms/step -
accuracy: 0.7224 - loss: 0.5874 - val_accuracy: 0.7094 - val_loss: 0.5987
Epoch 84/1000
19/19              0s 8ms/step -
accuracy: 0.6729 - loss: 0.6304 - val_accuracy: 0.7094 - val_loss: 0.5985
Epoch 85/1000
19/19              0s 6ms/step -
accuracy: 0.7086 - loss: 0.6003 - val_accuracy: 0.7094 - val_loss: 0.5982
Epoch 86/1000
19/19              0s 6ms/step -
accuracy: 0.7412 - loss: 0.5718 - val_accuracy: 0.7094 - val_loss: 0.5980
Epoch 87/1000
19/19              0s 8ms/step -
accuracy: 0.7208 - loss: 0.5902 - val_accuracy: 0.7094 - val_loss: 0.5977
Epoch 88/1000
19/19              0s 11ms/step -
accuracy: 0.7239 - loss: 0.5856 - val_accuracy: 0.7094 - val_loss: 0.5975
Epoch 89/1000
19/19              0s 13ms/step -
accuracy: 0.7101 - loss: 0.5954 - val_accuracy: 0.7094 - val_loss: 0.5973
Epoch 90/1000
19/19              0s 13ms/step -
accuracy: 0.7186 - loss: 0.5889 - val_accuracy: 0.7094 - val_loss: 0.5970
```

```
Epoch 91/1000
19/19              0s 10ms/step -
accuracy: 0.7021 - loss: 0.6015 - val_accuracy: 0.7094 - val_loss: 0.5967
Epoch 92/1000
19/19              0s 13ms/step -
accuracy: 0.6976 - loss: 0.6079 - val_accuracy: 0.7094 - val_loss: 0.5965
Epoch 93/1000
19/19              0s 13ms/step -
accuracy: 0.6899 - loss: 0.6119 - val_accuracy: 0.7094 - val_loss: 0.5963
Epoch 94/1000
19/19              0s 12ms/step -
accuracy: 0.7217 - loss: 0.5875 - val_accuracy: 0.7094 - val_loss: 0.5961
Epoch 95/1000
19/19              0s 14ms/step -
accuracy: 0.7138 - loss: 0.5917 - val_accuracy: 0.7094 - val_loss: 0.5958
Epoch 96/1000
19/19              0s 19ms/step -
accuracy: 0.6782 - loss: 0.6205 - val_accuracy: 0.7094 - val_loss: 0.5956
Epoch 97/1000
19/19              0s 6ms/step -
accuracy: 0.7370 - loss: 0.5721 - val_accuracy: 0.7094 - val_loss: 0.5954
Epoch 98/1000
19/19              0s 6ms/step -
accuracy: 0.7055 - loss: 0.6002 - val_accuracy: 0.7094 - val_loss: 0.5951
Epoch 99/1000
19/19              0s 7ms/step -
accuracy: 0.7035 - loss: 0.6003 - val_accuracy: 0.7094 - val_loss: 0.5949
Epoch 100/1000
19/19              0s 7ms/step -
accuracy: 0.7255 - loss: 0.5784 - val_accuracy: 0.7094 - val_loss: 0.5946
Epoch 101/1000
19/19              0s 5ms/step -
accuracy: 0.7390 - loss: 0.5686 - val_accuracy: 0.7094 - val_loss: 0.5944
Epoch 102/1000
19/19              0s 7ms/step -
accuracy: 0.6997 - loss: 0.6016 - val_accuracy: 0.7094 - val_loss: 0.5941
Epoch 103/1000
19/19              0s 8ms/step -
accuracy: 0.7201 - loss: 0.5838 - val_accuracy: 0.7094 - val_loss: 0.5939
Epoch 104/1000
19/19              0s 7ms/step -
accuracy: 0.7289 - loss: 0.5763 - val_accuracy: 0.7094 - val_loss: 0.5937
Epoch 105/1000
19/19              0s 11ms/step -
accuracy: 0.7213 - loss: 0.5807 - val_accuracy: 0.7094 - val_loss: 0.5935
Epoch 106/1000
19/19              0s 11ms/step -
accuracy: 0.7476 - loss: 0.5590 - val_accuracy: 0.7094 - val_loss: 0.5932
```

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Epoch 107/1000
19/19          0s 15ms/step -
accuracy: 0.7292 - loss: 0.5759 - val_accuracy: 0.7094 - val_loss: 0.5930
Epoch 108/1000
19/19          0s 10ms/step -
accuracy: 0.7055 - loss: 0.5934 - val_accuracy: 0.7094 - val_loss: 0.5928
Epoch 109/1000
19/19          0s 13ms/step -
accuracy: 0.6978 - loss: 0.6033 - val_accuracy: 0.7094 - val_loss: 0.5926
Epoch 110/1000
19/19          0s 12ms/step -
accuracy: 0.7020 - loss: 0.5968 - val_accuracy: 0.7094 - val_loss: 0.5923
Epoch 111/1000
19/19          0s 13ms/step -
accuracy: 0.7331 - loss: 0.5700 - val_accuracy: 0.7094 - val_loss: 0.5921
Epoch 112/1000
19/19          0s 11ms/step -
accuracy: 0.7258 - loss: 0.5779 - val_accuracy: 0.7094 - val_loss: 0.5919
Epoch 113/1000
19/19          0s 13ms/step -
accuracy: 0.7005 - loss: 0.5983 - val_accuracy: 0.7094 - val_loss: 0.5917
Epoch 114/1000
19/19          0s 13ms/step -
accuracy: 0.7312 - loss: 0.5735 - val_accuracy: 0.7094 - val_loss: 0.5915
Epoch 115/1000
19/19          0s 13ms/step -
accuracy: 0.7281 - loss: 0.5749 - val_accuracy: 0.7094 - val_loss: 0.5913
Epoch 116/1000
19/19          0s 14ms/step -
accuracy: 0.7305 - loss: 0.5736 - val_accuracy: 0.7094 - val_loss: 0.5910
Epoch 117/1000
19/19          0s 14ms/step -
accuracy: 0.6836 - loss: 0.6111 - val_accuracy: 0.7094 - val_loss: 0.5908
Epoch 118/1000
19/19          0s 13ms/step -
accuracy: 0.7663 - loss: 0.5413 - val_accuracy: 0.7094 - val_loss: 0.5906
Epoch 119/1000
19/19          0s 14ms/step -
accuracy: 0.7474 - loss: 0.5564 - val_accuracy: 0.7094 - val_loss: 0.5904
Epoch 120/1000
19/19          0s 13ms/step -
accuracy: 0.7043 - loss: 0.5930 - val_accuracy: 0.7094 - val_loss: 0.5902
Epoch 121/1000
19/19          0s 13ms/step -
accuracy: 0.7210 - loss: 0.5759 - val_accuracy: 0.7094 - val_loss: 0.5899
Epoch 122/1000
19/19          0s 13ms/step -
accuracy: 0.7214 - loss: 0.5783 - val_accuracy: 0.7094 - val_loss: 0.5897
```

```
Epoch 123/1000
19/19                0s 14ms/step -
accuracy: 0.7289 - loss: 0.5690 - val_accuracy: 0.7094 - val_loss: 0.5895
Epoch 124/1000
19/19                0s 13ms/step -
accuracy: 0.7055 - loss: 0.5888 - val_accuracy: 0.7094 - val_loss: 0.5893
Epoch 125/1000
19/19                0s 14ms/step -
accuracy: 0.7096 - loss: 0.5904 - val_accuracy: 0.7094 - val_loss: 0.5891
Epoch 126/1000
19/19                0s 13ms/step -
accuracy: 0.6879 - loss: 0.6023 - val_accuracy: 0.7094 - val_loss: 0.5889
Epoch 127/1000
19/19                0s 13ms/step -
accuracy: 0.6920 - loss: 0.5991 - val_accuracy: 0.7094 - val_loss: 0.5887
Epoch 128/1000
19/19                0s 14ms/step -
accuracy: 0.6756 - loss: 0.6184 - val_accuracy: 0.7094 - val_loss: 0.5885
Epoch 129/1000
19/19                0s 14ms/step -
accuracy: 0.7282 - loss: 0.5693 - val_accuracy: 0.7094 - val_loss: 0.5883
Epoch 130/1000
19/19                0s 13ms/step -
accuracy: 0.7112 - loss: 0.5853 - val_accuracy: 0.7094 - val_loss: 0.5880
Epoch 131/1000
19/19                0s 14ms/step -
accuracy: 0.7252 - loss: 0.5715 - val_accuracy: 0.7094 - val_loss: 0.5878
Epoch 132/1000
19/19                0s 14ms/step -
accuracy: 0.6917 - loss: 0.6015 - val_accuracy: 0.7094 - val_loss: 0.5876
Epoch 133/1000
19/19                0s 14ms/step -
accuracy: 0.7145 - loss: 0.5816 - val_accuracy: 0.7094 - val_loss: 0.5874
Epoch 134/1000
19/19                0s 13ms/step -
accuracy: 0.6947 - loss: 0.5983 - val_accuracy: 0.7094 - val_loss: 0.5872
Epoch 135/1000
19/19                0s 13ms/step -
accuracy: 0.7093 - loss: 0.5857 - val_accuracy: 0.7094 - val_loss: 0.5871
Epoch 136/1000
19/19                0s 14ms/step -
accuracy: 0.7223 - loss: 0.5694 - val_accuracy: 0.7094 - val_loss: 0.5869
Epoch 137/1000
19/19                0s 13ms/step -
accuracy: 0.7214 - loss: 0.5712 - val_accuracy: 0.7094 - val_loss: 0.5866
Epoch 138/1000
19/19                0s 13ms/step -
accuracy: 0.6789 - loss: 0.6095 - val_accuracy: 0.7094 - val_loss: 0.5865
```

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Epoch 139/1000
19/19              0s 14ms/step -
accuracy: 0.7048 - loss: 0.5865 - val_accuracy: 0.7094 - val_loss: 0.5863
Epoch 140/1000
19/19              0s 14ms/step -
accuracy: 0.7372 - loss: 0.5594 - val_accuracy: 0.7094 - val_loss: 0.5860
Epoch 141/1000
19/19              0s 13ms/step -
accuracy: 0.7390 - loss: 0.5563 - val_accuracy: 0.7094 - val_loss: 0.5858
Epoch 142/1000
19/19              0s 13ms/step -
accuracy: 0.7057 - loss: 0.5867 - val_accuracy: 0.7094 - val_loss: 0.5856
Epoch 143/1000
19/19              0s 13ms/step -
accuracy: 0.7159 - loss: 0.5745 - val_accuracy: 0.7094 - val_loss: 0.5853
Epoch 144/1000
19/19              0s 14ms/step -
accuracy: 0.7203 - loss: 0.5740 - val_accuracy: 0.7094 - val_loss: 0.5851
Epoch 145/1000
19/19              0s 14ms/step -
accuracy: 0.6881 - loss: 0.5993 - val_accuracy: 0.7094 - val_loss: 0.5849
Epoch 146/1000
19/19              0s 14ms/step -
accuracy: 0.7204 - loss: 0.5721 - val_accuracy: 0.7094 - val_loss: 0.5847
Epoch 147/1000
19/19              0s 13ms/step -
accuracy: 0.7304 - loss: 0.5649 - val_accuracy: 0.7094 - val_loss: 0.5845
Epoch 148/1000
19/19              0s 14ms/step -
accuracy: 0.6881 - loss: 0.5968 - val_accuracy: 0.7094 - val_loss: 0.5843
Epoch 149/1000
19/19              0s 14ms/step -
accuracy: 0.7216 - loss: 0.5669 - val_accuracy: 0.7094 - val_loss: 0.5840
Epoch 150/1000
19/19              0s 13ms/step -
accuracy: 0.7452 - loss: 0.5515 - val_accuracy: 0.7094 - val_loss: 0.5838
Epoch 151/1000
19/19              0s 13ms/step -
accuracy: 0.7092 - loss: 0.5786 - val_accuracy: 0.7094 - val_loss: 0.5837
Epoch 152/1000
19/19              0s 13ms/step -
accuracy: 0.6832 - loss: 0.6021 - val_accuracy: 0.7094 - val_loss: 0.5835
Epoch 153/1000
19/19              0s 14ms/step -
accuracy: 0.6988 - loss: 0.5902 - val_accuracy: 0.7094 - val_loss: 0.5833
Epoch 154/1000
19/19              0s 13ms/step -
accuracy: 0.6951 - loss: 0.5934 - val_accuracy: 0.7094 - val_loss: 0.5831
```

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Epoch 155/1000
19/19              0s 13ms/step -
accuracy: 0.6946 - loss: 0.5869 - val_accuracy: 0.7094 - val_loss: 0.5829
Epoch 156/1000
19/19              0s 14ms/step -
accuracy: 0.7056 - loss: 0.5842 - val_accuracy: 0.7094 - val_loss: 0.5827
Epoch 157/1000
19/19              0s 14ms/step -
accuracy: 0.7373 - loss: 0.5565 - val_accuracy: 0.7094 - val_loss: 0.5825
Epoch 158/1000
19/19              0s 13ms/step -
accuracy: 0.7213 - loss: 0.5723 - val_accuracy: 0.7094 - val_loss: 0.5823
Epoch 159/1000
19/19              0s 13ms/step -
accuracy: 0.7398 - loss: 0.5549 - val_accuracy: 0.7094 - val_loss: 0.5821
Epoch 160/1000
19/19              0s 14ms/step -
accuracy: 0.6854 - loss: 0.6000 - val_accuracy: 0.7094 - val_loss: 0.5819
Epoch 161/1000
19/19              0s 13ms/step -
accuracy: 0.7132 - loss: 0.5770 - val_accuracy: 0.7094 - val_loss: 0.5817
Epoch 162/1000
19/19              0s 13ms/step -
accuracy: 0.7274 - loss: 0.5588 - val_accuracy: 0.7094 - val_loss: 0.5815
Epoch 163/1000
19/19              0s 14ms/step -
accuracy: 0.7044 - loss: 0.5831 - val_accuracy: 0.7094 - val_loss: 0.5813
Epoch 164/1000
19/19              0s 14ms/step -
accuracy: 0.7178 - loss: 0.5722 - val_accuracy: 0.7094 - val_loss: 0.5811
Epoch 165/1000
19/19              0s 14ms/step -
accuracy: 0.7389 - loss: 0.5554 - val_accuracy: 0.7094 - val_loss: 0.5809
Epoch 166/1000
19/19              0s 14ms/step -
accuracy: 0.7121 - loss: 0.5724 - val_accuracy: 0.7094 - val_loss: 0.5807
Epoch 167/1000
19/19              0s 12ms/step -
accuracy: 0.7384 - loss: 0.5528 - val_accuracy: 0.7094 - val_loss: 0.5805
Epoch 168/1000
19/19              0s 14ms/step -
accuracy: 0.7192 - loss: 0.5653 - val_accuracy: 0.7094 - val_loss: 0.5804
Epoch 169/1000
19/19              0s 13ms/step -
accuracy: 0.6914 - loss: 0.5920 - val_accuracy: 0.7094 - val_loss: 0.5802
Epoch 170/1000
19/19              0s 13ms/step -
accuracy: 0.7145 - loss: 0.5695 - val_accuracy: 0.7094 - val_loss: 0.5800
```

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Epoch 171/1000
19/19              0s 13ms/step -
accuracy: 0.6905 - loss: 0.6018 - val_accuracy: 0.7094 - val_loss: 0.5798
Epoch 172/1000
19/19              0s 14ms/step -
accuracy: 0.7071 - loss: 0.5769 - val_accuracy: 0.7094 - val_loss: 0.5797
Epoch 173/1000
19/19              0s 14ms/step -
accuracy: 0.7226 - loss: 0.5635 - val_accuracy: 0.7094 - val_loss: 0.5795
Epoch 174/1000
19/19              0s 13ms/step -
accuracy: 0.7404 - loss: 0.5503 - val_accuracy: 0.7094 - val_loss: 0.5792
Epoch 175/1000
19/19              0s 14ms/step -
accuracy: 0.7012 - loss: 0.5844 - val_accuracy: 0.7094 - val_loss: 0.5790
Epoch 176/1000
19/19              0s 13ms/step -
accuracy: 0.7037 - loss: 0.5826 - val_accuracy: 0.7094 - val_loss: 0.5789
Epoch 177/1000
19/19              0s 13ms/step -
accuracy: 0.7241 - loss: 0.5645 - val_accuracy: 0.7094 - val_loss: 0.5787
Epoch 178/1000
19/19              0s 14ms/step -
accuracy: 0.6995 - loss: 0.5777 - val_accuracy: 0.7094 - val_loss: 0.5785
Epoch 179/1000
19/19              0s 13ms/step -
accuracy: 0.7017 - loss: 0.5867 - val_accuracy: 0.7094 - val_loss: 0.5783
Epoch 180/1000
19/19              0s 14ms/step -
accuracy: 0.7266 - loss: 0.5638 - val_accuracy: 0.7094 - val_loss: 0.5781
Epoch 181/1000
19/19              0s 13ms/step -
accuracy: 0.7033 - loss: 0.5790 - val_accuracy: 0.7094 - val_loss: 0.5780
Epoch 182/1000
19/19              0s 13ms/step -
accuracy: 0.7323 - loss: 0.5485 - val_accuracy: 0.7094 - val_loss: 0.5778
Epoch 183/1000
19/19              0s 14ms/step -
accuracy: 0.7320 - loss: 0.5556 - val_accuracy: 0.7094 - val_loss: 0.5776
Epoch 184/1000
19/19              0s 13ms/step -
accuracy: 0.7346 - loss: 0.5492 - val_accuracy: 0.7094 - val_loss: 0.5774
Epoch 185/1000
19/19              0s 14ms/step -
accuracy: 0.7085 - loss: 0.5758 - val_accuracy: 0.7094 - val_loss: 0.5772
Epoch 186/1000
19/19              0s 14ms/step -
accuracy: 0.7372 - loss: 0.5489 - val_accuracy: 0.7094 - val_loss: 0.5770
```

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Epoch 187/1000
19/19              0s 14ms/step -
accuracy: 0.7373 - loss: 0.5525 - val_accuracy: 0.7094 - val_loss: 0.5768
Epoch 188/1000
19/19              0s 13ms/step -
accuracy: 0.6854 - loss: 0.5942 - val_accuracy: 0.7094 - val_loss: 0.5766
Epoch 189/1000
19/19              0s 13ms/step -
accuracy: 0.7209 - loss: 0.5609 - val_accuracy: 0.7094 - val_loss: 0.5764
Epoch 190/1000
19/19              0s 11ms/step -
accuracy: 0.7132 - loss: 0.5689 - val_accuracy: 0.7094 - val_loss: 0.5762
Epoch 191/1000
19/19              0s 14ms/step -
accuracy: 0.7260 - loss: 0.5594 - val_accuracy: 0.7094 - val_loss: 0.5761
Epoch 192/1000
19/19              0s 13ms/step -
accuracy: 0.7030 - loss: 0.5778 - val_accuracy: 0.7094 - val_loss: 0.5759
Epoch 193/1000
19/19              0s 15ms/step -
accuracy: 0.7048 - loss: 0.5805 - val_accuracy: 0.7094 - val_loss: 0.5758
Epoch 194/1000
19/19              0s 13ms/step -
accuracy: 0.7438 - loss: 0.5402 - val_accuracy: 0.7094 - val_loss: 0.5755
Epoch 195/1000
19/19              0s 14ms/step -
accuracy: 0.7217 - loss: 0.5569 - val_accuracy: 0.7094 - val_loss: 0.5754
Epoch 196/1000
19/19              0s 14ms/step -
accuracy: 0.7196 - loss: 0.5609 - val_accuracy: 0.7094 - val_loss: 0.5752
Epoch 197/1000
19/19              0s 13ms/step -
accuracy: 0.7222 - loss: 0.5688 - val_accuracy: 0.7094 - val_loss: 0.5751
Epoch 198/1000
19/19              0s 13ms/step -
accuracy: 0.7151 - loss: 0.5703 - val_accuracy: 0.7094 - val_loss: 0.5749
Epoch 199/1000
19/19              0s 14ms/step -
accuracy: 0.7118 - loss: 0.5682 - val_accuracy: 0.7094 - val_loss: 0.5747
Epoch 200/1000
19/19              0s 14ms/step -
accuracy: 0.7153 - loss: 0.5703 - val_accuracy: 0.7094 - val_loss: 0.5745
Epoch 201/1000
19/19              0s 15ms/step -
accuracy: 0.7186 - loss: 0.5598 - val_accuracy: 0.7094 - val_loss: 0.5743
Epoch 202/1000
19/19              0s 14ms/step -
accuracy: 0.6883 - loss: 0.5892 - val_accuracy: 0.7094 - val_loss: 0.5741
```

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Epoch 203/1000
19/19              0s 14ms/step -
accuracy: 0.7027 - loss: 0.5734 - val_accuracy: 0.7094 - val_loss: 0.5740
Epoch 204/1000
19/19              0s 13ms/step -
accuracy: 0.7249 - loss: 0.5587 - val_accuracy: 0.7094 - val_loss: 0.5739
Epoch 205/1000
19/19              0s 13ms/step -
accuracy: 0.7113 - loss: 0.5644 - val_accuracy: 0.7094 - val_loss: 0.5736
Epoch 206/1000
19/19              0s 13ms/step -
accuracy: 0.7134 - loss: 0.5655 - val_accuracy: 0.7094 - val_loss: 0.5735
Epoch 207/1000
19/19              0s 13ms/step -
accuracy: 0.7130 - loss: 0.5732 - val_accuracy: 0.7094 - val_loss: 0.5733
Epoch 208/1000
19/19              0s 13ms/step -
accuracy: 0.7390 - loss: 0.5482 - val_accuracy: 0.7094 - val_loss: 0.5731
Epoch 209/1000
19/19              0s 13ms/step -
accuracy: 0.6971 - loss: 0.5843 - val_accuracy: 0.7094 - val_loss: 0.5729
Epoch 210/1000
19/19              0s 16ms/step -
accuracy: 0.7350 - loss: 0.5466 - val_accuracy: 0.7094 - val_loss: 0.5728
Epoch 211/1000
19/19              0s 12ms/step -
accuracy: 0.6852 - loss: 0.5863 - val_accuracy: 0.7094 - val_loss: 0.5727
Epoch 212/1000
19/19              0s 13ms/step -
accuracy: 0.7073 - loss: 0.5683 - val_accuracy: 0.7094 - val_loss: 0.5726
Epoch 213/1000
19/19              0s 13ms/step -
accuracy: 0.7076 - loss: 0.5700 - val_accuracy: 0.7094 - val_loss: 0.5724
Epoch 214/1000
19/19              0s 13ms/step -
accuracy: 0.7435 - loss: 0.5367 - val_accuracy: 0.7094 - val_loss: 0.5721
Epoch 215/1000
19/19              0s 12ms/step -
accuracy: 0.7071 - loss: 0.5699 - val_accuracy: 0.7094 - val_loss: 0.5720
Epoch 216/1000
19/19              0s 13ms/step -
accuracy: 0.7128 - loss: 0.5608 - val_accuracy: 0.7094 - val_loss: 0.5719
Epoch 217/1000
19/19              0s 13ms/step -
accuracy: 0.7431 - loss: 0.5425 - val_accuracy: 0.7094 - val_loss: 0.5717
Epoch 218/1000
19/19              0s 13ms/step -
accuracy: 0.7162 - loss: 0.5545 - val_accuracy: 0.7094 - val_loss: 0.5714
```

```
Epoch 219/1000
19/19              0s 14ms/step -
accuracy: 0.7507 - loss: 0.5368 - val_accuracy: 0.7094 - val_loss: 0.5712
Epoch 220/1000
19/19              0s 13ms/step -
accuracy: 0.6944 - loss: 0.5708 - val_accuracy: 0.7094 - val_loss: 0.5712
Epoch 221/1000
19/19              0s 13ms/step -
accuracy: 0.7090 - loss: 0.5659 - val_accuracy: 0.7094 - val_loss: 0.5710
Epoch 222/1000
19/19              0s 13ms/step -
accuracy: 0.7131 - loss: 0.5619 - val_accuracy: 0.7094 - val_loss: 0.5709
Epoch 223/1000
19/19              0s 13ms/step -
accuracy: 0.6970 - loss: 0.5825 - val_accuracy: 0.7094 - val_loss: 0.5708
Epoch 224/1000
19/19              0s 13ms/step -
accuracy: 0.6988 - loss: 0.5703 - val_accuracy: 0.7094 - val_loss: 0.5705
Epoch 225/1000
19/19              0s 12ms/step -
accuracy: 0.7281 - loss: 0.5474 - val_accuracy: 0.7094 - val_loss: 0.5704
Epoch 226/1000
19/19              0s 12ms/step -
accuracy: 0.7043 - loss: 0.5692 - val_accuracy: 0.7094 - val_loss: 0.5702
Epoch 227/1000
19/19              0s 13ms/step -
accuracy: 0.6831 - loss: 0.5900 - val_accuracy: 0.7094 - val_loss: 0.5701
Epoch 228/1000
19/19              0s 13ms/step -
accuracy: 0.7062 - loss: 0.5645 - val_accuracy: 0.7094 - val_loss: 0.5699
Epoch 229/1000
19/19              0s 12ms/step -
accuracy: 0.7382 - loss: 0.5471 - val_accuracy: 0.7094 - val_loss: 0.5697
Epoch 230/1000
19/19              0s 13ms/step -
accuracy: 0.7018 - loss: 0.5817 - val_accuracy: 0.7094 - val_loss: 0.5696
Epoch 231/1000
19/19              0s 13ms/step -
accuracy: 0.7354 - loss: 0.5470 - val_accuracy: 0.7094 - val_loss: 0.5694
Epoch 232/1000
19/19              0s 12ms/step -
accuracy: 0.7394 - loss: 0.5419 - val_accuracy: 0.7094 - val_loss: 0.5693
Epoch 233/1000
19/19              0s 13ms/step -
accuracy: 0.6898 - loss: 0.5766 - val_accuracy: 0.7094 - val_loss: 0.5692
Epoch 234/1000
19/19              0s 13ms/step -
accuracy: 0.7199 - loss: 0.5606 - val_accuracy: 0.7094 - val_loss: 0.5691
```

```
Epoch 235/1000
19/19              0s 13ms/step -
accuracy: 0.7145 - loss: 0.5644 - val_accuracy: 0.7094 - val_loss: 0.5689
Epoch 236/1000
19/19              0s 13ms/step -
accuracy: 0.7285 - loss: 0.5459 - val_accuracy: 0.7094 - val_loss: 0.5687
Epoch 237/1000
19/19              0s 12ms/step -
accuracy: 0.7102 - loss: 0.5605 - val_accuracy: 0.7094 - val_loss: 0.5686
Epoch 238/1000
19/19              0s 13ms/step -
accuracy: 0.7423 - loss: 0.5407 - val_accuracy: 0.7094 - val_loss: 0.5684
Epoch 239/1000
19/19              0s 12ms/step -
accuracy: 0.6993 - loss: 0.5738 - val_accuracy: 0.7094 - val_loss: 0.5683
Epoch 240/1000
19/19              0s 13ms/step -
accuracy: 0.7144 - loss: 0.5610 - val_accuracy: 0.7094 - val_loss: 0.5681
Epoch 241/1000
19/19              0s 13ms/step -
accuracy: 0.6801 - loss: 0.5777 - val_accuracy: 0.7094 - val_loss: 0.5680
Epoch 242/1000
19/19              0s 13ms/step -
accuracy: 0.7275 - loss: 0.5445 - val_accuracy: 0.7094 - val_loss: 0.5679
Epoch 243/1000
19/19              0s 13ms/step -
accuracy: 0.7273 - loss: 0.5525 - val_accuracy: 0.7094 - val_loss: 0.5677
Epoch 244/1000
19/19              0s 12ms/step -
accuracy: 0.7122 - loss: 0.5671 - val_accuracy: 0.7094 - val_loss: 0.5676
Epoch 245/1000
19/19              0s 13ms/step -
accuracy: 0.7392 - loss: 0.5480 - val_accuracy: 0.7094 - val_loss: 0.5674
Epoch 246/1000
19/19              0s 13ms/step -
accuracy: 0.7111 - loss: 0.5642 - val_accuracy: 0.7094 - val_loss: 0.5672
Epoch 247/1000
19/19              0s 12ms/step -
accuracy: 0.7149 - loss: 0.5566 - val_accuracy: 0.7094 - val_loss: 0.5670
Epoch 248/1000
19/19              0s 13ms/step -
accuracy: 0.7003 - loss: 0.5725 - val_accuracy: 0.7094 - val_loss: 0.5669
Epoch 249/1000
19/19              0s 13ms/step -
accuracy: 0.7051 - loss: 0.5601 - val_accuracy: 0.7094 - val_loss: 0.5668
Epoch 250/1000
19/19              0s 13ms/step -
accuracy: 0.6750 - loss: 0.5974 - val_accuracy: 0.7094 - val_loss: 0.5667
```

```
Epoch 251/1000
19/19              0s 13ms/step -
accuracy: 0.6959 - loss: 0.5688 - val_accuracy: 0.7094 - val_loss: 0.5666
Epoch 252/1000
19/19              0s 13ms/step -
accuracy: 0.7437 - loss: 0.5308 - val_accuracy: 0.7094 - val_loss: 0.5664
Epoch 253/1000
19/19              0s 13ms/step -
accuracy: 0.7066 - loss: 0.5604 - val_accuracy: 0.7094 - val_loss: 0.5664
Epoch 254/1000
19/19              0s 12ms/step -
accuracy: 0.7079 - loss: 0.5580 - val_accuracy: 0.7094 - val_loss: 0.5662
Epoch 255/1000
19/19              0s 12ms/step -
accuracy: 0.7089 - loss: 0.5605 - val_accuracy: 0.7094 - val_loss: 0.5660
Epoch 256/1000
19/19              0s 13ms/step -
accuracy: 0.7267 - loss: 0.5550 - val_accuracy: 0.7094 - val_loss: 0.5659
Epoch 257/1000
19/19              0s 13ms/step -
accuracy: 0.7337 - loss: 0.5379 - val_accuracy: 0.7094 - val_loss: 0.5657
Epoch 258/1000
19/19              0s 12ms/step -
accuracy: 0.7278 - loss: 0.5532 - val_accuracy: 0.7094 - val_loss: 0.5656
Epoch 259/1000
19/19              0s 12ms/step -
accuracy: 0.7204 - loss: 0.5527 - val_accuracy: 0.7094 - val_loss: 0.5655
Epoch 260/1000
19/19              0s 13ms/step -
accuracy: 0.7010 - loss: 0.5602 - val_accuracy: 0.7094 - val_loss: 0.5654
Epoch 261/1000
19/19              0s 13ms/step -
accuracy: 0.7147 - loss: 0.5509 - val_accuracy: 0.7094 - val_loss: 0.5652
Epoch 262/1000
19/19              0s 12ms/step -
accuracy: 0.7265 - loss: 0.5442 - val_accuracy: 0.7094 - val_loss: 0.5651
Epoch 263/1000
19/19              0s 13ms/step -
accuracy: 0.7250 - loss: 0.5405 - val_accuracy: 0.7094 - val_loss: 0.5649
Epoch 264/1000
19/19              0s 13ms/step -
accuracy: 0.7149 - loss: 0.5558 - val_accuracy: 0.7094 - val_loss: 0.5647
Epoch 265/1000
19/19              0s 12ms/step -
accuracy: 0.6987 - loss: 0.5644 - val_accuracy: 0.7094 - val_loss: 0.5647
Epoch 266/1000
19/19              0s 12ms/step -
accuracy: 0.7037 - loss: 0.5613 - val_accuracy: 0.7094 - val_loss: 0.5646
```

```
Epoch 267/1000
19/19              0s 13ms/step -
accuracy: 0.7358 - loss: 0.5363 - val_accuracy: 0.7094 - val_loss: 0.5644
Epoch 268/1000
19/19              0s 13ms/step -
accuracy: 0.7039 - loss: 0.5627 - val_accuracy: 0.7094 - val_loss: 0.5643
Epoch 269/1000
19/19              0s 13ms/step -
accuracy: 0.7291 - loss: 0.5360 - val_accuracy: 0.7094 - val_loss: 0.5641
Epoch 270/1000
19/19              0s 12ms/step -
accuracy: 0.7356 - loss: 0.5326 - val_accuracy: 0.7094 - val_loss: 0.5639
Epoch 271/1000
19/19              0s 12ms/step -
accuracy: 0.6925 - loss: 0.5618 - val_accuracy: 0.7094 - val_loss: 0.5638
Epoch 272/1000
19/19              0s 12ms/step -
accuracy: 0.7026 - loss: 0.5572 - val_accuracy: 0.7094 - val_loss: 0.5637
Epoch 273/1000
19/19              0s 13ms/step -
accuracy: 0.7399 - loss: 0.5250 - val_accuracy: 0.7094 - val_loss: 0.5635
Epoch 274/1000
19/19              0s 13ms/step -
accuracy: 0.7108 - loss: 0.5535 - val_accuracy: 0.7094 - val_loss: 0.5633
Epoch 275/1000
19/19              0s 12ms/step -
accuracy: 0.7378 - loss: 0.5348 - val_accuracy: 0.7094 - val_loss: 0.5631
Epoch 276/1000
19/19              0s 13ms/step -
accuracy: 0.7135 - loss: 0.5501 - val_accuracy: 0.7094 - val_loss: 0.5630
Epoch 277/1000
19/19              0s 13ms/step -
accuracy: 0.6700 - loss: 0.5845 - val_accuracy: 0.7094 - val_loss: 0.5630
Epoch 278/1000
19/19              0s 12ms/step -
accuracy: 0.7071 - loss: 0.5628 - val_accuracy: 0.7094 - val_loss: 0.5628
Epoch 279/1000
19/19              0s 13ms/step -
accuracy: 0.7278 - loss: 0.5363 - val_accuracy: 0.7179 - val_loss: 0.5626
Epoch 280/1000
19/19              0s 12ms/step -
accuracy: 0.7158 - loss: 0.5518 - val_accuracy: 0.7179 - val_loss: 0.5625
Epoch 281/1000
19/19              0s 13ms/step -
accuracy: 0.6817 - loss: 0.5745 - val_accuracy: 0.7094 - val_loss: 0.5625
Epoch 282/1000
19/19              0s 12ms/step -
accuracy: 0.7225 - loss: 0.5472 - val_accuracy: 0.7179 - val_loss: 0.5624
```

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Epoch 283/1000
19/19              0s 13ms/step -
accuracy: 0.7292 - loss: 0.5367 - val_accuracy: 0.7179 - val_loss: 0.5623
Epoch 284/1000
19/19              0s 12ms/step -
accuracy: 0.7292 - loss: 0.5404 - val_accuracy: 0.7179 - val_loss: 0.5621
Epoch 285/1000
19/19              0s 13ms/step -
accuracy: 0.7558 - loss: 0.5148 - val_accuracy: 0.7179 - val_loss: 0.5619
Epoch 286/1000
19/19              0s 13ms/step -
accuracy: 0.7038 - loss: 0.5611 - val_accuracy: 0.7179 - val_loss: 0.5618
Epoch 287/1000
19/19              0s 13ms/step -
accuracy: 0.7275 - loss: 0.5438 - val_accuracy: 0.7179 - val_loss: 0.5617
Epoch 288/1000
19/19              0s 12ms/step -
accuracy: 0.7275 - loss: 0.5282 - val_accuracy: 0.7179 - val_loss: 0.5616
Epoch 289/1000
19/19              0s 12ms/step -
accuracy: 0.7344 - loss: 0.5226 - val_accuracy: 0.7179 - val_loss: 0.5614
Epoch 290/1000
19/19              0s 14ms/step -
accuracy: 0.7050 - loss: 0.5554 - val_accuracy: 0.7179 - val_loss: 0.5612
Epoch 291/1000
19/19              0s 13ms/step -
accuracy: 0.7218 - loss: 0.5322 - val_accuracy: 0.7179 - val_loss: 0.5612
Epoch 292/1000
19/19              0s 13ms/step -
accuracy: 0.6875 - loss: 0.5613 - val_accuracy: 0.7179 - val_loss: 0.5611
Epoch 293/1000
19/19              0s 13ms/step -
accuracy: 0.7239 - loss: 0.5459 - val_accuracy: 0.7179 - val_loss: 0.5609
Epoch 294/1000
19/19              0s 17ms/step -
accuracy: 0.7419 - loss: 0.5259 - val_accuracy: 0.7179 - val_loss: 0.5608
Epoch 295/1000
19/19              0s 13ms/step -
accuracy: 0.6967 - loss: 0.5630 - val_accuracy: 0.7179 - val_loss: 0.5608
Epoch 296/1000
19/19              0s 13ms/step -
accuracy: 0.6935 - loss: 0.5530 - val_accuracy: 0.7179 - val_loss: 0.5608
Epoch 297/1000
19/19              0s 13ms/step -
accuracy: 0.7102 - loss: 0.5538 - val_accuracy: 0.7179 - val_loss: 0.5605
Epoch 298/1000
19/19              0s 12ms/step -
accuracy: 0.7087 - loss: 0.5640 - val_accuracy: 0.7179 - val_loss: 0.5604
```

```
Epoch 299/1000
19/19              0s 14ms/step -
accuracy: 0.7108 - loss: 0.5560 - val_accuracy: 0.7179 - val_loss: 0.5602
Epoch 300/1000
19/19              0s 13ms/step -
accuracy: 0.7068 - loss: 0.5592 - val_accuracy: 0.7179 - val_loss: 0.5601
Epoch 301/1000
19/19              0s 13ms/step -
accuracy: 0.7110 - loss: 0.5507 - val_accuracy: 0.7179 - val_loss: 0.5600
Epoch 302/1000
19/19              0s 13ms/step -
accuracy: 0.6960 - loss: 0.5646 - val_accuracy: 0.7179 - val_loss: 0.5598
Epoch 303/1000
19/19              0s 12ms/step -
accuracy: 0.7082 - loss: 0.5589 - val_accuracy: 0.7179 - val_loss: 0.5597
Epoch 304/1000
19/19              0s 12ms/step -
accuracy: 0.7357 - loss: 0.5267 - val_accuracy: 0.7179 - val_loss: 0.5596
Epoch 305/1000
19/19              0s 13ms/step -
accuracy: 0.7466 - loss: 0.5152 - val_accuracy: 0.7179 - val_loss: 0.5594
Epoch 306/1000
19/19              0s 12ms/step -
accuracy: 0.7123 - loss: 0.5579 - val_accuracy: 0.7179 - val_loss: 0.5593
Epoch 307/1000
19/19              0s 13ms/step -
accuracy: 0.7239 - loss: 0.5377 - val_accuracy: 0.7179 - val_loss: 0.5591
Epoch 308/1000
19/19              0s 12ms/step -
accuracy: 0.7110 - loss: 0.5533 - val_accuracy: 0.7179 - val_loss: 0.5590
Epoch 309/1000
19/19              0s 13ms/step -
accuracy: 0.6998 - loss: 0.5613 - val_accuracy: 0.7179 - val_loss: 0.5590
Epoch 310/1000
19/19              0s 13ms/step -
accuracy: 0.6970 - loss: 0.5461 - val_accuracy: 0.7179 - val_loss: 0.5590
Epoch 311/1000
19/19              0s 12ms/step -
accuracy: 0.6757 - loss: 0.5817 - val_accuracy: 0.7179 - val_loss: 0.5590
Epoch 312/1000
19/19              0s 12ms/step -
accuracy: 0.6940 - loss: 0.5614 - val_accuracy: 0.7179 - val_loss: 0.5588
Epoch 313/1000
19/19              0s 13ms/step -
accuracy: 0.7246 - loss: 0.5347 - val_accuracy: 0.7179 - val_loss: 0.5585
Epoch 314/1000
19/19              0s 13ms/step -
accuracy: 0.6756 - loss: 0.5614 - val_accuracy: 0.7179 - val_loss: 0.5584
```

```
Epoch 315/1000
19/19            0s 13ms/step -
accuracy: 0.6941 - loss: 0.5600 - val_accuracy: 0.7179 - val_loss: 0.5584
Epoch 316/1000
19/19            0s 13ms/step -
accuracy: 0.7398 - loss: 0.5122 - val_accuracy: 0.7179 - val_loss: 0.5582
Epoch 317/1000
19/19            0s 12ms/step -
accuracy: 0.7206 - loss: 0.5457 - val_accuracy: 0.7179 - val_loss: 0.5581
Epoch 318/1000
19/19            0s 13ms/step -
accuracy: 0.7284 - loss: 0.5373 - val_accuracy: 0.7094 - val_loss: 0.5579
Epoch 319/1000
19/19            0s 12ms/step -
accuracy: 0.7190 - loss: 0.5405 - val_accuracy: 0.7094 - val_loss: 0.5578
Epoch 320/1000
19/19            0s 13ms/step -
accuracy: 0.7295 - loss: 0.5280 - val_accuracy: 0.7094 - val_loss: 0.5577
Epoch 321/1000
19/19            0s 12ms/step -
accuracy: 0.6871 - loss: 0.5790 - val_accuracy: 0.7094 - val_loss: 0.5577
Epoch 322/1000
19/19            0s 12ms/step -
accuracy: 0.7173 - loss: 0.5556 - val_accuracy: 0.7094 - val_loss: 0.5576
Epoch 323/1000
19/19            0s 13ms/step -
accuracy: 0.7218 - loss: 0.5363 - val_accuracy: 0.7094 - val_loss: 0.5574
Epoch 324/1000
19/19            0s 12ms/step -
accuracy: 0.6920 - loss: 0.5699 - val_accuracy: 0.7094 - val_loss: 0.5573
Epoch 325/1000
19/19            0s 12ms/step -
accuracy: 0.6967 - loss: 0.5563 - val_accuracy: 0.7094 - val_loss: 0.5572
Epoch 326/1000
19/19            0s 12ms/step -
accuracy: 0.7114 - loss: 0.5484 - val_accuracy: 0.7094 - val_loss: 0.5570
Epoch 327/1000
19/19            0s 12ms/step -
accuracy: 0.7108 - loss: 0.5598 - val_accuracy: 0.7094 - val_loss: 0.5569
Epoch 328/1000
19/19            0s 12ms/step -
accuracy: 0.7015 - loss: 0.5601 - val_accuracy: 0.7094 - val_loss: 0.5568
Epoch 329/1000
19/19            0s 13ms/step -
accuracy: 0.7396 - loss: 0.5227 - val_accuracy: 0.7094 - val_loss: 0.5566
Epoch 330/1000
19/19            0s 13ms/step -
accuracy: 0.6847 - loss: 0.5798 - val_accuracy: 0.7094 - val_loss: 0.5566
```

```
Epoch 331/1000
19/19              0s 13ms/step -
accuracy: 0.7050 - loss: 0.5581 - val_accuracy: 0.7094 - val_loss: 0.5565
Epoch 332/1000
19/19              0s 12ms/step -
accuracy: 0.7032 - loss: 0.5523 - val_accuracy: 0.7094 - val_loss: 0.5564
Epoch 333/1000
19/19              0s 12ms/step -
accuracy: 0.6917 - loss: 0.5745 - val_accuracy: 0.7094 - val_loss: 0.5564
Epoch 334/1000
19/19              0s 12ms/step -
accuracy: 0.7130 - loss: 0.5485 - val_accuracy: 0.7094 - val_loss: 0.5562
Epoch 335/1000
19/19              0s 13ms/step -
accuracy: 0.7116 - loss: 0.5386 - val_accuracy: 0.7094 - val_loss: 0.5561
Epoch 336/1000
19/19              0s 12ms/step -
accuracy: 0.7070 - loss: 0.5401 - val_accuracy: 0.7094 - val_loss: 0.5561
Epoch 337/1000
19/19              0s 12ms/step -
accuracy: 0.6690 - loss: 0.5713 - val_accuracy: 0.7094 - val_loss: 0.5561
Epoch 338/1000
19/19              0s 14ms/step -
accuracy: 0.6882 - loss: 0.5548 - val_accuracy: 0.7094 - val_loss: 0.5559
Epoch 339/1000
19/19              0s 12ms/step -
accuracy: 0.7221 - loss: 0.5384 - val_accuracy: 0.7094 - val_loss: 0.5557
Epoch 340/1000
19/19              0s 13ms/step -
accuracy: 0.7141 - loss: 0.5394 - val_accuracy: 0.7094 - val_loss: 0.5556
Epoch 341/1000
19/19              0s 13ms/step -
accuracy: 0.7165 - loss: 0.5425 - val_accuracy: 0.7094 - val_loss: 0.5555
Epoch 342/1000
19/19              0s 13ms/step -
accuracy: 0.7064 - loss: 0.5438 - val_accuracy: 0.7094 - val_loss: 0.5554
Epoch 343/1000
19/19              0s 13ms/step -
accuracy: 0.6686 - loss: 0.5911 - val_accuracy: 0.7094 - val_loss: 0.5554
Epoch 344/1000
19/19              0s 13ms/step -
accuracy: 0.7194 - loss: 0.5533 - val_accuracy: 0.7094 - val_loss: 0.5551
Epoch 345/1000
19/19              0s 16ms/step -
accuracy: 0.7093 - loss: 0.5372 - val_accuracy: 0.7094 - val_loss: 0.5550
Epoch 346/1000
19/19              0s 12ms/step -
accuracy: 0.7096 - loss: 0.5512 - val_accuracy: 0.7094 - val_loss: 0.5550
```

```
Epoch 347/1000
19/19          0s 13ms/step -
accuracy: 0.6935 - loss: 0.5505 - val_accuracy: 0.7094 - val_loss: 0.5549
Epoch 348/1000
19/19          0s 12ms/step -
accuracy: 0.6883 - loss: 0.5639 - val_accuracy: 0.7094 - val_loss: 0.5547
Epoch 349/1000
19/19          0s 13ms/step -
accuracy: 0.6974 - loss: 0.5626 - val_accuracy: 0.7094 - val_loss: 0.5546
Epoch 350/1000
19/19          0s 12ms/step -
accuracy: 0.7198 - loss: 0.5450 - val_accuracy: 0.7094 - val_loss: 0.5546
Epoch 351/1000
19/19          0s 13ms/step -
accuracy: 0.6885 - loss: 0.5575 - val_accuracy: 0.7094 - val_loss: 0.5546
Epoch 352/1000
19/19          0s 12ms/step -
accuracy: 0.7381 - loss: 0.5229 - val_accuracy: 0.7094 - val_loss: 0.5544
Epoch 353/1000
19/19          0s 13ms/step -
accuracy: 0.7138 - loss: 0.5340 - val_accuracy: 0.7094 - val_loss: 0.5544
Epoch 354/1000
19/19          0s 14ms/step -
accuracy: 0.7175 - loss: 0.5511 - val_accuracy: 0.7094 - val_loss: 0.5543
Epoch 355/1000
19/19          0s 12ms/step -
accuracy: 0.7092 - loss: 0.5382 - val_accuracy: 0.7094 - val_loss: 0.5540
Epoch 356/1000
19/19          0s 13ms/step -
accuracy: 0.7296 - loss: 0.5363 - val_accuracy: 0.7094 - val_loss: 0.5538
Epoch 357/1000
19/19          0s 12ms/step -
accuracy: 0.6921 - loss: 0.5522 - val_accuracy: 0.7094 - val_loss: 0.5538
Epoch 358/1000
19/19          0s 13ms/step -
accuracy: 0.7283 - loss: 0.5313 - val_accuracy: 0.7094 - val_loss: 0.5536
Epoch 359/1000
19/19          0s 12ms/step -
accuracy: 0.7056 - loss: 0.5522 - val_accuracy: 0.7094 - val_loss: 0.5534
Epoch 360/1000
19/19          0s 12ms/step -
accuracy: 0.7146 - loss: 0.5315 - val_accuracy: 0.7094 - val_loss: 0.5533
Epoch 361/1000
19/19          0s 12ms/step -
accuracy: 0.7189 - loss: 0.5342 - val_accuracy: 0.7094 - val_loss: 0.5532
Epoch 362/1000
19/19          0s 13ms/step -
accuracy: 0.7442 - loss: 0.5050 - val_accuracy: 0.7094 - val_loss: 0.5530
```

```
Epoch 363/1000
19/19              0s 13ms/step -
accuracy: 0.7193 - loss: 0.5343 - val_accuracy: 0.7094 - val_loss: 0.5529
Epoch 364/1000
19/19              0s 12ms/step -
accuracy: 0.7323 - loss: 0.5259 - val_accuracy: 0.7094 - val_loss: 0.5527
Epoch 365/1000
19/19              0s 13ms/step -
accuracy: 0.6940 - loss: 0.5582 - val_accuracy: 0.7094 - val_loss: 0.5528
Epoch 366/1000
19/19              0s 12ms/step -
accuracy: 0.7068 - loss: 0.5457 - val_accuracy: 0.7094 - val_loss: 0.5527
Epoch 367/1000
19/19              0s 13ms/step -
accuracy: 0.7488 - loss: 0.5157 - val_accuracy: 0.7094 - val_loss: 0.5526
Epoch 368/1000
19/19              0s 13ms/step -
accuracy: 0.7039 - loss: 0.5427 - val_accuracy: 0.7094 - val_loss: 0.5526
Epoch 369/1000
19/19              0s 13ms/step -
accuracy: 0.6941 - loss: 0.5491 - val_accuracy: 0.7094 - val_loss: 0.5524
Epoch 370/1000
19/19              0s 13ms/step -
accuracy: 0.7464 - loss: 0.5190 - val_accuracy: 0.7094 - val_loss: 0.5523
Epoch 371/1000
19/19              0s 12ms/step -
accuracy: 0.6856 - loss: 0.5662 - val_accuracy: 0.7094 - val_loss: 0.5523
Epoch 372/1000
19/19              0s 12ms/step -
accuracy: 0.7364 - loss: 0.5436 - val_accuracy: 0.7094 - val_loss: 0.5520
Epoch 373/1000
19/19              0s 12ms/step -
accuracy: 0.7284 - loss: 0.5282 - val_accuracy: 0.7094 - val_loss: 0.5519
Epoch 374/1000
19/19              0s 13ms/step -
accuracy: 0.6908 - loss: 0.5581 - val_accuracy: 0.7094 - val_loss: 0.5519
Epoch 375/1000
19/19              0s 16ms/step -
accuracy: 0.7311 - loss: 0.5485 - val_accuracy: 0.7094 - val_loss: 0.5518
Epoch 376/1000
19/19              0s 13ms/step -
accuracy: 0.7182 - loss: 0.5415 - val_accuracy: 0.7094 - val_loss: 0.5516
Epoch 377/1000
19/19              0s 13ms/step -
accuracy: 0.7224 - loss: 0.5243 - val_accuracy: 0.7094 - val_loss: 0.5516
Epoch 378/1000
19/19              0s 13ms/step -
accuracy: 0.7270 - loss: 0.5160 - val_accuracy: 0.7094 - val_loss: 0.5514
```

```
Epoch 379/1000
19/19              0s 12ms/step -
accuracy: 0.7196 - loss: 0.5325 - val_accuracy: 0.7094 - val_loss: 0.5514
Epoch 380/1000
19/19              0s 13ms/step -
accuracy: 0.7140 - loss: 0.5548 - val_accuracy: 0.7094 - val_loss: 0.5514
Epoch 381/1000
19/19              0s 13ms/step -
accuracy: 0.7436 - loss: 0.5172 - val_accuracy: 0.7094 - val_loss: 0.5510
Epoch 382/1000
19/19              0s 13ms/step -
accuracy: 0.6858 - loss: 0.5539 - val_accuracy: 0.7094 - val_loss: 0.5510
Epoch 383/1000
19/19              0s 13ms/step -
accuracy: 0.7302 - loss: 0.5368 - val_accuracy: 0.7094 - val_loss: 0.5509
Epoch 384/1000
19/19              0s 12ms/step -
accuracy: 0.7017 - loss: 0.5487 - val_accuracy: 0.7094 - val_loss: 0.5509
Epoch 385/1000
19/19              0s 12ms/step -
accuracy: 0.7152 - loss: 0.5358 - val_accuracy: 0.7094 - val_loss: 0.5507
Epoch 386/1000
19/19              0s 13ms/step -
accuracy: 0.7098 - loss: 0.5422 - val_accuracy: 0.7094 - val_loss: 0.5507
Epoch 387/1000
19/19              0s 12ms/step -
accuracy: 0.7099 - loss: 0.5337 - val_accuracy: 0.7094 - val_loss: 0.5507
Epoch 388/1000
19/19              0s 13ms/step -
accuracy: 0.6817 - loss: 0.5631 - val_accuracy: 0.7094 - val_loss: 0.5507
Epoch 389/1000
19/19              0s 12ms/step -
accuracy: 0.7187 - loss: 0.5299 - val_accuracy: 0.7094 - val_loss: 0.5507
Epoch 390/1000
19/19              0s 12ms/step -
accuracy: 0.7390 - loss: 0.5167 - val_accuracy: 0.7094 - val_loss: 0.5503
Epoch 391/1000
19/19              0s 13ms/step -
accuracy: 0.7307 - loss: 0.5265 - val_accuracy: 0.7094 - val_loss: 0.5500
Epoch 392/1000
19/19              0s 17ms/step -
accuracy: 0.7118 - loss: 0.5409 - val_accuracy: 0.7094 - val_loss: 0.5501
Epoch 393/1000
19/19              0s 13ms/step -
accuracy: 0.7037 - loss: 0.5520 - val_accuracy: 0.7094 - val_loss: 0.5499
Epoch 394/1000
19/19              0s 12ms/step -
accuracy: 0.7334 - loss: 0.5255 - val_accuracy: 0.7094 - val_loss: 0.5497
```

```
Epoch 395/1000
19/19              0s 12ms/step -
accuracy: 0.7425 - loss: 0.4984 - val_accuracy: 0.7094 - val_loss: 0.5496
Epoch 396/1000
19/19              0s 13ms/step -
accuracy: 0.7264 - loss: 0.5317 - val_accuracy: 0.7094 - val_loss: 0.5495
Epoch 397/1000
19/19              0s 12ms/step -
accuracy: 0.7332 - loss: 0.5113 - val_accuracy: 0.7094 - val_loss: 0.5495
Epoch 398/1000
19/19              0s 13ms/step -
accuracy: 0.6803 - loss: 0.5569 - val_accuracy: 0.7094 - val_loss: 0.5496
Epoch 399/1000
19/19              0s 13ms/step -
accuracy: 0.6894 - loss: 0.5569 - val_accuracy: 0.7094 - val_loss: 0.5495
Epoch 400/1000
19/19              0s 13ms/step -
accuracy: 0.7139 - loss: 0.5318 - val_accuracy: 0.7094 - val_loss: 0.5493
Epoch 401/1000
19/19              0s 12ms/step -
accuracy: 0.7065 - loss: 0.5408 - val_accuracy: 0.7094 - val_loss: 0.5492
Epoch 402/1000
19/19              0s 13ms/step -
accuracy: 0.7361 - loss: 0.5247 - val_accuracy: 0.7094 - val_loss: 0.5491
Epoch 403/1000
19/19              0s 13ms/step -
accuracy: 0.7352 - loss: 0.5172 - val_accuracy: 0.7094 - val_loss: 0.5489
Epoch 404/1000
19/19              0s 12ms/step -
accuracy: 0.7018 - loss: 0.5428 - val_accuracy: 0.7094 - val_loss: 0.5490
Epoch 405/1000
19/19              0s 13ms/step -
accuracy: 0.7181 - loss: 0.5360 - val_accuracy: 0.7094 - val_loss: 0.5489
Epoch 406/1000
19/19              0s 12ms/step -
accuracy: 0.6780 - loss: 0.5584 - val_accuracy: 0.7094 - val_loss: 0.5488
Epoch 407/1000
19/19              0s 12ms/step -
accuracy: 0.6948 - loss: 0.5668 - val_accuracy: 0.7094 - val_loss: 0.5488
Epoch 408/1000
19/19              0s 12ms/step -
accuracy: 0.7070 - loss: 0.5524 - val_accuracy: 0.7094 - val_loss: 0.5485
Epoch 409/1000
19/19              0s 13ms/step -
accuracy: 0.6770 - loss: 0.5628 - val_accuracy: 0.7094 - val_loss: 0.5485
Epoch 410/1000
19/19              0s 12ms/step -
accuracy: 0.7029 - loss: 0.5366 - val_accuracy: 0.7094 - val_loss: 0.5485
```

```
Epoch 411/1000
19/19              0s 13ms/step -
accuracy: 0.7225 - loss: 0.5292 - val_accuracy: 0.7094 - val_loss: 0.5483
Epoch 412/1000
19/19              0s 12ms/step -
accuracy: 0.7262 - loss: 0.5263 - val_accuracy: 0.7094 - val_loss: 0.5481
Epoch 413/1000
19/19              0s 14ms/step -
accuracy: 0.7100 - loss: 0.5403 - val_accuracy: 0.7094 - val_loss: 0.5481
Epoch 414/1000
19/19              0s 12ms/step -
accuracy: 0.7251 - loss: 0.5231 - val_accuracy: 0.7094 - val_loss: 0.5479
Epoch 415/1000
19/19              0s 13ms/step -
accuracy: 0.6997 - loss: 0.5458 - val_accuracy: 0.7094 - val_loss: 0.5479
Epoch 416/1000
19/19              0s 13ms/step -
accuracy: 0.7199 - loss: 0.5373 - val_accuracy: 0.7179 - val_loss: 0.5476
Epoch 417/1000
19/19              0s 12ms/step -
accuracy: 0.7055 - loss: 0.5505 - val_accuracy: 0.7179 - val_loss: 0.5474
Epoch 418/1000
19/19              0s 13ms/step -
accuracy: 0.7098 - loss: 0.5378 - val_accuracy: 0.7179 - val_loss: 0.5474
Epoch 419/1000
19/19              0s 13ms/step -
accuracy: 0.7055 - loss: 0.5394 - val_accuracy: 0.7179 - val_loss: 0.5474
Epoch 420/1000
19/19              0s 13ms/step -
accuracy: 0.7416 - loss: 0.5171 - val_accuracy: 0.7179 - val_loss: 0.5473
Epoch 421/1000
19/19              0s 12ms/step -
accuracy: 0.7108 - loss: 0.5255 - val_accuracy: 0.7179 - val_loss: 0.5472
Epoch 422/1000
19/19              0s 13ms/step -
accuracy: 0.7040 - loss: 0.5368 - val_accuracy: 0.7179 - val_loss: 0.5472
Epoch 423/1000
19/19              0s 12ms/step -
accuracy: 0.7118 - loss: 0.5271 - val_accuracy: 0.7179 - val_loss: 0.5470
Epoch 424/1000
19/19              0s 12ms/step -
accuracy: 0.7020 - loss: 0.5460 - val_accuracy: 0.7179 - val_loss: 0.5470
Epoch 425/1000
19/19              0s 13ms/step -
accuracy: 0.7092 - loss: 0.5494 - val_accuracy: 0.7094 - val_loss: 0.5470
Epoch 426/1000
19/19              0s 13ms/step -
accuracy: 0.7097 - loss: 0.5386 - val_accuracy: 0.7179 - val_loss: 0.5469
```

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Epoch 427/1000
19/19              0s 14ms/step -
accuracy: 0.7159 - loss: 0.5322 - val_accuracy: 0.7179 - val_loss: 0.5467
Epoch 428/1000
19/19              0s 12ms/step -
accuracy: 0.7215 - loss: 0.5252 - val_accuracy: 0.7179 - val_loss: 0.5466
Epoch 429/1000
19/19              0s 13ms/step -
accuracy: 0.7103 - loss: 0.5430 - val_accuracy: 0.7179 - val_loss: 0.5466
Epoch 430/1000
19/19              0s 12ms/step -
accuracy: 0.6978 - loss: 0.5499 - val_accuracy: 0.7094 - val_loss: 0.5466
Epoch 431/1000
19/19              0s 12ms/step -
accuracy: 0.7161 - loss: 0.5319 - val_accuracy: 0.7179 - val_loss: 0.5464
Epoch 432/1000
19/19              0s 12ms/step -
accuracy: 0.7243 - loss: 0.5338 - val_accuracy: 0.7179 - val_loss: 0.5462
Epoch 433/1000
19/19              0s 13ms/step -
accuracy: 0.6902 - loss: 0.5649 - val_accuracy: 0.7179 - val_loss: 0.5462
Epoch 434/1000
19/19              0s 14ms/step -
accuracy: 0.7191 - loss: 0.5328 - val_accuracy: 0.7179 - val_loss: 0.5461
Epoch 435/1000
19/19              0s 12ms/step -
accuracy: 0.7251 - loss: 0.5274 - val_accuracy: 0.7179 - val_loss: 0.5459
Epoch 436/1000
19/19              0s 12ms/step -
accuracy: 0.7160 - loss: 0.5394 - val_accuracy: 0.7179 - val_loss: 0.5459
Epoch 437/1000
19/19              0s 12ms/step -
accuracy: 0.7190 - loss: 0.5407 - val_accuracy: 0.7179 - val_loss: 0.5458
Epoch 438/1000
19/19              0s 13ms/step -
accuracy: 0.7315 - loss: 0.5245 - val_accuracy: 0.7265 - val_loss: 0.5455
Epoch 439/1000
19/19              0s 12ms/step -
accuracy: 0.7185 - loss: 0.5263 - val_accuracy: 0.7179 - val_loss: 0.5456
Epoch 440/1000
19/19              0s 12ms/step -
accuracy: 0.7239 - loss: 0.5343 - val_accuracy: 0.7179 - val_loss: 0.5456
Epoch 441/1000
19/19              0s 13ms/step -
accuracy: 0.6844 - loss: 0.5639 - val_accuracy: 0.7179 - val_loss: 0.5454
Epoch 442/1000
19/19              0s 13ms/step -
accuracy: 0.7302 - loss: 0.5232 - val_accuracy: 0.7265 - val_loss: 0.5453
```

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Epoch 443/1000
19/19              0s 12ms/step -
accuracy: 0.7225 - loss: 0.5227 - val_accuracy: 0.7179 - val_loss: 0.5452
Epoch 444/1000
19/19              0s 13ms/step -
accuracy: 0.7227 - loss: 0.5411 - val_accuracy: 0.7265 - val_loss: 0.5450
Epoch 445/1000
19/19              0s 14ms/step -
accuracy: 0.7253 - loss: 0.5325 - val_accuracy: 0.7179 - val_loss: 0.5448
Epoch 446/1000
19/19              0s 12ms/step -
accuracy: 0.7098 - loss: 0.5438 - val_accuracy: 0.7265 - val_loss: 0.5447
Epoch 447/1000
19/19              0s 13ms/step -
accuracy: 0.7007 - loss: 0.5461 - val_accuracy: 0.7265 - val_loss: 0.5447
Epoch 448/1000
19/19              0s 12ms/step -
accuracy: 0.7251 - loss: 0.5439 - val_accuracy: 0.7265 - val_loss: 0.5446
Epoch 449/1000
19/19              0s 12ms/step -
accuracy: 0.7377 - loss: 0.5297 - val_accuracy: 0.7179 - val_loss: 0.5444
Epoch 450/1000
19/19              0s 12ms/step -
accuracy: 0.7113 - loss: 0.5346 - val_accuracy: 0.7179 - val_loss: 0.5444
Epoch 451/1000
19/19              0s 13ms/step -
accuracy: 0.7221 - loss: 0.5264 - val_accuracy: 0.7179 - val_loss: 0.5444
Epoch 452/1000
19/19              0s 13ms/step -
accuracy: 0.7073 - loss: 0.5222 - val_accuracy: 0.7265 - val_loss: 0.5444
Epoch 453/1000
19/19              0s 13ms/step -
accuracy: 0.7319 - loss: 0.5240 - val_accuracy: 0.7265 - val_loss: 0.5443
Epoch 454/1000
19/19              0s 13ms/step -
accuracy: 0.7440 - loss: 0.5151 - val_accuracy: 0.7179 - val_loss: 0.5441
Epoch 455/1000
19/19              0s 12ms/step -
accuracy: 0.7066 - loss: 0.5471 - val_accuracy: 0.7265 - val_loss: 0.5443
Epoch 456/1000
19/19              0s 12ms/step -
accuracy: 0.7005 - loss: 0.5402 - val_accuracy: 0.7265 - val_loss: 0.5442
Epoch 457/1000
19/19              0s 13ms/step -
accuracy: 0.7478 - loss: 0.5116 - val_accuracy: 0.7179 - val_loss: 0.5438
Epoch 458/1000
19/19              0s 17ms/step -
accuracy: 0.7425 - loss: 0.5126 - val_accuracy: 0.7179 - val_loss: 0.5437
```

```
Epoch 459/1000
19/19              0s 13ms/step -
accuracy: 0.7128 - loss: 0.5469 - val_accuracy: 0.7179 - val_loss: 0.5436
Epoch 460/1000
19/19              0s 13ms/step -
accuracy: 0.6827 - loss: 0.5635 - val_accuracy: 0.7179 - val_loss: 0.5436
Epoch 461/1000
19/19              0s 12ms/step -
accuracy: 0.7159 - loss: 0.5513 - val_accuracy: 0.7179 - val_loss: 0.5435
Epoch 462/1000
19/19              0s 12ms/step -
accuracy: 0.6828 - loss: 0.5696 - val_accuracy: 0.7179 - val_loss: 0.5434
Epoch 463/1000
19/19              0s 13ms/step -
accuracy: 0.6907 - loss: 0.5498 - val_accuracy: 0.7265 - val_loss: 0.5435
Epoch 464/1000
19/19              0s 12ms/step -
accuracy: 0.7058 - loss: 0.5413 - val_accuracy: 0.7265 - val_loss: 0.5434
Epoch 465/1000
19/19              0s 12ms/step -
accuracy: 0.7051 - loss: 0.5466 - val_accuracy: 0.7265 - val_loss: 0.5434
Epoch 466/1000
19/19              0s 12ms/step -
accuracy: 0.6925 - loss: 0.5466 - val_accuracy: 0.7265 - val_loss: 0.5435
Epoch 467/1000
19/19              0s 12ms/step -
accuracy: 0.7394 - loss: 0.5037 - val_accuracy: 0.7179 - val_loss: 0.5431
Epoch 468/1000
19/19              0s 12ms/step -
accuracy: 0.7019 - loss: 0.5464 - val_accuracy: 0.7179 - val_loss: 0.5430
Epoch 469/1000
19/19              0s 12ms/step -
accuracy: 0.6994 - loss: 0.5631 - val_accuracy: 0.7265 - val_loss: 0.5428
Epoch 470/1000
19/19              0s 13ms/step -
accuracy: 0.6946 - loss: 0.5440 - val_accuracy: 0.7265 - val_loss: 0.5426
Epoch 471/1000
19/19              0s 12ms/step -
accuracy: 0.7045 - loss: 0.5401 - val_accuracy: 0.7179 - val_loss: 0.5427
Epoch 472/1000
19/19              0s 13ms/step -
accuracy: 0.6738 - loss: 0.5653 - val_accuracy: 0.7179 - val_loss: 0.5427
Epoch 473/1000
19/19              0s 12ms/step -
accuracy: 0.7259 - loss: 0.5174 - val_accuracy: 0.7179 - val_loss: 0.5426
Epoch 474/1000
19/19              0s 12ms/step -
accuracy: 0.7193 - loss: 0.5195 - val_accuracy: 0.7265 - val_loss: 0.5422
```

```
Epoch 475/1000
19/19              0s 13ms/step -
accuracy: 0.6830 - loss: 0.5588 - val_accuracy: 0.7265 - val_loss: 0.5424
Epoch 476/1000
19/19              0s 12ms/step -
accuracy: 0.6935 - loss: 0.5535 - val_accuracy: 0.7265 - val_loss: 0.5423
Epoch 477/1000
19/19              0s 13ms/step -
accuracy: 0.7409 - loss: 0.4967 - val_accuracy: 0.7265 - val_loss: 0.5422
Epoch 478/1000
19/19              0s 13ms/step -
accuracy: 0.7193 - loss: 0.5243 - val_accuracy: 0.7265 - val_loss: 0.5420
Epoch 479/1000
19/19              0s 12ms/step -
accuracy: 0.7388 - loss: 0.5190 - val_accuracy: 0.7265 - val_loss: 0.5419
Epoch 480/1000
19/19              0s 13ms/step -
accuracy: 0.7350 - loss: 0.5157 - val_accuracy: 0.7265 - val_loss: 0.5419
Epoch 481/1000
19/19              0s 12ms/step -
accuracy: 0.7012 - loss: 0.5449 - val_accuracy: 0.7179 - val_loss: 0.5421
Epoch 482/1000
19/19              0s 12ms/step -
accuracy: 0.6931 - loss: 0.5438 - val_accuracy: 0.7265 - val_loss: 0.5419
Epoch 483/1000
19/19              0s 20ms/step -
accuracy: 0.7070 - loss: 0.5498 - val_accuracy: 0.7265 - val_loss: 0.5416
Epoch 484/1000
19/19              0s 13ms/step -
accuracy: 0.7016 - loss: 0.5521 - val_accuracy: 0.7265 - val_loss: 0.5415
Epoch 485/1000
19/19              0s 14ms/step -
accuracy: 0.7026 - loss: 0.5434 - val_accuracy: 0.7265 - val_loss: 0.5415
Epoch 486/1000
19/19              0s 13ms/step -
accuracy: 0.7088 - loss: 0.5310 - val_accuracy: 0.7265 - val_loss: 0.5415
Epoch 487/1000
19/19              0s 13ms/step -
accuracy: 0.6921 - loss: 0.5417 - val_accuracy: 0.7265 - val_loss: 0.5411
Epoch 488/1000
19/19              0s 14ms/step -
accuracy: 0.7119 - loss: 0.5193 - val_accuracy: 0.7265 - val_loss: 0.5410
Epoch 489/1000
19/19              0s 14ms/step -
accuracy: 0.7090 - loss: 0.5208 - val_accuracy: 0.7265 - val_loss: 0.5409
Epoch 490/1000
19/19              0s 14ms/step -
accuracy: 0.7134 - loss: 0.5259 - val_accuracy: 0.7265 - val_loss: 0.5408
```

```
Epoch 491/1000
19/19              0s 15ms/step -
accuracy: 0.7175 - loss: 0.5369 - val_accuracy: 0.7179 - val_loss: 0.5406
Epoch 492/1000
19/19              0s 15ms/step -
accuracy: 0.6984 - loss: 0.5466 - val_accuracy: 0.7265 - val_loss: 0.5408
Epoch 493/1000
19/19              0s 14ms/step -
accuracy: 0.7083 - loss: 0.5150 - val_accuracy: 0.7265 - val_loss: 0.5408
Epoch 494/1000
19/19              0s 14ms/step -
accuracy: 0.7019 - loss: 0.5353 - val_accuracy: 0.7265 - val_loss: 0.5405
Epoch 495/1000
19/19              0s 14ms/step -
accuracy: 0.6968 - loss: 0.5380 - val_accuracy: 0.7179 - val_loss: 0.5403
Epoch 496/1000
19/19              0s 16ms/step -
accuracy: 0.6723 - loss: 0.5669 - val_accuracy: 0.7265 - val_loss: 0.5404
Epoch 497/1000
19/19              0s 13ms/step -
accuracy: 0.6732 - loss: 0.5576 - val_accuracy: 0.7265 - val_loss: 0.5404
Epoch 498/1000
19/19              0s 12ms/step -
accuracy: 0.7145 - loss: 0.5377 - val_accuracy: 0.7265 - val_loss: 0.5403
Epoch 499/1000
19/19              0s 14ms/step -
accuracy: 0.6840 - loss: 0.5413 - val_accuracy: 0.7265 - val_loss: 0.5406
Epoch 500/1000
19/19              0s 12ms/step -
accuracy: 0.6789 - loss: 0.5480 - val_accuracy: 0.7265 - val_loss: 0.5405
Epoch 501/1000
19/19              0s 13ms/step -
accuracy: 0.7394 - loss: 0.5168 - val_accuracy: 0.7265 - val_loss: 0.5401
Epoch 502/1000
19/19              0s 13ms/step -
accuracy: 0.7109 - loss: 0.5459 - val_accuracy: 0.7265 - val_loss: 0.5400
Epoch 503/1000
19/19              0s 14ms/step -
accuracy: 0.7153 - loss: 0.5345 - val_accuracy: 0.7265 - val_loss: 0.5399
Epoch 504/1000
19/19              0s 16ms/step -
accuracy: 0.6961 - loss: 0.5440 - val_accuracy: 0.7265 - val_loss: 0.5398
Epoch 505/1000
19/19              0s 14ms/step -
accuracy: 0.7115 - loss: 0.5156 - val_accuracy: 0.7179 - val_loss: 0.5396
Epoch 506/1000
19/19              0s 14ms/step -
accuracy: 0.7358 - loss: 0.5239 - val_accuracy: 0.7179 - val_loss: 0.5395
```

```
Epoch 507/1000
19/19              0s 13ms/step -
accuracy: 0.7098 - loss: 0.5173 - val_accuracy: 0.7179 - val_loss: 0.5394
Epoch 508/1000
19/19              0s 13ms/step -
accuracy: 0.6872 - loss: 0.5523 - val_accuracy: 0.7265 - val_loss: 0.5396
Epoch 509/1000
19/19              0s 13ms/step -
accuracy: 0.7099 - loss: 0.5368 - val_accuracy: 0.7179 - val_loss: 0.5393
Epoch 510/1000
19/19              0s 14ms/step -
accuracy: 0.7236 - loss: 0.5129 - val_accuracy: 0.7179 - val_loss: 0.5393
Epoch 511/1000
19/19              0s 13ms/step -
accuracy: 0.6840 - loss: 0.5561 - val_accuracy: 0.7179 - val_loss: 0.5392
Epoch 512/1000
19/19              0s 13ms/step -
accuracy: 0.6840 - loss: 0.5566 - val_accuracy: 0.7265 - val_loss: 0.5392
Epoch 513/1000
19/19              0s 13ms/step -
accuracy: 0.7099 - loss: 0.5386 - val_accuracy: 0.7179 - val_loss: 0.5390
Epoch 514/1000
19/19              0s 14ms/step -
accuracy: 0.7040 - loss: 0.5366 - val_accuracy: 0.7179 - val_loss: 0.5389
Epoch 515/1000
19/19              0s 14ms/step -
accuracy: 0.6896 - loss: 0.5455 - val_accuracy: 0.7265 - val_loss: 0.5392
Epoch 516/1000
19/19              0s 14ms/step -
accuracy: 0.7019 - loss: 0.5234 - val_accuracy: 0.7265 - val_loss: 0.5389
Epoch 517/1000
19/19              0s 16ms/step -
accuracy: 0.6985 - loss: 0.5463 - val_accuracy: 0.7265 - val_loss: 0.5388
Epoch 518/1000
19/19              0s 13ms/step -
accuracy: 0.7249 - loss: 0.5359 - val_accuracy: 0.7179 - val_loss: 0.5387
Epoch 519/1000
19/19              0s 14ms/step -
accuracy: 0.7115 - loss: 0.5463 - val_accuracy: 0.7265 - val_loss: 0.5387
Epoch 520/1000
19/19              0s 14ms/step -
accuracy: 0.7073 - loss: 0.5398 - val_accuracy: 0.7179 - val_loss: 0.5385
Epoch 521/1000
19/19              0s 14ms/step -
accuracy: 0.7445 - loss: 0.5030 - val_accuracy: 0.7179 - val_loss: 0.5382
Epoch 522/1000
19/19              0s 13ms/step -
accuracy: 0.7045 - loss: 0.5365 - val_accuracy: 0.7179 - val_loss: 0.5383
```

```
Epoch 523/1000
19/19              0s 16ms/step -
accuracy: 0.7210 - loss: 0.5212 - val_accuracy: 0.7179 - val_loss: 0.5383
Epoch 524/1000
19/19              0s 14ms/step -
accuracy: 0.7267 - loss: 0.5053 - val_accuracy: 0.7179 - val_loss: 0.5382
Epoch 525/1000
19/19              0s 15ms/step -
accuracy: 0.6334 - loss: 0.5963 - val_accuracy: 0.7265 - val_loss: 0.5387
Epoch 526/1000
19/19              0s 14ms/step -
accuracy: 0.6915 - loss: 0.5304 - val_accuracy: 0.7265 - val_loss: 0.5381
Epoch 527/1000
19/19              0s 13ms/step -
accuracy: 0.7116 - loss: 0.5303 - val_accuracy: 0.7179 - val_loss: 0.5380
Epoch 528/1000
19/19              0s 14ms/step -
accuracy: 0.6935 - loss: 0.5400 - val_accuracy: 0.7265 - val_loss: 0.5381
Epoch 529/1000
19/19              0s 14ms/step -
accuracy: 0.7003 - loss: 0.5331 - val_accuracy: 0.7265 - val_loss: 0.5380
Epoch 530/1000
19/19              0s 14ms/step -
accuracy: 0.7255 - loss: 0.5121 - val_accuracy: 0.7179 - val_loss: 0.5377
Epoch 531/1000
19/19              0s 15ms/step -
accuracy: 0.7294 - loss: 0.5059 - val_accuracy: 0.7265 - val_loss: 0.5378
Epoch 532/1000
19/19              0s 14ms/step -
accuracy: 0.7425 - loss: 0.5008 - val_accuracy: 0.7179 - val_loss: 0.5376
Epoch 533/1000
19/19              0s 14ms/step -
accuracy: 0.7171 - loss: 0.5320 - val_accuracy: 0.7179 - val_loss: 0.5375
Epoch 534/1000
19/19              0s 13ms/step -
accuracy: 0.6787 - loss: 0.5530 - val_accuracy: 0.7179 - val_loss: 0.5374
Epoch 535/1000
19/19              0s 13ms/step -
accuracy: 0.7313 - loss: 0.5174 - val_accuracy: 0.7179 - val_loss: 0.5368
Epoch 536/1000
19/19              0s 13ms/step -
accuracy: 0.7007 - loss: 0.5341 - val_accuracy: 0.7179 - val_loss: 0.5371
Epoch 537/1000
19/19              0s 13ms/step -
accuracy: 0.7321 - loss: 0.5075 - val_accuracy: 0.7179 - val_loss: 0.5370
Epoch 538/1000
19/19              0s 13ms/step -
accuracy: 0.7041 - loss: 0.5262 - val_accuracy: 0.7179 - val_loss: 0.5368
```

```
Epoch 539/1000
19/19              0s 14ms/step -
accuracy: 0.7157 - loss: 0.5263 - val_accuracy: 0.7179 - val_loss: 0.5368
Epoch 540/1000
19/19              0s 14ms/step -
accuracy: 0.7185 - loss: 0.5337 - val_accuracy: 0.7179 - val_loss: 0.5367
Epoch 541/1000
19/19              0s 14ms/step -
accuracy: 0.6850 - loss: 0.5416 - val_accuracy: 0.7179 - val_loss: 0.5367
Epoch 542/1000
19/19              0s 13ms/step -
accuracy: 0.6842 - loss: 0.5361 - val_accuracy: 0.7179 - val_loss: 0.5369
Epoch 543/1000
19/19              0s 14ms/step -
accuracy: 0.7230 - loss: 0.5186 - val_accuracy: 0.7179 - val_loss: 0.5365
Epoch 544/1000
19/19              0s 13ms/step -
accuracy: 0.6700 - loss: 0.5530 - val_accuracy: 0.7179 - val_loss: 0.5367
Epoch 545/1000
19/19              0s 16ms/step -
accuracy: 0.7171 - loss: 0.5130 - val_accuracy: 0.7179 - val_loss: 0.5365
Epoch 546/1000
19/19              0s 15ms/step -
accuracy: 0.7423 - loss: 0.4945 - val_accuracy: 0.7179 - val_loss: 0.5364
Epoch 547/1000
19/19              0s 16ms/step -
accuracy: 0.7251 - loss: 0.5227 - val_accuracy: 0.7179 - val_loss: 0.5362
Epoch 548/1000
19/19              0s 15ms/step -
accuracy: 0.6798 - loss: 0.5598 - val_accuracy: 0.7179 - val_loss: 0.5363
Epoch 549/1000
19/19              0s 14ms/step -
accuracy: 0.7113 - loss: 0.5322 - val_accuracy: 0.7179 - val_loss: 0.5362
Epoch 550/1000
19/19              0s 13ms/step -
accuracy: 0.6980 - loss: 0.5369 - val_accuracy: 0.7179 - val_loss: 0.5362
Epoch 551/1000
19/19              0s 14ms/step -
accuracy: 0.6958 - loss: 0.5148 - val_accuracy: 0.7179 - val_loss: 0.5364
Epoch 552/1000
19/19              0s 14ms/step -
accuracy: 0.7292 - loss: 0.5135 - val_accuracy: 0.7179 - val_loss: 0.5362
Epoch 553/1000
19/19              0s 14ms/step -
accuracy: 0.7109 - loss: 0.5204 - val_accuracy: 0.7179 - val_loss: 0.5362
Epoch 554/1000
19/19              0s 14ms/step -
accuracy: 0.6881 - loss: 0.5332 - val_accuracy: 0.7179 - val_loss: 0.5361
```

```
Epoch 555/1000
19/19              0s 16ms/step -
accuracy: 0.7126 - loss: 0.5197 - val_accuracy: 0.7179 - val_loss: 0.5358
Epoch 556/1000
19/19              0s 15ms/step -
accuracy: 0.7273 - loss: 0.5199 - val_accuracy: 0.7179 - val_loss: 0.5356
Epoch 557/1000
19/19              0s 14ms/step -
accuracy: 0.7067 - loss: 0.5229 - val_accuracy: 0.7179 - val_loss: 0.5354
Epoch 558/1000
19/19              0s 13ms/step -
accuracy: 0.7096 - loss: 0.5270 - val_accuracy: 0.7179 - val_loss: 0.5354
Epoch 559/1000
19/19              0s 13ms/step -
accuracy: 0.7046 - loss: 0.5402 - val_accuracy: 0.7179 - val_loss: 0.5353
Epoch 560/1000
19/19              0s 18ms/step -
accuracy: 0.6989 - loss: 0.5383 - val_accuracy: 0.7179 - val_loss: 0.5354
Epoch 561/1000
19/19              0s 13ms/step -
accuracy: 0.7050 - loss: 0.5214 - val_accuracy: 0.7179 - val_loss: 0.5353
Epoch 562/1000
19/19              0s 14ms/step -
accuracy: 0.7058 - loss: 0.5334 - val_accuracy: 0.7179 - val_loss: 0.5353
Epoch 563/1000
19/19              0s 13ms/step -
accuracy: 0.7362 - loss: 0.5027 - val_accuracy: 0.7179 - val_loss: 0.5351
Epoch 564/1000
19/19              0s 13ms/step -
accuracy: 0.7045 - loss: 0.5365 - val_accuracy: 0.7179 - val_loss: 0.5351
Epoch 565/1000
19/19              0s 15ms/step -
accuracy: 0.7386 - loss: 0.5134 - val_accuracy: 0.7179 - val_loss: 0.5347
Epoch 566/1000
19/19              0s 13ms/step -
accuracy: 0.7512 - loss: 0.4956 - val_accuracy: 0.7179 - val_loss: 0.5344
Epoch 567/1000
19/19              0s 16ms/step -
accuracy: 0.7245 - loss: 0.5171 - val_accuracy: 0.7179 - val_loss: 0.5344
Epoch 568/1000
19/19              0s 18ms/step -
accuracy: 0.7271 - loss: 0.5048 - val_accuracy: 0.7179 - val_loss: 0.5346
Epoch 569/1000
19/19              1s 14ms/step -
accuracy: 0.7180 - loss: 0.5376 - val_accuracy: 0.7179 - val_loss: 0.5345
Epoch 570/1000
19/19              0s 14ms/step -
accuracy: 0.7234 - loss: 0.5197 - val_accuracy: 0.7179 - val_loss: 0.5341
```

```
Epoch 571/1000
19/19                0s 14ms/step -
accuracy: 0.7304 - loss: 0.5123 - val_accuracy: 0.7179 - val_loss: 0.5340
Epoch 572/1000
19/19                0s 15ms/step -
accuracy: 0.7424 - loss: 0.4896 - val_accuracy: 0.7179 - val_loss: 0.5340
Epoch 573/1000
19/19                0s 16ms/step -
accuracy: 0.7055 - loss: 0.5470 - val_accuracy: 0.7179 - val_loss: 0.5342
Epoch 574/1000
19/19                0s 16ms/step -
accuracy: 0.7322 - loss: 0.5088 - val_accuracy: 0.7179 - val_loss: 0.5340
Epoch 575/1000
19/19                0s 16ms/step -
accuracy: 0.7227 - loss: 0.5183 - val_accuracy: 0.7179 - val_loss: 0.5341
Epoch 576/1000
19/19                0s 17ms/step -
accuracy: 0.7065 - loss: 0.5452 - val_accuracy: 0.7179 - val_loss: 0.5341
Epoch 577/1000
19/19                0s 14ms/step -
accuracy: 0.7224 - loss: 0.5186 - val_accuracy: 0.7179 - val_loss: 0.5339
Epoch 578/1000
19/19                0s 14ms/step -
accuracy: 0.7066 - loss: 0.5351 - val_accuracy: 0.7179 - val_loss: 0.5337
Epoch 579/1000
19/19                0s 14ms/step -
accuracy: 0.7028 - loss: 0.5371 - val_accuracy: 0.7179 - val_loss: 0.5339
Epoch 580/1000
19/19                0s 15ms/step -
accuracy: 0.6704 - loss: 0.5694 - val_accuracy: 0.7179 - val_loss: 0.5341
Epoch 581/1000
19/19                0s 14ms/step -
accuracy: 0.7154 - loss: 0.5282 - val_accuracy: 0.7179 - val_loss: 0.5341
Epoch 582/1000
19/19                0s 14ms/step -
accuracy: 0.6829 - loss: 0.5404 - val_accuracy: 0.7179 - val_loss: 0.5341
Epoch 583/1000
19/19                0s 14ms/step -
accuracy: 0.7087 - loss: 0.5279 - val_accuracy: 0.7179 - val_loss: 0.5336
Epoch 584/1000
19/19                0s 13ms/step -
accuracy: 0.7195 - loss: 0.5279 - val_accuracy: 0.7179 - val_loss: 0.5334
Epoch 585/1000
19/19                0s 13ms/step -
accuracy: 0.6945 - loss: 0.5285 - val_accuracy: 0.7179 - val_loss: 0.5332
Epoch 586/1000
19/19                0s 14ms/step -
accuracy: 0.6928 - loss: 0.5193 - val_accuracy: 0.7179 - val_loss: 0.5332
```

```
Epoch 587/1000
19/19              0s 14ms/step -
accuracy: 0.6930 - loss: 0.5281 - val_accuracy: 0.7179 - val_loss: 0.5333
Epoch 588/1000
19/19              0s 14ms/step -
accuracy: 0.6908 - loss: 0.5335 - val_accuracy: 0.7179 - val_loss: 0.5330
Epoch 589/1000
19/19              0s 14ms/step -
accuracy: 0.6940 - loss: 0.5441 - val_accuracy: 0.7179 - val_loss: 0.5331
Epoch 590/1000
19/19              0s 16ms/step -
accuracy: 0.7196 - loss: 0.5009 - val_accuracy: 0.7179 - val_loss: 0.5332
Epoch 591/1000
19/19              0s 14ms/step -
accuracy: 0.6989 - loss: 0.5325 - val_accuracy: 0.7179 - val_loss: 0.5331
Epoch 592/1000
19/19              0s 13ms/step -
accuracy: 0.7167 - loss: 0.5202 - val_accuracy: 0.7179 - val_loss: 0.5331
Epoch 593/1000
19/19              0s 13ms/step -
accuracy: 0.6941 - loss: 0.5566 - val_accuracy: 0.7179 - val_loss: 0.5330
Epoch 594/1000
19/19              0s 14ms/step -
accuracy: 0.7229 - loss: 0.5068 - val_accuracy: 0.7179 - val_loss: 0.5327
Epoch 595/1000
19/19              0s 13ms/step -
accuracy: 0.6964 - loss: 0.5205 - val_accuracy: 0.7179 - val_loss: 0.5327
Epoch 596/1000
19/19              0s 13ms/step -
accuracy: 0.7339 - loss: 0.5131 - val_accuracy: 0.7179 - val_loss: 0.5322
Epoch 597/1000
19/19              0s 14ms/step -
accuracy: 0.6910 - loss: 0.5508 - val_accuracy: 0.7179 - val_loss: 0.5324
Epoch 598/1000
19/19              0s 14ms/step -
accuracy: 0.7029 - loss: 0.5384 - val_accuracy: 0.7179 - val_loss: 0.5324
Epoch 599/1000
19/19              0s 14ms/step -
accuracy: 0.6952 - loss: 0.5470 - val_accuracy: 0.7179 - val_loss: 0.5322
Epoch 600/1000
19/19              0s 14ms/step -
accuracy: 0.6978 - loss: 0.5327 - val_accuracy: 0.7179 - val_loss: 0.5324
Epoch 601/1000
19/19              0s 14ms/step -
accuracy: 0.7086 - loss: 0.5289 - val_accuracy: 0.7179 - val_loss: 0.5321
Epoch 602/1000
19/19              0s 14ms/step -
accuracy: 0.6969 - loss: 0.5412 - val_accuracy: 0.7179 - val_loss: 0.5324
```

```
Epoch 603/1000
19/19              0s 14ms/step -
accuracy: 0.7336 - loss: 0.5114 - val_accuracy: 0.7179 - val_loss: 0.5319
Epoch 604/1000
19/19              0s 14ms/step -
accuracy: 0.7120 - loss: 0.5165 - val_accuracy: 0.7179 - val_loss: 0.5317
Epoch 605/1000
19/19              0s 13ms/step -
accuracy: 0.7302 - loss: 0.5015 - val_accuracy: 0.7179 - val_loss: 0.5315
Epoch 606/1000
19/19              0s 14ms/step -
accuracy: 0.7098 - loss: 0.5391 - val_accuracy: 0.7179 - val_loss: 0.5318
Epoch 607/1000
19/19              0s 13ms/step -
accuracy: 0.6976 - loss: 0.5498 - val_accuracy: 0.7179 - val_loss: 0.5318
Epoch 608/1000
19/19              0s 12ms/step -
accuracy: 0.6741 - loss: 0.5656 - val_accuracy: 0.7179 - val_loss: 0.5317
Epoch 609/1000
19/19              0s 13ms/step -
accuracy: 0.6978 - loss: 0.5334 - val_accuracy: 0.7179 - val_loss: 0.5319
Epoch 610/1000
19/19              0s 13ms/step -
accuracy: 0.7125 - loss: 0.5255 - val_accuracy: 0.7179 - val_loss: 0.5319
Epoch 611/1000
19/19              0s 13ms/step -
accuracy: 0.7503 - loss: 0.4812 - val_accuracy: 0.7179 - val_loss: 0.5312
Epoch 612/1000
19/19              0s 14ms/step -
accuracy: 0.6997 - loss: 0.5368 - val_accuracy: 0.7179 - val_loss: 0.5313
Epoch 613/1000
19/19              0s 14ms/step -
accuracy: 0.7241 - loss: 0.5137 - val_accuracy: 0.7179 - val_loss: 0.5313
Epoch 614/1000
19/19              0s 15ms/step -
accuracy: 0.6883 - loss: 0.5651 - val_accuracy: 0.7179 - val_loss: 0.5313
Epoch 615/1000
19/19              0s 15ms/step -
accuracy: 0.6810 - loss: 0.5507 - val_accuracy: 0.7179 - val_loss: 0.5315
Epoch 616/1000
19/19              0s 14ms/step -
accuracy: 0.7203 - loss: 0.5287 - val_accuracy: 0.7179 - val_loss: 0.5311
Epoch 617/1000
19/19              0s 14ms/step -
accuracy: 0.6989 - loss: 0.5439 - val_accuracy: 0.7179 - val_loss: 0.5311
Epoch 618/1000
19/19              0s 14ms/step -
accuracy: 0.6828 - loss: 0.5515 - val_accuracy: 0.7179 - val_loss: 0.5315
```

```
Epoch 619/1000
19/19              0s 14ms/step -
accuracy: 0.6896 - loss: 0.5464 - val_accuracy: 0.7179 - val_loss: 0.5310
Epoch 620/1000
19/19              0s 14ms/step -
accuracy: 0.7132 - loss: 0.5360 - val_accuracy: 0.7179 - val_loss: 0.5309
Epoch 621/1000
19/19              0s 14ms/step -
accuracy: 0.7157 - loss: 0.5277 - val_accuracy: 0.7179 - val_loss: 0.5308
Epoch 622/1000
19/19              0s 13ms/step -
accuracy: 0.7123 - loss: 0.5113 - val_accuracy: 0.7179 - val_loss: 0.5308
Epoch 623/1000
19/19              0s 17ms/step -
accuracy: 0.7013 - loss: 0.5188 - val_accuracy: 0.7179 - val_loss: 0.5307
Epoch 624/1000
19/19              0s 14ms/step -
accuracy: 0.6906 - loss: 0.5440 - val_accuracy: 0.7179 - val_loss: 0.5309
Epoch 625/1000
19/19              0s 14ms/step -
accuracy: 0.7083 - loss: 0.5170 - val_accuracy: 0.7179 - val_loss: 0.5308
Epoch 626/1000
19/19              0s 14ms/step -
accuracy: 0.7335 - loss: 0.5060 - val_accuracy: 0.7179 - val_loss: 0.5305
Epoch 627/1000
19/19              0s 13ms/step -
accuracy: 0.7430 - loss: 0.5102 - val_accuracy: 0.7179 - val_loss: 0.5302
Epoch 628/1000
19/19              0s 13ms/step -
accuracy: 0.6908 - loss: 0.5550 - val_accuracy: 0.7179 - val_loss: 0.5303
Epoch 629/1000
19/19              0s 14ms/step -
accuracy: 0.7369 - loss: 0.5126 - val_accuracy: 0.7179 - val_loss: 0.5303
Epoch 630/1000
19/19              0s 14ms/step -
accuracy: 0.7246 - loss: 0.5108 - val_accuracy: 0.7179 - val_loss: 0.5302
Epoch 631/1000
19/19              0s 16ms/step -
accuracy: 0.7169 - loss: 0.5320 - val_accuracy: 0.7179 - val_loss: 0.5299
Epoch 632/1000
19/19              0s 13ms/step -
accuracy: 0.7121 - loss: 0.5241 - val_accuracy: 0.7265 - val_loss: 0.5297
Epoch 633/1000
19/19              0s 14ms/step -
accuracy: 0.7158 - loss: 0.5131 - val_accuracy: 0.7179 - val_loss: 0.5300
Epoch 634/1000
19/19              0s 14ms/step -
accuracy: 0.6960 - loss: 0.5435 - val_accuracy: 0.7179 - val_loss: 0.5299
```

```
Epoch 635/1000
19/19              0s 13ms/step -
accuracy: 0.7093 - loss: 0.5358 - val_accuracy: 0.7179 - val_loss: 0.5302
Epoch 636/1000
19/19              0s 14ms/step -
accuracy: 0.7224 - loss: 0.4971 - val_accuracy: 0.7179 - val_loss: 0.5300
Epoch 637/1000
19/19              0s 13ms/step -
accuracy: 0.7182 - loss: 0.5088 - val_accuracy: 0.7179 - val_loss: 0.5300
Epoch 638/1000
19/19              0s 13ms/step -
accuracy: 0.7026 - loss: 0.5358 - val_accuracy: 0.7179 - val_loss: 0.5301
Epoch 639/1000
19/19              0s 13ms/step -
accuracy: 0.6957 - loss: 0.5280 - val_accuracy: 0.7179 - val_loss: 0.5297
Epoch 640/1000
19/19              0s 14ms/step -
accuracy: 0.7306 - loss: 0.5098 - val_accuracy: 0.7179 - val_loss: 0.5293
Epoch 641/1000
19/19              0s 14ms/step -
accuracy: 0.6997 - loss: 0.5186 - val_accuracy: 0.7179 - val_loss: 0.5294
Epoch 642/1000
19/19              0s 13ms/step -
accuracy: 0.6945 - loss: 0.5370 - val_accuracy: 0.7179 - val_loss: 0.5295
Epoch 643/1000
19/19              0s 14ms/step -
accuracy: 0.7220 - loss: 0.5201 - val_accuracy: 0.7179 - val_loss: 0.5293
Epoch 644/1000
19/19              0s 14ms/step -
accuracy: 0.7220 - loss: 0.5210 - val_accuracy: 0.7179 - val_loss: 0.5294
Epoch 645/1000
19/19              0s 12ms/step -
accuracy: 0.7371 - loss: 0.5007 - val_accuracy: 0.7265 - val_loss: 0.5290
Epoch 646/1000
19/19              0s 14ms/step -
accuracy: 0.7013 - loss: 0.5307 - val_accuracy: 0.7179 - val_loss: 0.5290
Epoch 647/1000
19/19              0s 12ms/step -
accuracy: 0.6683 - loss: 0.5417 - val_accuracy: 0.7179 - val_loss: 0.5293
Epoch 648/1000
19/19              0s 14ms/step -
accuracy: 0.7389 - loss: 0.4984 - val_accuracy: 0.7179 - val_loss: 0.5288
Epoch 649/1000
19/19              0s 15ms/step -
accuracy: 0.7026 - loss: 0.5227 - val_accuracy: 0.7179 - val_loss: 0.5289
Epoch 650/1000
19/19              0s 14ms/step -
accuracy: 0.6902 - loss: 0.5450 - val_accuracy: 0.7179 - val_loss: 0.5289
```

```
Epoch 651/1000
19/19              0s 15ms/step -
accuracy: 0.6957 - loss: 0.5313 - val_accuracy: 0.7179 - val_loss: 0.5291
Epoch 652/1000
19/19              0s 17ms/step -
accuracy: 0.7108 - loss: 0.5212 - val_accuracy: 0.7179 - val_loss: 0.5288
Epoch 653/1000
19/19              0s 14ms/step -
accuracy: 0.6869 - loss: 0.5259 - val_accuracy: 0.7179 - val_loss: 0.5288
Epoch 654/1000
19/19              0s 13ms/step -
accuracy: 0.7026 - loss: 0.5354 - val_accuracy: 0.7179 - val_loss: 0.5286
Epoch 655/1000
19/19              0s 13ms/step -
accuracy: 0.7162 - loss: 0.5139 - val_accuracy: 0.7265 - val_loss: 0.5284
Epoch 656/1000
19/19              0s 14ms/step -
accuracy: 0.7217 - loss: 0.5153 - val_accuracy: 0.7179 - val_loss: 0.5286
Epoch 657/1000
19/19              0s 14ms/step -
accuracy: 0.7210 - loss: 0.5165 - val_accuracy: 0.7179 - val_loss: 0.5285
Epoch 658/1000
19/19              0s 14ms/step -
accuracy: 0.7007 - loss: 0.5366 - val_accuracy: 0.7179 - val_loss: 0.5285
Epoch 659/1000
19/19              0s 13ms/step -
accuracy: 0.7123 - loss: 0.5189 - val_accuracy: 0.7179 - val_loss: 0.5282
Epoch 660/1000
19/19              0s 13ms/step -
accuracy: 0.7099 - loss: 0.5296 - val_accuracy: 0.7179 - val_loss: 0.5283
Epoch 661/1000
19/19              1s 14ms/step -
accuracy: 0.6849 - loss: 0.5465 - val_accuracy: 0.7179 - val_loss: 0.5282
Epoch 662/1000
19/19              0s 14ms/step -
accuracy: 0.7379 - loss: 0.4985 - val_accuracy: 0.7265 - val_loss: 0.5279
Epoch 663/1000
19/19              0s 14ms/step -
accuracy: 0.6805 - loss: 0.5467 - val_accuracy: 0.7179 - val_loss: 0.5280
Epoch 664/1000
19/19              0s 13ms/step -
accuracy: 0.7253 - loss: 0.5303 - val_accuracy: 0.7179 - val_loss: 0.5280
Epoch 665/1000
19/19              0s 13ms/step -
accuracy: 0.6870 - loss: 0.5273 - val_accuracy: 0.7179 - val_loss: 0.5281
Epoch 666/1000
19/19              0s 13ms/step -
accuracy: 0.7017 - loss: 0.5253 - val_accuracy: 0.7179 - val_loss: 0.5279
```

```
Epoch 667/1000
19/19              0s 13ms/step -
accuracy: 0.7232 - loss: 0.4977 - val_accuracy: 0.7179 - val_loss: 0.5279
Epoch 668/1000
19/19              1s 13ms/step -
accuracy: 0.7185 - loss: 0.5003 - val_accuracy: 0.7179 - val_loss: 0.5276
Epoch 669/1000
19/19              0s 14ms/step -
accuracy: 0.6867 - loss: 0.5350 - val_accuracy: 0.7265 - val_loss: 0.5275
Epoch 670/1000
19/19              0s 14ms/step -
accuracy: 0.7017 - loss: 0.5260 - val_accuracy: 0.7179 - val_loss: 0.5276
Epoch 671/1000
19/19              0s 14ms/step -
accuracy: 0.7082 - loss: 0.5445 - val_accuracy: 0.7179 - val_loss: 0.5275
Epoch 672/1000
19/19              0s 16ms/step -
accuracy: 0.7103 - loss: 0.5181 - val_accuracy: 0.7179 - val_loss: 0.5276
Epoch 673/1000
19/19              0s 19ms/step -
accuracy: 0.7239 - loss: 0.5104 - val_accuracy: 0.7179 - val_loss: 0.5274
Epoch 674/1000
19/19              0s 14ms/step -
accuracy: 0.7011 - loss: 0.5148 - val_accuracy: 0.7265 - val_loss: 0.5273
Epoch 675/1000
19/19              0s 14ms/step -
accuracy: 0.6980 - loss: 0.5306 - val_accuracy: 0.7179 - val_loss: 0.5277
Epoch 676/1000
19/19              0s 13ms/step -
accuracy: 0.7132 - loss: 0.5110 - val_accuracy: 0.7179 - val_loss: 0.5275
Epoch 677/1000
19/19              0s 14ms/step -
accuracy: 0.6822 - loss: 0.5616 - val_accuracy: 0.7179 - val_loss: 0.5277
Epoch 678/1000
19/19              0s 14ms/step -
accuracy: 0.7266 - loss: 0.5074 - val_accuracy: 0.7179 - val_loss: 0.5271
Epoch 679/1000
19/19              0s 14ms/step -
accuracy: 0.6882 - loss: 0.5408 - val_accuracy: 0.7179 - val_loss: 0.5273
Epoch 680/1000
19/19              0s 17ms/step -
accuracy: 0.6785 - loss: 0.5337 - val_accuracy: 0.7179 - val_loss: 0.5277
Epoch 681/1000
19/19              0s 13ms/step -
accuracy: 0.7236 - loss: 0.5174 - val_accuracy: 0.7179 - val_loss: 0.5272
Epoch 682/1000
19/19              0s 14ms/step -
accuracy: 0.7070 - loss: 0.5254 - val_accuracy: 0.7179 - val_loss: 0.5273
```

```
Epoch 683/1000
19/19              0s 13ms/step -
accuracy: 0.7188 - loss: 0.5099 - val_accuracy: 0.7179 - val_loss: 0.5270
Epoch 684/1000
19/19              0s 14ms/step -
accuracy: 0.7344 - loss: 0.5060 - val_accuracy: 0.7179 - val_loss: 0.5267
Epoch 685/1000
19/19              0s 14ms/step -
accuracy: 0.7460 - loss: 0.4968 - val_accuracy: 0.7265 - val_loss: 0.5265
Epoch 686/1000
19/19              0s 13ms/step -
accuracy: 0.6912 - loss: 0.5362 - val_accuracy: 0.7179 - val_loss: 0.5267
Epoch 687/1000
19/19              0s 16ms/step -
accuracy: 0.7129 - loss: 0.5029 - val_accuracy: 0.7179 - val_loss: 0.5267
Epoch 688/1000
19/19              0s 13ms/step -
accuracy: 0.6976 - loss: 0.5208 - val_accuracy: 0.7179 - val_loss: 0.5270
Epoch 689/1000
19/19              0s 13ms/step -
accuracy: 0.7209 - loss: 0.5079 - val_accuracy: 0.7179 - val_loss: 0.5271
Epoch 690/1000
19/19              0s 14ms/step -
accuracy: 0.7194 - loss: 0.4998 - val_accuracy: 0.7265 - val_loss: 0.5262
Epoch 691/1000
19/19              0s 13ms/step -
accuracy: 0.7175 - loss: 0.5196 - val_accuracy: 0.7179 - val_loss: 0.5264
Epoch 692/1000
19/19              0s 13ms/step -
accuracy: 0.7106 - loss: 0.5142 - val_accuracy: 0.7179 - val_loss: 0.5264
Epoch 693/1000
19/19              0s 12ms/step -
accuracy: 0.7263 - loss: 0.5013 - val_accuracy: 0.7179 - val_loss: 0.5262
Epoch 694/1000
19/19              0s 14ms/step -
accuracy: 0.7329 - loss: 0.5010 - val_accuracy: 0.7436 - val_loss: 0.5259
Epoch 695/1000
19/19              0s 13ms/step -
accuracy: 0.7202 - loss: 0.5153 - val_accuracy: 0.7436 - val_loss: 0.5259
Epoch 696/1000
19/19              0s 13ms/step -
accuracy: 0.7199 - loss: 0.5176 - val_accuracy: 0.7179 - val_loss: 0.5261
Epoch 697/1000
19/19              0s 14ms/step -
accuracy: 0.6805 - loss: 0.5496 - val_accuracy: 0.7179 - val_loss: 0.5261
Epoch 698/1000
19/19              0s 15ms/step -
accuracy: 0.6989 - loss: 0.5274 - val_accuracy: 0.7179 - val_loss: 0.5261
```

```
Epoch 699/1000
19/19              1s 14ms/step -
accuracy: 0.7311 - loss: 0.4940 - val_accuracy: 0.7436 - val_loss: 0.5256
Epoch 700/1000
19/19              0s 14ms/step -
accuracy: 0.6987 - loss: 0.5318 - val_accuracy: 0.7350 - val_loss: 0.5256
Epoch 701/1000
19/19              0s 14ms/step -
accuracy: 0.7228 - loss: 0.4981 - val_accuracy: 0.7265 - val_loss: 0.5257
Epoch 702/1000
19/19              0s 13ms/step -
accuracy: 0.6977 - loss: 0.5403 - val_accuracy: 0.7179 - val_loss: 0.5259
Epoch 703/1000
19/19              0s 14ms/step -
accuracy: 0.7023 - loss: 0.5221 - val_accuracy: 0.7265 - val_loss: 0.5256
Epoch 704/1000
19/19              0s 14ms/step -
accuracy: 0.7112 - loss: 0.5134 - val_accuracy: 0.7179 - val_loss: 0.5256
Epoch 705/1000
19/19              0s 17ms/step -
accuracy: 0.7015 - loss: 0.5352 - val_accuracy: 0.7179 - val_loss: 0.5258
Epoch 706/1000
19/19              0s 14ms/step -
accuracy: 0.6864 - loss: 0.5286 - val_accuracy: 0.7179 - val_loss: 0.5260
Epoch 707/1000
19/19              0s 14ms/step -
accuracy: 0.6830 - loss: 0.5451 - val_accuracy: 0.7179 - val_loss: 0.5263
Epoch 708/1000
19/19              0s 13ms/step -
accuracy: 0.7192 - loss: 0.5145 - val_accuracy: 0.7179 - val_loss: 0.5258
Epoch 709/1000
19/19              0s 15ms/step -
accuracy: 0.7244 - loss: 0.5066 - val_accuracy: 0.7350 - val_loss: 0.5252
Epoch 710/1000
19/19              0s 14ms/step -
accuracy: 0.6900 - loss: 0.5364 - val_accuracy: 0.7179 - val_loss: 0.5254
Epoch 711/1000
19/19              0s 17ms/step -
accuracy: 0.7071 - loss: 0.5206 - val_accuracy: 0.7179 - val_loss: 0.5254
Epoch 712/1000
19/19              0s 13ms/step -
accuracy: 0.7184 - loss: 0.5172 - val_accuracy: 0.7265 - val_loss: 0.5251
Epoch 713/1000
19/19              0s 16ms/step -
accuracy: 0.7250 - loss: 0.5201 - val_accuracy: 0.7436 - val_loss: 0.5250
Epoch 714/1000
19/19              0s 14ms/step -
accuracy: 0.6898 - loss: 0.5350 - val_accuracy: 0.7179 - val_loss: 0.5253
```

```
Epoch 715/1000
19/19          0s 16ms/step -
accuracy: 0.7113 - loss: 0.5194 - val_accuracy: 0.7265 - val_loss: 0.5249
Epoch 716/1000
19/19          0s 13ms/step -
accuracy: 0.7244 - loss: 0.4995 - val_accuracy: 0.7436 - val_loss: 0.5247
Epoch 717/1000
19/19          0s 15ms/step -
accuracy: 0.7167 - loss: 0.5075 - val_accuracy: 0.7179 - val_loss: 0.5252
Epoch 718/1000
19/19          0s 14ms/step -
accuracy: 0.7135 - loss: 0.5131 - val_accuracy: 0.7179 - val_loss: 0.5251
Epoch 719/1000
19/19          0s 14ms/step -
accuracy: 0.6802 - loss: 0.5345 - val_accuracy: 0.7179 - val_loss: 0.5251
Epoch 720/1000
19/19          0s 15ms/step -
accuracy: 0.7093 - loss: 0.5189 - val_accuracy: 0.7179 - val_loss: 0.5250
Epoch 721/1000
19/19          0s 14ms/step -
accuracy: 0.6825 - loss: 0.5277 - val_accuracy: 0.7179 - val_loss: 0.5250
Epoch 722/1000
19/19          0s 16ms/step -
accuracy: 0.7226 - loss: 0.5103 - val_accuracy: 0.7436 - val_loss: 0.5244
Epoch 723/1000
19/19          0s 13ms/step -
accuracy: 0.7335 - loss: 0.5097 - val_accuracy: 0.7436 - val_loss: 0.5243
Epoch 724/1000
19/19          0s 22ms/step -
accuracy: 0.7554 - loss: 0.4955 - val_accuracy: 0.7436 - val_loss: 0.5239
Epoch 725/1000
19/19          0s 14ms/step -
accuracy: 0.6928 - loss: 0.5260 - val_accuracy: 0.7436 - val_loss: 0.5240
Epoch 726/1000
19/19          0s 15ms/step -
accuracy: 0.7161 - loss: 0.5201 - val_accuracy: 0.7179 - val_loss: 0.5246
Epoch 727/1000
19/19          0s 15ms/step -
accuracy: 0.6842 - loss: 0.5376 - val_accuracy: 0.7179 - val_loss: 0.5249
Epoch 728/1000
19/19          0s 15ms/step -
accuracy: 0.7011 - loss: 0.5217 - val_accuracy: 0.7179 - val_loss: 0.5246
Epoch 729/1000
19/19          0s 14ms/step -
accuracy: 0.7091 - loss: 0.5257 - val_accuracy: 0.7179 - val_loss: 0.5245
Epoch 730/1000
19/19          0s 15ms/step -
accuracy: 0.7242 - loss: 0.5029 - val_accuracy: 0.7179 - val_loss: 0.5244
```

```
Epoch 731/1000
19/19          0s 14ms/step -
accuracy: 0.7113 - loss: 0.5080 - val_accuracy: 0.7179 - val_loss: 0.5242
Epoch 732/1000
19/19          0s 14ms/step -
accuracy: 0.7139 - loss: 0.5265 - val_accuracy: 0.7179 - val_loss: 0.5243
Epoch 733/1000
19/19          0s 14ms/step -
accuracy: 0.7270 - loss: 0.5013 - val_accuracy: 0.7436 - val_loss: 0.5240
Epoch 734/1000
19/19          0s 18ms/step -
accuracy: 0.7334 - loss: 0.4871 - val_accuracy: 0.7436 - val_loss: 0.5238
Epoch 735/1000
19/19          0s 13ms/step -
accuracy: 0.7094 - loss: 0.5194 - val_accuracy: 0.7436 - val_loss: 0.5237
Epoch 736/1000
19/19          0s 13ms/step -
accuracy: 0.7076 - loss: 0.5171 - val_accuracy: 0.7436 - val_loss: 0.5237
Epoch 737/1000
19/19          0s 13ms/step -
accuracy: 0.7461 - loss: 0.4901 - val_accuracy: 0.7436 - val_loss: 0.5234
Epoch 738/1000
19/19          0s 13ms/step -
accuracy: 0.7260 - loss: 0.5087 - val_accuracy: 0.7436 - val_loss: 0.5236
Epoch 739/1000
19/19          0s 13ms/step -
accuracy: 0.6919 - loss: 0.5395 - val_accuracy: 0.7179 - val_loss: 0.5242
Epoch 740/1000
19/19          0s 14ms/step -
accuracy: 0.7327 - loss: 0.5051 - val_accuracy: 0.7436 - val_loss: 0.5237
Epoch 741/1000
19/19          0s 14ms/step -
accuracy: 0.7225 - loss: 0.5015 - val_accuracy: 0.7436 - val_loss: 0.5235
Epoch 742/1000
19/19          0s 17ms/step -
accuracy: 0.7237 - loss: 0.4963 - val_accuracy: 0.7436 - val_loss: 0.5231
Epoch 743/1000
19/19          0s 14ms/step -
accuracy: 0.7242 - loss: 0.5200 - val_accuracy: 0.7436 - val_loss: 0.5233
Epoch 744/1000
19/19          0s 14ms/step -
accuracy: 0.7046 - loss: 0.5261 - val_accuracy: 0.7436 - val_loss: 0.5232
Epoch 745/1000
19/19          0s 13ms/step -
accuracy: 0.7097 - loss: 0.5285 - val_accuracy: 0.7436 - val_loss: 0.5231
Epoch 746/1000
19/19          0s 13ms/step -
accuracy: 0.7222 - loss: 0.5125 - val_accuracy: 0.7436 - val_loss: 0.5230
```

```
Epoch 747/1000
19/19              0s 13ms/step -
accuracy: 0.6980 - loss: 0.5042 - val_accuracy: 0.7436 - val_loss: 0.5233
Epoch 748/1000
19/19              0s 14ms/step -
accuracy: 0.7096 - loss: 0.5297 - val_accuracy: 0.7350 - val_loss: 0.5233
Epoch 749/1000
19/19              1s 13ms/step -
accuracy: 0.7029 - loss: 0.5216 - val_accuracy: 0.7350 - val_loss: 0.5234
Epoch 750/1000
19/19              0s 14ms/step -
accuracy: 0.7227 - loss: 0.5002 - val_accuracy: 0.7350 - val_loss: 0.5233
Epoch 751/1000
19/19              0s 13ms/step -
accuracy: 0.6818 - loss: 0.5429 - val_accuracy: 0.7179 - val_loss: 0.5234
Epoch 752/1000
19/19              0s 14ms/step -
accuracy: 0.7193 - loss: 0.5292 - val_accuracy: 0.7436 - val_loss: 0.5229
Epoch 753/1000
19/19              0s 14ms/step -
accuracy: 0.7176 - loss: 0.5105 - val_accuracy: 0.7436 - val_loss: 0.5228
Epoch 754/1000
19/19              0s 14ms/step -
accuracy: 0.7231 - loss: 0.5023 - val_accuracy: 0.7436 - val_loss: 0.5227
Epoch 755/1000
19/19              0s 13ms/step -
accuracy: 0.7091 - loss: 0.5361 - val_accuracy: 0.7436 - val_loss: 0.5229
Epoch 756/1000
19/19              0s 14ms/step -
accuracy: 0.7341 - loss: 0.5129 - val_accuracy: 0.7436 - val_loss: 0.5226
Epoch 757/1000
19/19              0s 13ms/step -
accuracy: 0.7177 - loss: 0.5095 - val_accuracy: 0.7436 - val_loss: 0.5227
Epoch 758/1000
19/19              0s 13ms/step -
accuracy: 0.6992 - loss: 0.5402 - val_accuracy: 0.7350 - val_loss: 0.5229
Epoch 759/1000
19/19              0s 14ms/step -
accuracy: 0.7315 - loss: 0.5044 - val_accuracy: 0.7436 - val_loss: 0.5224
Epoch 760/1000
19/19              0s 14ms/step -
accuracy: 0.7127 - loss: 0.5115 - val_accuracy: 0.7436 - val_loss: 0.5226
Epoch 761/1000
19/19              0s 14ms/step -
accuracy: 0.7146 - loss: 0.5067 - val_accuracy: 0.7436 - val_loss: 0.5224
Epoch 762/1000
19/19              0s 14ms/step -
accuracy: 0.6804 - loss: 0.5525 - val_accuracy: 0.7350 - val_loss: 0.5227
```

```
Epoch 763/1000
19/19              0s 14ms/step -
accuracy: 0.6870 - loss: 0.5356 - val_accuracy: 0.7350 - val_loss: 0.5226
Epoch 764/1000
19/19              0s 22ms/step -
accuracy: 0.7158 - loss: 0.5267 - val_accuracy: 0.7350 - val_loss: 0.5225
Epoch 765/1000
19/19              1s 15ms/step -
accuracy: 0.7182 - loss: 0.5135 - val_accuracy: 0.7436 - val_loss: 0.5221
Epoch 766/1000
19/19              0s 14ms/step -
accuracy: 0.7275 - loss: 0.4972 - val_accuracy: 0.7436 - val_loss: 0.5220
Epoch 767/1000
19/19              1s 15ms/step -
accuracy: 0.6953 - loss: 0.5273 - val_accuracy: 0.7436 - val_loss: 0.5223
Epoch 768/1000
19/19              0s 15ms/step -
accuracy: 0.7221 - loss: 0.5077 - val_accuracy: 0.7350 - val_loss: 0.5224
Epoch 769/1000
19/19              0s 13ms/step -
accuracy: 0.6961 - loss: 0.5211 - val_accuracy: 0.7179 - val_loss: 0.5226
Epoch 770/1000
19/19              0s 16ms/step -
accuracy: 0.7098 - loss: 0.5246 - val_accuracy: 0.7350 - val_loss: 0.5223
Epoch 771/1000
19/19              0s 17ms/step -
accuracy: 0.6988 - loss: 0.5371 - val_accuracy: 0.7436 - val_loss: 0.5221
Epoch 772/1000
19/19              0s 13ms/step -
accuracy: 0.7356 - loss: 0.4821 - val_accuracy: 0.7436 - val_loss: 0.5215
Epoch 773/1000
19/19              0s 13ms/step -
accuracy: 0.7172 - loss: 0.5254 - val_accuracy: 0.7436 - val_loss: 0.5218
Epoch 774/1000
19/19              0s 14ms/step -
accuracy: 0.7056 - loss: 0.5207 - val_accuracy: 0.7350 - val_loss: 0.5223
Epoch 775/1000
19/19              0s 15ms/step -
accuracy: 0.7298 - loss: 0.5009 - val_accuracy: 0.7436 - val_loss: 0.5219
Epoch 776/1000
19/19              0s 13ms/step -
accuracy: 0.6946 - loss: 0.5250 - val_accuracy: 0.7179 - val_loss: 0.5223
Epoch 777/1000
19/19              0s 13ms/step -
accuracy: 0.7096 - loss: 0.5093 - val_accuracy: 0.7350 - val_loss: 0.5221
Epoch 778/1000
19/19              0s 13ms/step -
accuracy: 0.7142 - loss: 0.5188 - val_accuracy: 0.7436 - val_loss: 0.5218
```

```
Epoch 779/1000
19/19            0s 13ms/step -
accuracy: 0.7261 - loss: 0.5023 - val_accuracy: 0.7436 - val_loss: 0.5216
Epoch 780/1000
19/19            0s 14ms/step -
accuracy: 0.7044 - loss: 0.5351 - val_accuracy: 0.7350 - val_loss: 0.5219
Epoch 781/1000
19/19            0s 16ms/step -
accuracy: 0.6773 - loss: 0.5655 - val_accuracy: 0.7179 - val_loss: 0.5221
Epoch 782/1000
19/19            1s 14ms/step -
accuracy: 0.7272 - loss: 0.5102 - val_accuracy: 0.7350 - val_loss: 0.5217
Epoch 783/1000
19/19            0s 14ms/step -
accuracy: 0.7145 - loss: 0.5074 - val_accuracy: 0.7350 - val_loss: 0.5217
Epoch 784/1000
19/19            0s 13ms/step -
accuracy: 0.7084 - loss: 0.5203 - val_accuracy: 0.7436 - val_loss: 0.5215
Epoch 785/1000
19/19            0s 12ms/step -
accuracy: 0.7246 - loss: 0.4973 - val_accuracy: 0.7350 - val_loss: 0.5215
Epoch 786/1000
19/19            0s 12ms/step -
accuracy: 0.6893 - loss: 0.5295 - val_accuracy: 0.7350 - val_loss: 0.5214
Epoch 787/1000
19/19            0s 12ms/step -
accuracy: 0.6920 - loss: 0.5380 - val_accuracy: 0.7350 - val_loss: 0.5216
Epoch 788/1000
19/19            0s 6ms/step -
accuracy: 0.7176 - loss: 0.5029 - val_accuracy: 0.7436 - val_loss: 0.5210
Epoch 789/1000
19/19            0s 10ms/step -
accuracy: 0.7300 - loss: 0.5110 - val_accuracy: 0.7436 - val_loss: 0.5210
Epoch 790/1000
19/19            0s 13ms/step -
accuracy: 0.7231 - loss: 0.5092 - val_accuracy: 0.7436 - val_loss: 0.5207
Epoch 791/1000
19/19            0s 13ms/step -
accuracy: 0.7215 - loss: 0.5209 - val_accuracy: 0.7436 - val_loss: 0.5207
Epoch 792/1000
19/19            0s 12ms/step -
accuracy: 0.6908 - loss: 0.5552 - val_accuracy: 0.7436 - val_loss: 0.5210
Epoch 793/1000
19/19            0s 13ms/step -
accuracy: 0.6898 - loss: 0.5278 - val_accuracy: 0.7350 - val_loss: 0.5211
Epoch 794/1000
19/19            0s 5ms/step -
accuracy: 0.7127 - loss: 0.5224 - val_accuracy: 0.7436 - val_loss: 0.5210
```

```
Epoch 795/1000
19/19              0s 13ms/step -
accuracy: 0.7155 - loss: 0.5101 - val_accuracy: 0.7350 - val_loss: 0.5213
Epoch 796/1000
19/19              0s 13ms/step -
accuracy: 0.7143 - loss: 0.5300 - val_accuracy: 0.7436 - val_loss: 0.5210
Epoch 797/1000
19/19              0s 12ms/step -
accuracy: 0.6886 - loss: 0.5594 - val_accuracy: 0.7350 - val_loss: 0.5210
Epoch 798/1000
19/19              0s 13ms/step -
accuracy: 0.7089 - loss: 0.5178 - val_accuracy: 0.7350 - val_loss: 0.5210
Epoch 799/1000
19/19              0s 14ms/step -
accuracy: 0.6963 - loss: 0.5252 - val_accuracy: 0.7350 - val_loss: 0.5213
Epoch 800/1000
19/19              0s 7ms/step -
accuracy: 0.7042 - loss: 0.5213 - val_accuracy: 0.7436 - val_loss: 0.5206
Epoch 801/1000
19/19              0s 11ms/step -
accuracy: 0.7072 - loss: 0.5431 - val_accuracy: 0.7436 - val_loss: 0.5207
Epoch 802/1000
19/19              0s 11ms/step -
accuracy: 0.7151 - loss: 0.5118 - val_accuracy: 0.7350 - val_loss: 0.5209
Epoch 803/1000
19/19              0s 12ms/step -
accuracy: 0.7163 - loss: 0.5259 - val_accuracy: 0.7436 - val_loss: 0.5205
Epoch 804/1000
19/19              0s 12ms/step -
accuracy: 0.7224 - loss: 0.5074 - val_accuracy: 0.7436 - val_loss: 0.5206
Epoch 805/1000
19/19              0s 11ms/step -
accuracy: 0.6960 - loss: 0.5340 - val_accuracy: 0.7436 - val_loss: 0.5204
Epoch 806/1000
19/19              0s 6ms/step -
accuracy: 0.7315 - loss: 0.5321 - val_accuracy: 0.7436 - val_loss: 0.5198
Epoch 807/1000
19/19              0s 8ms/step -
accuracy: 0.7141 - loss: 0.5008 - val_accuracy: 0.7436 - val_loss: 0.5197
Epoch 808/1000
19/19              0s 6ms/step -
accuracy: 0.7145 - loss: 0.5267 - val_accuracy: 0.7436 - val_loss: 0.5202
Epoch 809/1000
19/19              0s 11ms/step -
accuracy: 0.7077 - loss: 0.5329 - val_accuracy: 0.7436 - val_loss: 0.5202
Epoch 810/1000
19/19              0s 13ms/step -
accuracy: 0.7251 - loss: 0.4986 - val_accuracy: 0.7436 - val_loss: 0.5203
```

```
Epoch 811/1000
19/19              0s 11ms/step -
accuracy: 0.7377 - loss: 0.4905 - val_accuracy: 0.7436 - val_loss: 0.5202
Epoch 812/1000
19/19              0s 11ms/step -
accuracy: 0.7256 - loss: 0.5109 - val_accuracy: 0.7436 - val_loss: 0.5199
Epoch 813/1000
19/19              0s 13ms/step -
accuracy: 0.6959 - loss: 0.5534 - val_accuracy: 0.7436 - val_loss: 0.5200
Epoch 814/1000
19/19              0s 13ms/step -
accuracy: 0.6873 - loss: 0.5316 - val_accuracy: 0.7350 - val_loss: 0.5205
Epoch 815/1000
19/19              0s 13ms/step -
accuracy: 0.7002 - loss: 0.5495 - val_accuracy: 0.7436 - val_loss: 0.5198
Epoch 816/1000
19/19              0s 12ms/step -
accuracy: 0.7227 - loss: 0.5152 - val_accuracy: 0.7436 - val_loss: 0.5198
Epoch 817/1000
19/19              0s 13ms/step -
accuracy: 0.7416 - loss: 0.4950 - val_accuracy: 0.7436 - val_loss: 0.5199
Epoch 818/1000
19/19              0s 5ms/step -
accuracy: 0.7054 - loss: 0.5253 - val_accuracy: 0.7436 - val_loss: 0.5198
Epoch 819/1000
19/19              0s 11ms/step -
accuracy: 0.7172 - loss: 0.5290 - val_accuracy: 0.7436 - val_loss: 0.5198
Epoch 820/1000
19/19              0s 12ms/step -
accuracy: 0.6994 - loss: 0.5226 - val_accuracy: 0.7350 - val_loss: 0.5200
Epoch 821/1000
19/19              0s 13ms/step -
accuracy: 0.7116 - loss: 0.5051 - val_accuracy: 0.7436 - val_loss: 0.5198
Epoch 822/1000
19/19              0s 14ms/step -
accuracy: 0.6920 - loss: 0.5318 - val_accuracy: 0.7350 - val_loss: 0.5199
Epoch 823/1000
19/19              0s 13ms/step -
accuracy: 0.7249 - loss: 0.4964 - val_accuracy: 0.7350 - val_loss: 0.5200
Epoch 824/1000
19/19              0s 11ms/step -
accuracy: 0.7234 - loss: 0.5030 - val_accuracy: 0.7436 - val_loss: 0.5196
Epoch 825/1000
19/19              0s 13ms/step -
accuracy: 0.7134 - loss: 0.5182 - val_accuracy: 0.7436 - val_loss: 0.5197
Epoch 826/1000
19/19              0s 13ms/step -
accuracy: 0.7090 - loss: 0.5226 - val_accuracy: 0.7436 - val_loss: 0.5197
```

```
Epoch 827/1000
19/19              0s 13ms/step -
accuracy: 0.6925 - loss: 0.5249 - val_accuracy: 0.7350 - val_loss: 0.5199
Epoch 828/1000
19/19              0s 13ms/step -
accuracy: 0.7098 - loss: 0.5214 - val_accuracy: 0.7436 - val_loss: 0.5196
Epoch 829/1000
19/19              0s 5ms/step -
accuracy: 0.7417 - loss: 0.5194 - val_accuracy: 0.7436 - val_loss: 0.5192
Epoch 830/1000
19/19              0s 12ms/step -
accuracy: 0.7149 - loss: 0.5266 - val_accuracy: 0.7436 - val_loss: 0.5194
Epoch 831/1000
19/19              0s 7ms/step -
accuracy: 0.7043 - loss: 0.5346 - val_accuracy: 0.7436 - val_loss: 0.5194
Epoch 832/1000
19/19              0s 7ms/step -
accuracy: 0.7182 - loss: 0.5193 - val_accuracy: 0.7350 - val_loss: 0.5196
Epoch 833/1000
19/19              0s 11ms/step -
accuracy: 0.7024 - loss: 0.5262 - val_accuracy: 0.7350 - val_loss: 0.5195
Epoch 834/1000
19/19              0s 7ms/step -
accuracy: 0.6986 - loss: 0.5377 - val_accuracy: 0.7350 - val_loss: 0.5200
Epoch 835/1000
19/19              0s 7ms/step -
accuracy: 0.7159 - loss: 0.5196 - val_accuracy: 0.7350 - val_loss: 0.5197
Epoch 836/1000
19/19              0s 11ms/step -
accuracy: 0.7105 - loss: 0.5195 - val_accuracy: 0.7350 - val_loss: 0.5199
Epoch 837/1000
19/19              0s 11ms/step -
accuracy: 0.7078 - loss: 0.5022 - val_accuracy: 0.7350 - val_loss: 0.5198
Epoch 838/1000
19/19              0s 6ms/step -
accuracy: 0.6927 - loss: 0.5353 - val_accuracy: 0.7436 - val_loss: 0.5191
Epoch 839/1000
19/19              0s 6ms/step -
accuracy: 0.7224 - loss: 0.5182 - val_accuracy: 0.7436 - val_loss: 0.5188
Epoch 840/1000
19/19              0s 7ms/step -
accuracy: 0.6902 - loss: 0.5321 - val_accuracy: 0.7436 - val_loss: 0.5189
Epoch 841/1000
19/19              0s 10ms/step -
accuracy: 0.7243 - loss: 0.5087 - val_accuracy: 0.7436 - val_loss: 0.5186
Epoch 842/1000
19/19              0s 6ms/step -
accuracy: 0.7265 - loss: 0.5214 - val_accuracy: 0.7436 - val_loss: 0.5185
```

```
Epoch 843/1000
19/19              0s 6ms/step -
accuracy: 0.7316 - loss: 0.5143 - val_accuracy: 0.7436 - val_loss: 0.5185
Epoch 844/1000
19/19              0s 7ms/step -
accuracy: 0.7145 - loss: 0.5227 - val_accuracy: 0.7436 - val_loss: 0.5183
Epoch 845/1000
19/19              0s 7ms/step -
accuracy: 0.7364 - loss: 0.5066 - val_accuracy: 0.7436 - val_loss: 0.5182
Epoch 846/1000
19/19              0s 6ms/step -
accuracy: 0.7365 - loss: 0.5027 - val_accuracy: 0.7436 - val_loss: 0.5185
Epoch 847/1000
19/19              0s 11ms/step -
accuracy: 0.7343 - loss: 0.5109 - val_accuracy: 0.7436 - val_loss: 0.5182
Epoch 848/1000
19/19              0s 8ms/step -
accuracy: 0.7233 - loss: 0.5203 - val_accuracy: 0.7436 - val_loss: 0.5178
Epoch 849/1000
19/19              0s 6ms/step -
accuracy: 0.7266 - loss: 0.4977 - val_accuracy: 0.7436 - val_loss: 0.5180
Epoch 850/1000
19/19              0s 8ms/step -
accuracy: 0.7332 - loss: 0.4950 - val_accuracy: 0.7436 - val_loss: 0.5183
Epoch 851/1000
19/19              0s 12ms/step -
accuracy: 0.7204 - loss: 0.5128 - val_accuracy: 0.7436 - val_loss: 0.5186
Epoch 852/1000
19/19              0s 6ms/step -
accuracy: 0.7358 - loss: 0.4763 - val_accuracy: 0.7350 - val_loss: 0.5189
Epoch 853/1000
19/19              0s 6ms/step -
accuracy: 0.7322 - loss: 0.5074 - val_accuracy: 0.7436 - val_loss: 0.5180
Epoch 854/1000
19/19              0s 12ms/step -
accuracy: 0.7216 - loss: 0.4990 - val_accuracy: 0.7436 - val_loss: 0.5178
Epoch 855/1000
19/19              0s 8ms/step -
accuracy: 0.7320 - loss: 0.5122 - val_accuracy: 0.7436 - val_loss: 0.5177
Epoch 856/1000
19/19              0s 6ms/step -
accuracy: 0.7415 - loss: 0.4881 - val_accuracy: 0.7436 - val_loss: 0.5176
Epoch 857/1000
19/19              0s 11ms/step -
accuracy: 0.7273 - loss: 0.5092 - val_accuracy: 0.7436 - val_loss: 0.5181
Epoch 858/1000
19/19              0s 6ms/step -
accuracy: 0.6743 - loss: 0.5339 - val_accuracy: 0.7350 - val_loss: 0.5186
```

```
Epoch 859/1000
19/19              0s 9ms/step -
accuracy: 0.7128 - loss: 0.5115 - val_accuracy: 0.7436 - val_loss: 0.5182
Epoch 860/1000
19/19              0s 6ms/step -
accuracy: 0.7164 - loss: 0.5388 - val_accuracy: 0.7436 - val_loss: 0.5180
Epoch 861/1000
19/19              0s 14ms/step -
accuracy: 0.7085 - loss: 0.5238 - val_accuracy: 0.7436 - val_loss: 0.5181
Epoch 862/1000
19/19              0s 6ms/step -
accuracy: 0.7196 - loss: 0.5255 - val_accuracy: 0.7436 - val_loss: 0.5181
Epoch 863/1000
19/19              0s 11ms/step -
accuracy: 0.7199 - loss: 0.5051 - val_accuracy: 0.7436 - val_loss: 0.5178
Epoch 864/1000
19/19              0s 11ms/step -
accuracy: 0.7447 - loss: 0.4808 - val_accuracy: 0.7436 - val_loss: 0.5175
Epoch 865/1000
19/19              0s 16ms/step -
accuracy: 0.7410 - loss: 0.4915 - val_accuracy: 0.7436 - val_loss: 0.5178
Epoch 866/1000
19/19              0s 6ms/step -
accuracy: 0.7254 - loss: 0.5228 - val_accuracy: 0.7436 - val_loss: 0.5175
Epoch 867/1000
19/19              0s 7ms/step -
accuracy: 0.7132 - loss: 0.5220 - val_accuracy: 0.7436 - val_loss: 0.5179
Epoch 868/1000
19/19              0s 6ms/step -
accuracy: 0.6936 - loss: 0.5428 - val_accuracy: 0.7350 - val_loss: 0.5181
Epoch 869/1000
19/19              0s 9ms/step -
accuracy: 0.6863 - loss: 0.5424 - val_accuracy: 0.7350 - val_loss: 0.5181
Epoch 870/1000
19/19              0s 10ms/step -
accuracy: 0.7281 - loss: 0.5127 - val_accuracy: 0.7350 - val_loss: 0.5181
Epoch 871/1000
19/19              0s 7ms/step -
accuracy: 0.7154 - loss: 0.5199 - val_accuracy: 0.7436 - val_loss: 0.5177
Epoch 872/1000
19/19              0s 7ms/step -
accuracy: 0.7317 - loss: 0.5208 - val_accuracy: 0.7436 - val_loss: 0.5176
Epoch 873/1000
19/19              0s 6ms/step -
accuracy: 0.7314 - loss: 0.5016 - val_accuracy: 0.7436 - val_loss: 0.5178
Epoch 874/1000
19/19              0s 6ms/step -
accuracy: 0.7053 - loss: 0.5428 - val_accuracy: 0.7350 - val_loss: 0.5180
```

```
Epoch 875/1000
19/19              0s 7ms/step -
accuracy: 0.7127 - loss: 0.5095 - val_accuracy: 0.7436 - val_loss: 0.5176
Epoch 876/1000
19/19              0s 6ms/step -
accuracy: 0.7206 - loss: 0.5225 - val_accuracy: 0.7436 - val_loss: 0.5177
Epoch 877/1000
19/19              0s 6ms/step -
accuracy: 0.6958 - loss: 0.5227 - val_accuracy: 0.7350 - val_loss: 0.5179
Epoch 878/1000
19/19              0s 11ms/step -
accuracy: 0.7126 - loss: 0.5112 - val_accuracy: 0.7436 - val_loss: 0.5175
Epoch 879/1000
19/19              0s 7ms/step -
accuracy: 0.7348 - loss: 0.4946 - val_accuracy: 0.7436 - val_loss: 0.5170
Epoch 880/1000
19/19              0s 9ms/step -
accuracy: 0.7247 - loss: 0.4963 - val_accuracy: 0.7436 - val_loss: 0.5168
Epoch 881/1000
19/19              0s 8ms/step -
accuracy: 0.7130 - loss: 0.5153 - val_accuracy: 0.7436 - val_loss: 0.5168
Epoch 882/1000
19/19              0s 8ms/step -
accuracy: 0.7292 - loss: 0.5220 - val_accuracy: 0.7350 - val_loss: 0.5175
Epoch 883/1000
19/19              0s 7ms/step -
accuracy: 0.7246 - loss: 0.4952 - val_accuracy: 0.7436 - val_loss: 0.5173
Epoch 884/1000
19/19              0s 6ms/step -
accuracy: 0.7342 - loss: 0.5050 - val_accuracy: 0.7436 - val_loss: 0.5170
Epoch 885/1000
19/19              0s 6ms/step -
accuracy: 0.7092 - loss: 0.5215 - val_accuracy: 0.7436 - val_loss: 0.5169
Epoch 886/1000
19/19              0s 6ms/step -
accuracy: 0.7236 - loss: 0.5032 - val_accuracy: 0.7436 - val_loss: 0.5171
Epoch 887/1000
19/19              0s 7ms/step -
accuracy: 0.7209 - loss: 0.5071 - val_accuracy: 0.7436 - val_loss: 0.5169
Epoch 888/1000
19/19              0s 8ms/step -
accuracy: 0.7050 - loss: 0.5313 - val_accuracy: 0.7350 - val_loss: 0.5172
Epoch 889/1000
19/19              0s 7ms/step -
accuracy: 0.7243 - loss: 0.5189 - val_accuracy: 0.7436 - val_loss: 0.5171
Epoch 890/1000
19/19              0s 7ms/step -
accuracy: 0.6978 - loss: 0.5392 - val_accuracy: 0.7350 - val_loss: 0.5177
```

```
Epoch 891/1000
19/19              0s 7ms/step -
accuracy: 0.7250 - loss: 0.4973 - val_accuracy: 0.7350 - val_loss: 0.5171
Epoch 892/1000
19/19              0s 7ms/step -
accuracy: 0.6780 - loss: 0.5619 - val_accuracy: 0.7350 - val_loss: 0.5175
Epoch 893/1000
19/19              0s 6ms/step -
accuracy: 0.6990 - loss: 0.5388 - val_accuracy: 0.7350 - val_loss: 0.5175
Epoch 894/1000
19/19              0s 6ms/step -
accuracy: 0.7028 - loss: 0.5359 - val_accuracy: 0.7350 - val_loss: 0.5175
Epoch 895/1000
19/19              0s 10ms/step -
accuracy: 0.7266 - loss: 0.4955 - val_accuracy: 0.7350 - val_loss: 0.5171
Epoch 896/1000
19/19              0s 6ms/step -
accuracy: 0.7060 - loss: 0.5159 - val_accuracy: 0.7350 - val_loss: 0.5173
Epoch 897/1000
19/19              0s 6ms/step -
accuracy: 0.7299 - loss: 0.5100 - val_accuracy: 0.7436 - val_loss: 0.5166
Epoch 898/1000
19/19              0s 6ms/step -
accuracy: 0.7190 - loss: 0.5145 - val_accuracy: 0.7436 - val_loss: 0.5166
Epoch 899/1000
19/19              0s 8ms/step -
accuracy: 0.7062 - loss: 0.5336 - val_accuracy: 0.7350 - val_loss: 0.5169
Epoch 900/1000
19/19              0s 6ms/step -
accuracy: 0.7324 - loss: 0.5269 - val_accuracy: 0.7436 - val_loss: 0.5168
Epoch 901/1000
19/19              0s 7ms/step -
accuracy: 0.7252 - loss: 0.5259 - val_accuracy: 0.7436 - val_loss: 0.5166
Epoch 902/1000
19/19              0s 10ms/step -
accuracy: 0.7084 - loss: 0.5094 - val_accuracy: 0.7436 - val_loss: 0.5164
Epoch 903/1000
19/19              0s 8ms/step -
accuracy: 0.7096 - loss: 0.5399 - val_accuracy: 0.7436 - val_loss: 0.5166
Epoch 904/1000
19/19              0s 14ms/step -
accuracy: 0.7418 - loss: 0.4897 - val_accuracy: 0.7436 - val_loss: 0.5162
Epoch 905/1000
19/19              0s 10ms/step -
accuracy: 0.7039 - loss: 0.5306 - val_accuracy: 0.7436 - val_loss: 0.5163
Epoch 906/1000
19/19              0s 12ms/step -
accuracy: 0.7019 - loss: 0.5259 - val_accuracy: 0.7436 - val_loss: 0.5160
```

```
Epoch 907/1000
19/19              0s 9ms/step -
accuracy: 0.7108 - loss: 0.5393 - val_accuracy: 0.7436 - val_loss: 0.5161
Epoch 908/1000
19/19              0s 7ms/step -
accuracy: 0.7233 - loss: 0.5098 - val_accuracy: 0.7436 - val_loss: 0.5161
Epoch 909/1000
19/19              0s 13ms/step -
accuracy: 0.7126 - loss: 0.5261 - val_accuracy: 0.7436 - val_loss: 0.5160
Epoch 910/1000
19/19              0s 13ms/step -
accuracy: 0.7084 - loss: 0.5383 - val_accuracy: 0.7436 - val_loss: 0.5160
Epoch 911/1000
19/19              0s 13ms/step -
accuracy: 0.7450 - loss: 0.4823 - val_accuracy: 0.7436 - val_loss: 0.5156
Epoch 912/1000
19/19              0s 13ms/step -
accuracy: 0.7072 - loss: 0.5006 - val_accuracy: 0.7436 - val_loss: 0.5156
Epoch 913/1000
19/19              0s 13ms/step -
accuracy: 0.7270 - loss: 0.5204 - val_accuracy: 0.7436 - val_loss: 0.5159
Epoch 914/1000
19/19              0s 6ms/step -
accuracy: 0.7107 - loss: 0.5167 - val_accuracy: 0.7350 - val_loss: 0.5163
Epoch 915/1000
19/19              0s 13ms/step -
accuracy: 0.7122 - loss: 0.5210 - val_accuracy: 0.7436 - val_loss: 0.5157
Epoch 916/1000
19/19              0s 14ms/step -
accuracy: 0.7283 - loss: 0.4921 - val_accuracy: 0.7436 - val_loss: 0.5158
Epoch 917/1000
19/19              0s 13ms/step -
accuracy: 0.7283 - loss: 0.5244 - val_accuracy: 0.7350 - val_loss: 0.5161
Epoch 918/1000
19/19              0s 13ms/step -
accuracy: 0.7262 - loss: 0.5128 - val_accuracy: 0.7350 - val_loss: 0.5165
Epoch 919/1000
19/19              0s 13ms/step -
accuracy: 0.7282 - loss: 0.4993 - val_accuracy: 0.7436 - val_loss: 0.5159
Epoch 920/1000
19/19              0s 9ms/step -
accuracy: 0.7255 - loss: 0.5382 - val_accuracy: 0.7436 - val_loss: 0.5153
Epoch 921/1000
19/19              0s 13ms/step -
accuracy: 0.7485 - loss: 0.4985 - val_accuracy: 0.7436 - val_loss: 0.5155
Epoch 922/1000
19/19              0s 13ms/step -
accuracy: 0.7369 - loss: 0.5077 - val_accuracy: 0.7436 - val_loss: 0.5154
```

```
Epoch 923/1000
19/19              0s 12ms/step -
accuracy: 0.7045 - loss: 0.5158 - val_accuracy: 0.7436 - val_loss: 0.5157
Epoch 924/1000
19/19              0s 13ms/step -
accuracy: 0.7120 - loss: 0.5166 - val_accuracy: 0.7436 - val_loss: 0.5155
Epoch 925/1000
19/19              0s 11ms/step -
accuracy: 0.6984 - loss: 0.5267 - val_accuracy: 0.7436 - val_loss: 0.5154
Epoch 926/1000
19/19              0s 11ms/step -
accuracy: 0.7213 - loss: 0.5038 - val_accuracy: 0.7436 - val_loss: 0.5150
Epoch 927/1000
19/19              0s 13ms/step -
accuracy: 0.7343 - loss: 0.4984 - val_accuracy: 0.7436 - val_loss: 0.5150
Epoch 928/1000
19/19              0s 13ms/step -
accuracy: 0.7239 - loss: 0.5199 - val_accuracy: 0.7436 - val_loss: 0.5153
Epoch 929/1000
19/19              0s 14ms/step -
accuracy: 0.7328 - loss: 0.5158 - val_accuracy: 0.7436 - val_loss: 0.5150
Epoch 930/1000
19/19              0s 13ms/step -
accuracy: 0.7111 - loss: 0.5216 - val_accuracy: 0.7436 - val_loss: 0.5152
Epoch 931/1000
19/19              0s 11ms/step -
accuracy: 0.7501 - loss: 0.4757 - val_accuracy: 0.7436 - val_loss: 0.5155
Epoch 932/1000
19/19              0s 13ms/step -
accuracy: 0.7212 - loss: 0.4974 - val_accuracy: 0.7436 - val_loss: 0.5150
Epoch 933/1000
19/19              0s 13ms/step -
accuracy: 0.7343 - loss: 0.4862 - val_accuracy: 0.7436 - val_loss: 0.5149
Epoch 934/1000
19/19              0s 14ms/step -
accuracy: 0.7055 - loss: 0.5166 - val_accuracy: 0.7436 - val_loss: 0.5151
Epoch 935/1000
19/19              0s 13ms/step -
accuracy: 0.7182 - loss: 0.5183 - val_accuracy: 0.7436 - val_loss: 0.5150
Epoch 936/1000
19/19              0s 12ms/step -
accuracy: 0.6794 - loss: 0.5354 - val_accuracy: 0.7350 - val_loss: 0.5156
Epoch 937/1000
19/19              0s 6ms/step -
accuracy: 0.7147 - loss: 0.5013 - val_accuracy: 0.7350 - val_loss: 0.5155
Epoch 938/1000
19/19              0s 10ms/step -
accuracy: 0.7005 - loss: 0.5286 - val_accuracy: 0.7436 - val_loss: 0.5153
```

```
Epoch 939/1000
19/19          0s 13ms/step -
accuracy: 0.7148 - loss: 0.5135 - val_accuracy: 0.7436 - val_loss: 0.5148
Epoch 940/1000
19/19          0s 13ms/step -
accuracy: 0.7264 - loss: 0.5101 - val_accuracy: 0.7436 - val_loss: 0.5147
Epoch 941/1000
19/19          0s 13ms/step -
accuracy: 0.7198 - loss: 0.5240 - val_accuracy: 0.7436 - val_loss: 0.5146
Epoch 942/1000
19/19          0s 12ms/step -
accuracy: 0.6918 - loss: 0.5426 - val_accuracy: 0.7436 - val_loss: 0.5148
Epoch 943/1000
19/19          0s 12ms/step -
accuracy: 0.7259 - loss: 0.4894 - val_accuracy: 0.7436 - val_loss: 0.5148
Epoch 944/1000
19/19          0s 13ms/step -
accuracy: 0.6990 - loss: 0.5398 - val_accuracy: 0.7350 - val_loss: 0.5152
Epoch 945/1000
19/19          0s 13ms/step -
accuracy: 0.7228 - loss: 0.5031 - val_accuracy: 0.7350 - val_loss: 0.5152
Epoch 946/1000
19/19          0s 13ms/step -
accuracy: 0.7261 - loss: 0.5268 - val_accuracy: 0.7436 - val_loss: 0.5148
Epoch 947/1000
19/19          0s 12ms/step -
accuracy: 0.7138 - loss: 0.5150 - val_accuracy: 0.7436 - val_loss: 0.5148
Epoch 948/1000
19/19          0s 12ms/step -
accuracy: 0.7054 - loss: 0.5159 - val_accuracy: 0.7436 - val_loss: 0.5150
Epoch 949/1000
19/19          0s 13ms/step -
accuracy: 0.6945 - loss: 0.5190 - val_accuracy: 0.7436 - val_loss: 0.5149
Epoch 950/1000
19/19          0s 14ms/step -
accuracy: 0.7253 - loss: 0.5162 - val_accuracy: 0.7436 - val_loss: 0.5142
Epoch 951/1000
19/19          0s 13ms/step -
accuracy: 0.7197 - loss: 0.5064 - val_accuracy: 0.7436 - val_loss: 0.5146
Epoch 952/1000
19/19          0s 7ms/step -
accuracy: 0.7353 - loss: 0.5096 - val_accuracy: 0.7436 - val_loss: 0.5145
Epoch 953/1000
19/19          0s 14ms/step -
accuracy: 0.7303 - loss: 0.4896 - val_accuracy: 0.7436 - val_loss: 0.5140
Epoch 954/1000
19/19          0s 14ms/step -
accuracy: 0.7374 - loss: 0.5005 - val_accuracy: 0.7436 - val_loss: 0.5141
```

```
Epoch 955/1000
19/19                0s 13ms/step -
accuracy: 0.7205 - loss: 0.5183 - val_accuracy: 0.7436 - val_loss: 0.5146
Epoch 956/1000
19/19                0s 13ms/step -
accuracy: 0.6962 - loss: 0.5485 - val_accuracy: 0.7350 - val_loss: 0.5153
Epoch 957/1000
19/19                0s 12ms/step -
accuracy: 0.6994 - loss: 0.5194 - val_accuracy: 0.7350 - val_loss: 0.5155
Epoch 958/1000
19/19                0s 10ms/step -
accuracy: 0.6776 - loss: 0.5431 - val_accuracy: 0.7350 - val_loss: 0.5153
Epoch 959/1000
19/19                0s 14ms/step -
accuracy: 0.7028 - loss: 0.5208 - val_accuracy: 0.7350 - val_loss: 0.5150
Epoch 960/1000
19/19                0s 13ms/step -
accuracy: 0.7031 - loss: 0.5187 - val_accuracy: 0.7436 - val_loss: 0.5144
Epoch 961/1000
19/19                0s 12ms/step -
accuracy: 0.7114 - loss: 0.5433 - val_accuracy: 0.7436 - val_loss: 0.5143
Epoch 962/1000
19/19                0s 6ms/step -
accuracy: 0.7106 - loss: 0.5268 - val_accuracy: 0.7436 - val_loss: 0.5145
Epoch 963/1000
19/19                0s 8ms/step -
accuracy: 0.7290 - loss: 0.4956 - val_accuracy: 0.7436 - val_loss: 0.5140
Epoch 964/1000
19/19                0s 13ms/step -
accuracy: 0.7325 - loss: 0.5037 - val_accuracy: 0.7436 - val_loss: 0.5138
Epoch 965/1000
19/19                0s 13ms/step -
accuracy: 0.7653 - loss: 0.4667 - val_accuracy: 0.7436 - val_loss: 0.5134
Epoch 966/1000
19/19                0s 14ms/step -
accuracy: 0.7165 - loss: 0.5352 - val_accuracy: 0.7436 - val_loss: 0.5136
Epoch 967/1000
19/19                0s 13ms/step -
accuracy: 0.7206 - loss: 0.5175 - val_accuracy: 0.7436 - val_loss: 0.5138
Epoch 968/1000
19/19                0s 8ms/step -
accuracy: 0.7165 - loss: 0.5080 - val_accuracy: 0.7436 - val_loss: 0.5143
Epoch 969/1000
19/19                0s 13ms/step -
accuracy: 0.7084 - loss: 0.5244 - val_accuracy: 0.7436 - val_loss: 0.5142
Epoch 970/1000
19/19                0s 13ms/step -
accuracy: 0.6930 - loss: 0.5306 - val_accuracy: 0.7436 - val_loss: 0.5142
```

```
Epoch 971/1000
19/19          0s 13ms/step -
accuracy: 0.7188 - loss: 0.4987 - val_accuracy: 0.7436 - val_loss: 0.5142
Epoch 972/1000
19/19          0s 14ms/step -
accuracy: 0.7254 - loss: 0.5041 - val_accuracy: 0.7436 - val_loss: 0.5137
Epoch 973/1000
19/19          0s 11ms/step -
accuracy: 0.7099 - loss: 0.5318 - val_accuracy: 0.7436 - val_loss: 0.5137
Epoch 974/1000
19/19          0s 9ms/step -
accuracy: 0.7126 - loss: 0.5242 - val_accuracy: 0.7436 - val_loss: 0.5136
Epoch 975/1000
19/19          0s 13ms/step -
accuracy: 0.7376 - loss: 0.4972 - val_accuracy: 0.7436 - val_loss: 0.5138
Epoch 976/1000
19/19          0s 13ms/step -
accuracy: 0.7081 - loss: 0.5181 - val_accuracy: 0.7350 - val_loss: 0.5142
Epoch 977/1000
19/19          0s 13ms/step -
accuracy: 0.7311 - loss: 0.4944 - val_accuracy: 0.7350 - val_loss: 0.5141
Epoch 978/1000
19/19          0s 12ms/step -
accuracy: 0.7128 - loss: 0.5090 - val_accuracy: 0.7436 - val_loss: 0.5137
Epoch 979/1000
19/19          0s 13ms/step -
accuracy: 0.7023 - loss: 0.5412 - val_accuracy: 0.7436 - val_loss: 0.5138
Epoch 980/1000
19/19          0s 13ms/step -
accuracy: 0.7147 - loss: 0.5179 - val_accuracy: 0.7436 - val_loss: 0.5138
Epoch 981/1000
19/19          0s 13ms/step -
accuracy: 0.7421 - loss: 0.4893 - val_accuracy: 0.7436 - val_loss: 0.5132
Epoch 982/1000
19/19          0s 13ms/step -
accuracy: 0.7156 - loss: 0.5097 - val_accuracy: 0.7436 - val_loss: 0.5135
Epoch 983/1000
19/19          0s 6ms/step -
accuracy: 0.7374 - loss: 0.4880 - val_accuracy: 0.7436 - val_loss: 0.5133
Epoch 984/1000
19/19          0s 13ms/step -
accuracy: 0.7393 - loss: 0.4926 - val_accuracy: 0.7436 - val_loss: 0.5131
Epoch 985/1000
19/19          0s 13ms/step -
accuracy: 0.7130 - loss: 0.5311 - val_accuracy: 0.7436 - val_loss: 0.5133
Epoch 986/1000
19/19          0s 13ms/step -
accuracy: 0.7428 - loss: 0.4902 - val_accuracy: 0.7436 - val_loss: 0.5130
```

```
Epoch 987/1000
19/19              0s 13ms/step -
accuracy: 0.7348 - loss: 0.4978 - val_accuracy: 0.7436 - val_loss: 0.5131
Epoch 988/1000
19/19              0s 10ms/step -
accuracy: 0.7329 - loss: 0.5051 - val_accuracy: 0.7436 - val_loss: 0.5132
Epoch 989/1000
19/19              0s 12ms/step -
accuracy: 0.7167 - loss: 0.5102 - val_accuracy: 0.7436 - val_loss: 0.5132
Epoch 990/1000
19/19              0s 14ms/step -
accuracy: 0.7274 - loss: 0.5107 - val_accuracy: 0.7436 - val_loss: 0.5132
Epoch 991/1000
19/19              0s 12ms/step -
accuracy: 0.7110 - loss: 0.4990 - val_accuracy: 0.7436 - val_loss: 0.5132
Epoch 992/1000
19/19              0s 13ms/step -
accuracy: 0.7509 - loss: 0.4963 - val_accuracy: 0.7436 - val_loss: 0.5130
Epoch 993/1000
19/19              0s 8ms/step -
accuracy: 0.7343 - loss: 0.4907 - val_accuracy: 0.7436 - val_loss: 0.5132
Epoch 994/1000
19/19              0s 13ms/step -
accuracy: 0.7387 - loss: 0.4709 - val_accuracy: 0.7436 - val_loss: 0.5132
Epoch 995/1000
19/19              0s 13ms/step -
accuracy: 0.7162 - loss: 0.5087 - val_accuracy: 0.7436 - val_loss: 0.5133
Epoch 996/1000
19/19              0s 13ms/step -
accuracy: 0.7234 - loss: 0.5130 - val_accuracy: 0.7436 - val_loss: 0.5131
Epoch 997/1000
19/19              0s 13ms/step -
accuracy: 0.7056 - loss: 0.5122 - val_accuracy: 0.7350 - val_loss: 0.5134
Epoch 998/1000
19/19              0s 11ms/step -
accuracy: 0.7186 - loss: 0.5134 - val_accuracy: 0.7350 - val_loss: 0.5135
Epoch 999/1000
19/19              0s 12ms/step -
accuracy: 0.7158 - loss: 0.5044 - val_accuracy: 0.7436 - val_loss: 0.5131
Epoch 1000/1000
19/19              0s 14ms/step -
accuracy: 0.7423 - loss: 0.4960 - val_accuracy: 0.7436 - val_loss: 0.5126
```

```python
[22]: val_acc = history.history['val_accuracy'][-1]
      print(f"Final accuracy using Relu activation function {val_acc*100:.2f}%")
```

```
Final accuracy using Relu activation function 74.36%
```

```
[23]: plt.plot(history.history['accuracy'], label='Train Accuracy')
      plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
      plt.xlabel('Epochs')
      plt.ylabel('Accuracy')
      plt.title('Model Accuracy Over Epochs with relu activation')
      plt.legend()
      plt.show()
```
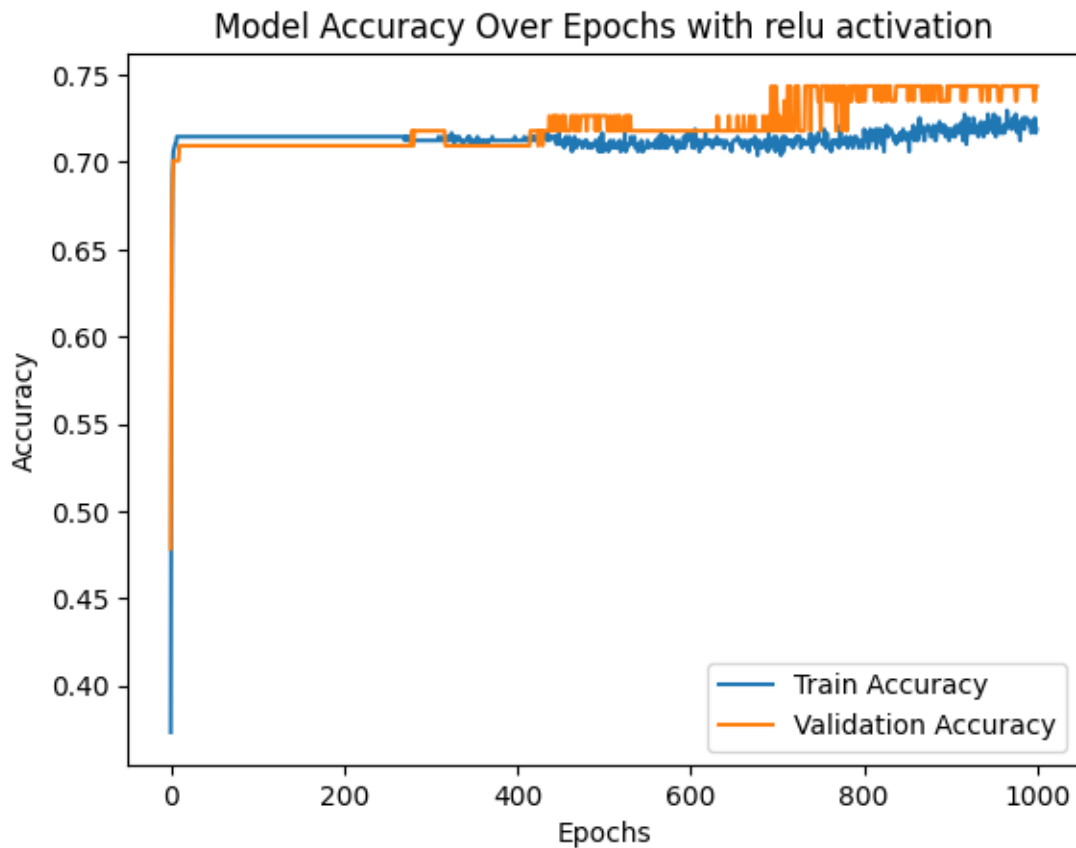

0.3.2 Using tanh activation, batch_size = 40 and 1000 epochs

```
[24]: model = Sequential()
      model.add(Dense(10, activation = 'tanh',input_shape = (9,)))
      model.add(Dense(1,activation = 'sigmoid'))
      model.summary()
      model.compile(loss = "BinaryCrossentropy", optimizer = "SGD", metrics =␣
       ↪["accuracy"])
      history = model.fit(x_train,y_train, batch_size=40, epochs = 1000, verbose=1,␣
       ↪validation_data=(x_test,y_test))
```

Model: "sequential_4"

Layer (type)	Output Shape	Param #
dense_6 (Dense)	(None, 10)	100
dense_7 (Dense)	(None, 1)	11

 Total params: 111 (444.00 B)

 Trainable params: 111 (444.00 B)

 Non-trainable params: 0 (0.00 B)

```
Epoch 1/1000
12/12          1s 29ms/step -
accuracy: 0.5882 - loss: 0.6841 - val_accuracy: 0.5726 - val_loss: 0.6780
Epoch 2/1000
12/12          0s 8ms/step -
accuracy: 0.5964 - loss: 0.6680 - val_accuracy: 0.6667 - val_loss: 0.6577
Epoch 3/1000
12/12          0s 15ms/step -
accuracy: 0.6155 - loss: 0.6498 - val_accuracy: 0.7009 - val_loss: 0.6423
Epoch 4/1000
12/12          0s 15ms/step -
accuracy: 0.6778 - loss: 0.6310 - val_accuracy: 0.6838 - val_loss: 0.6305
Epoch 5/1000
12/12          0s 22ms/step -
accuracy: 0.7049 - loss: 0.6135 - val_accuracy: 0.6752 - val_loss: 0.6214
Epoch 6/1000
12/12          0s 17ms/step -
accuracy: 0.7117 - loss: 0.5959 - val_accuracy: 0.6923 - val_loss: 0.6152
Epoch 7/1000
12/12          0s 20ms/step -
accuracy: 0.6886 - loss: 0.6063 - val_accuracy: 0.6923 - val_loss: 0.6101
Epoch 8/1000
12/12          0s 9ms/step -
accuracy: 0.6793 - loss: 0.6106 - val_accuracy: 0.7009 - val_loss: 0.6061
Epoch 9/1000
12/12          0s 18ms/step -
accuracy: 0.7144 - loss: 0.5891 - val_accuracy: 0.7009 - val_loss: 0.6030
Epoch 10/1000
12/12          0s 18ms/step -
accuracy: 0.7330 - loss: 0.5696 - val_accuracy: 0.7009 - val_loss: 0.6007
```

```
Epoch 11/1000
12/12              0s 19ms/step -
accuracy: 0.7156 - loss: 0.5852 - val_accuracy: 0.7009 - val_loss: 0.5989
Epoch 12/1000
12/12              0s 19ms/step -
accuracy: 0.6929 - loss: 0.5998 - val_accuracy: 0.7009 - val_loss: 0.5973
Epoch 13/1000
12/12              0s 16ms/step -
accuracy: 0.7047 - loss: 0.5914 - val_accuracy: 0.7009 - val_loss: 0.5961
Epoch 14/1000
12/12              0s 12ms/step -
accuracy: 0.6843 - loss: 0.5987 - val_accuracy: 0.7009 - val_loss: 0.5950
Epoch 15/1000
12/12              0s 17ms/step -
accuracy: 0.7222 - loss: 0.5733 - val_accuracy: 0.7009 - val_loss: 0.5942
Epoch 16/1000
12/12              0s 19ms/step -
accuracy: 0.7015 - loss: 0.5853 - val_accuracy: 0.7009 - val_loss: 0.5936
Epoch 17/1000
12/12              0s 17ms/step -
accuracy: 0.7192 - loss: 0.5759 - val_accuracy: 0.7009 - val_loss: 0.5931
Epoch 18/1000
12/12              0s 16ms/step -
accuracy: 0.7087 - loss: 0.5789 - val_accuracy: 0.7009 - val_loss: 0.5927
Epoch 19/1000
12/12              0s 19ms/step -
accuracy: 0.7054 - loss: 0.5834 - val_accuracy: 0.7009 - val_loss: 0.5923
Epoch 20/1000
12/12              0s 18ms/step -
accuracy: 0.7001 - loss: 0.5860 - val_accuracy: 0.7009 - val_loss: 0.5919
Epoch 21/1000
12/12              0s 18ms/step -
accuracy: 0.6720 - loss: 0.6120 - val_accuracy: 0.7009 - val_loss: 0.5916
Epoch 22/1000
12/12              0s 20ms/step -
accuracy: 0.7310 - loss: 0.5672 - val_accuracy: 0.7094 - val_loss: 0.5914
Epoch 23/1000
12/12              0s 19ms/step -
accuracy: 0.6926 - loss: 0.5867 - val_accuracy: 0.7094 - val_loss: 0.5911
Epoch 24/1000
12/12              0s 17ms/step -
accuracy: 0.7125 - loss: 0.5810 - val_accuracy: 0.7094 - val_loss: 0.5909
Epoch 25/1000
12/12              0s 18ms/step -
accuracy: 0.7172 - loss: 0.5730 - val_accuracy: 0.7094 - val_loss: 0.5907
Epoch 26/1000
12/12              0s 19ms/step -
accuracy: 0.6982 - loss: 0.5825 - val_accuracy: 0.7094 - val_loss: 0.5905
```

```
Epoch 27/1000
12/12              0s 22ms/step -
accuracy: 0.7290 - loss: 0.5573 - val_accuracy: 0.7094 - val_loss: 0.5903
Epoch 28/1000
12/12              0s 20ms/step -
accuracy: 0.7154 - loss: 0.5775 - val_accuracy: 0.7094 - val_loss: 0.5902
Epoch 29/1000
12/12              0s 18ms/step -
accuracy: 0.7308 - loss: 0.5648 - val_accuracy: 0.7094 - val_loss: 0.5900
Epoch 30/1000
12/12              0s 19ms/step -
accuracy: 0.7114 - loss: 0.5778 - val_accuracy: 0.7094 - val_loss: 0.5898
Epoch 31/1000
12/12              0s 20ms/step -
accuracy: 0.6942 - loss: 0.5921 - val_accuracy: 0.7094 - val_loss: 0.5896
Epoch 32/1000
12/12              0s 19ms/step -
accuracy: 0.7117 - loss: 0.5753 - val_accuracy: 0.7094 - val_loss: 0.5895
Epoch 33/1000
12/12              0s 19ms/step -
accuracy: 0.7209 - loss: 0.5691 - val_accuracy: 0.7094 - val_loss: 0.5893
Epoch 34/1000
12/12              0s 20ms/step -
accuracy: 0.7224 - loss: 0.5625 - val_accuracy: 0.7094 - val_loss: 0.5891
Epoch 35/1000
12/12              0s 19ms/step -
accuracy: 0.6878 - loss: 0.5916 - val_accuracy: 0.7094 - val_loss: 0.5889
Epoch 36/1000
12/12              0s 19ms/step -
accuracy: 0.6950 - loss: 0.5905 - val_accuracy: 0.7094 - val_loss: 0.5888
Epoch 37/1000
12/12              0s 21ms/step -
accuracy: 0.7141 - loss: 0.5760 - val_accuracy: 0.7094 - val_loss: 0.5886
Epoch 38/1000
12/12              0s 20ms/step -
accuracy: 0.7147 - loss: 0.5770 - val_accuracy: 0.7094 - val_loss: 0.5884
Epoch 39/1000
12/12              0s 18ms/step -
accuracy: 0.7042 - loss: 0.5860 - val_accuracy: 0.7094 - val_loss: 0.5883
Epoch 40/1000
12/12              0s 21ms/step -
accuracy: 0.7054 - loss: 0.5794 - val_accuracy: 0.7094 - val_loss: 0.5881
Epoch 41/1000
12/12              0s 20ms/step -
accuracy: 0.7032 - loss: 0.5748 - val_accuracy: 0.7094 - val_loss: 0.5880
Epoch 42/1000
12/12              0s 19ms/step -
accuracy: 0.7008 - loss: 0.5842 - val_accuracy: 0.7094 - val_loss: 0.5878
```

```
Epoch 43/1000
12/12            0s 20ms/step -
accuracy: 0.7123 - loss: 0.5670 - val_accuracy: 0.7094 - val_loss: 0.5876
Epoch 44/1000
12/12            0s 19ms/step -
accuracy: 0.7154 - loss: 0.5767 - val_accuracy: 0.7094 - val_loss: 0.5875
Epoch 45/1000
12/12            0s 20ms/step -
accuracy: 0.7018 - loss: 0.5783 - val_accuracy: 0.7094 - val_loss: 0.5873
Epoch 46/1000
12/12            0s 20ms/step -
accuracy: 0.6845 - loss: 0.6018 - val_accuracy: 0.7094 - val_loss: 0.5871
Epoch 47/1000
12/12            0s 18ms/step -
accuracy: 0.6923 - loss: 0.5876 - val_accuracy: 0.7094 - val_loss: 0.5870
Epoch 48/1000
12/12            0s 19ms/step -
accuracy: 0.7159 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5868
Epoch 49/1000
12/12            0s 18ms/step -
accuracy: 0.7068 - loss: 0.5723 - val_accuracy: 0.7094 - val_loss: 0.5867
Epoch 50/1000
12/12            0s 21ms/step -
accuracy: 0.7199 - loss: 0.5654 - val_accuracy: 0.7094 - val_loss: 0.5865
Epoch 51/1000
12/12            0s 20ms/step -
accuracy: 0.7225 - loss: 0.5658 - val_accuracy: 0.7094 - val_loss: 0.5864
Epoch 52/1000
12/12            0s 21ms/step -
accuracy: 0.7149 - loss: 0.5663 - val_accuracy: 0.7094 - val_loss: 0.5862
Epoch 53/1000
12/12            0s 18ms/step -
accuracy: 0.7013 - loss: 0.5769 - val_accuracy: 0.7094 - val_loss: 0.5860
Epoch 54/1000
12/12            0s 17ms/step -
accuracy: 0.7033 - loss: 0.5803 - val_accuracy: 0.7094 - val_loss: 0.5859
Epoch 55/1000
12/12            0s 23ms/step -
accuracy: 0.7214 - loss: 0.5663 - val_accuracy: 0.7094 - val_loss: 0.5857
Epoch 56/1000
12/12            0s 18ms/step -
accuracy: 0.6931 - loss: 0.5872 - val_accuracy: 0.7094 - val_loss: 0.5856
Epoch 57/1000
12/12            0s 18ms/step -
accuracy: 0.7229 - loss: 0.5692 - val_accuracy: 0.7094 - val_loss: 0.5854
Epoch 58/1000
12/12            0s 19ms/step -
accuracy: 0.7152 - loss: 0.5716 - val_accuracy: 0.7094 - val_loss: 0.5853
```

```
Epoch 59/1000
12/12              0s 20ms/step -
accuracy: 0.7169 - loss: 0.5722 - val_accuracy: 0.7094 - val_loss: 0.5851
Epoch 60/1000
12/12              0s 19ms/step -
accuracy: 0.7314 - loss: 0.5543 - val_accuracy: 0.7094 - val_loss: 0.5850
Epoch 61/1000
12/12              0s 19ms/step -
accuracy: 0.7259 - loss: 0.5620 - val_accuracy: 0.7094 - val_loss: 0.5848
Epoch 62/1000
12/12              0s 18ms/step -
accuracy: 0.6935 - loss: 0.5824 - val_accuracy: 0.7094 - val_loss: 0.5847
Epoch 63/1000
12/12              0s 20ms/step -
accuracy: 0.6964 - loss: 0.5856 - val_accuracy: 0.7094 - val_loss: 0.5845
Epoch 64/1000
12/12              0s 19ms/step -
accuracy: 0.7095 - loss: 0.5774 - val_accuracy: 0.7094 - val_loss: 0.5844
Epoch 65/1000
12/12              0s 18ms/step -
accuracy: 0.6956 - loss: 0.5950 - val_accuracy: 0.7094 - val_loss: 0.5842
Epoch 66/1000
12/12              0s 18ms/step -
accuracy: 0.7255 - loss: 0.5688 - val_accuracy: 0.7094 - val_loss: 0.5841
Epoch 67/1000
12/12              0s 19ms/step -
accuracy: 0.7067 - loss: 0.5679 - val_accuracy: 0.7094 - val_loss: 0.5839
Epoch 68/1000
12/12              0s 21ms/step -
accuracy: 0.6799 - loss: 0.6029 - val_accuracy: 0.7094 - val_loss: 0.5838
Epoch 69/1000
12/12              0s 17ms/step -
accuracy: 0.7102 - loss: 0.5707 - val_accuracy: 0.7094 - val_loss: 0.5837
Epoch 70/1000
12/12              0s 21ms/step -
accuracy: 0.7202 - loss: 0.5614 - val_accuracy: 0.7094 - val_loss: 0.5835
Epoch 71/1000
12/12              0s 25ms/step -
accuracy: 0.7202 - loss: 0.5738 - val_accuracy: 0.7094 - val_loss: 0.5833
Epoch 72/1000
12/12              0s 18ms/step -
accuracy: 0.7108 - loss: 0.5748 - val_accuracy: 0.7094 - val_loss: 0.5832
Epoch 73/1000
12/12              0s 18ms/step -
accuracy: 0.6823 - loss: 0.5958 - val_accuracy: 0.7094 - val_loss: 0.5831
Epoch 74/1000
12/12              0s 19ms/step -
accuracy: 0.7048 - loss: 0.5815 - val_accuracy: 0.7094 - val_loss: 0.5829
```

```
Epoch 75/1000
12/12              0s 20ms/step -
accuracy: 0.7326 - loss: 0.5562 - val_accuracy: 0.7094 - val_loss: 0.5828
Epoch 76/1000
12/12              0s 20ms/step -
accuracy: 0.7026 - loss: 0.5751 - val_accuracy: 0.7094 - val_loss: 0.5826
Epoch 77/1000
12/12              0s 19ms/step -
accuracy: 0.6957 - loss: 0.5844 - val_accuracy: 0.7094 - val_loss: 0.5825
Epoch 78/1000
12/12              1s 39ms/step -
accuracy: 0.7297 - loss: 0.5548 - val_accuracy: 0.7094 - val_loss: 0.5823
Epoch 79/1000
12/12              0s 19ms/step -
accuracy: 0.7038 - loss: 0.5808 - val_accuracy: 0.7094 - val_loss: 0.5822
Epoch 80/1000
12/12              0s 23ms/step -
accuracy: 0.7164 - loss: 0.5662 - val_accuracy: 0.7094 - val_loss: 0.5820
Epoch 81/1000
12/12              0s 19ms/step -
accuracy: 0.7378 - loss: 0.5469 - val_accuracy: 0.7094 - val_loss: 0.5819
Epoch 82/1000
12/12              0s 21ms/step -
accuracy: 0.7141 - loss: 0.5637 - val_accuracy: 0.7094 - val_loss: 0.5818
Epoch 83/1000
12/12              0s 18ms/step -
accuracy: 0.7236 - loss: 0.5569 - val_accuracy: 0.7094 - val_loss: 0.5816
Epoch 84/1000
12/12              0s 19ms/step -
accuracy: 0.7412 - loss: 0.5490 - val_accuracy: 0.7094 - val_loss: 0.5815
Epoch 85/1000
12/12              0s 17ms/step -
accuracy: 0.6986 - loss: 0.5865 - val_accuracy: 0.7094 - val_loss: 0.5813
Epoch 86/1000
12/12              0s 18ms/step -
accuracy: 0.7079 - loss: 0.5697 - val_accuracy: 0.7094 - val_loss: 0.5812
Epoch 87/1000
12/12              0s 17ms/step -
accuracy: 0.7196 - loss: 0.5644 - val_accuracy: 0.7094 - val_loss: 0.5811
Epoch 88/1000
12/12              0s 13ms/step -
accuracy: 0.7057 - loss: 0.5776 - val_accuracy: 0.7094 - val_loss: 0.5809
Epoch 89/1000
12/12              0s 14ms/step -
accuracy: 0.7106 - loss: 0.5760 - val_accuracy: 0.7094 - val_loss: 0.5808
Epoch 90/1000
12/12              0s 15ms/step -
accuracy: 0.7422 - loss: 0.5451 - val_accuracy: 0.7094 - val_loss: 0.5807
```

```
Epoch 91/1000
12/12              0s 17ms/step -
accuracy: 0.7329 - loss: 0.5437 - val_accuracy: 0.7094 - val_loss: 0.5805
Epoch 92/1000
12/12              0s 18ms/step -
accuracy: 0.7304 - loss: 0.5513 - val_accuracy: 0.7094 - val_loss: 0.5804
Epoch 93/1000
12/12              0s 19ms/step -
accuracy: 0.7163 - loss: 0.5718 - val_accuracy: 0.7094 - val_loss: 0.5802
Epoch 94/1000
12/12              0s 16ms/step -
accuracy: 0.7233 - loss: 0.5559 - val_accuracy: 0.7094 - val_loss: 0.5801
Epoch 95/1000
12/12              0s 18ms/step -
accuracy: 0.7052 - loss: 0.5703 - val_accuracy: 0.7094 - val_loss: 0.5800
Epoch 96/1000
12/12              0s 17ms/step -
accuracy: 0.7244 - loss: 0.5609 - val_accuracy: 0.7094 - val_loss: 0.5798
Epoch 97/1000
12/12              0s 19ms/step -
accuracy: 0.7227 - loss: 0.5568 - val_accuracy: 0.7094 - val_loss: 0.5797
Epoch 98/1000
12/12              0s 17ms/step -
accuracy: 0.6940 - loss: 0.5848 - val_accuracy: 0.7094 - val_loss: 0.5796
Epoch 99/1000
12/12              0s 19ms/step -
accuracy: 0.7396 - loss: 0.5445 - val_accuracy: 0.7094 - val_loss: 0.5795
Epoch 100/1000
12/12              0s 9ms/step -
accuracy: 0.7120 - loss: 0.5652 - val_accuracy: 0.7094 - val_loss: 0.5794
Epoch 101/1000
12/12              0s 8ms/step -
accuracy: 0.7094 - loss: 0.5699 - val_accuracy: 0.7094 - val_loss: 0.5792
Epoch 102/1000
12/12              0s 11ms/step -
accuracy: 0.7166 - loss: 0.5687 - val_accuracy: 0.7094 - val_loss: 0.5791
Epoch 103/1000
12/12              0s 17ms/step -
accuracy: 0.7418 - loss: 0.5482 - val_accuracy: 0.7094 - val_loss: 0.5789
Epoch 104/1000
12/12              0s 18ms/step -
accuracy: 0.7137 - loss: 0.5638 - val_accuracy: 0.7094 - val_loss: 0.5788
Epoch 105/1000
12/12              0s 11ms/step -
accuracy: 0.7125 - loss: 0.5647 - val_accuracy: 0.7094 - val_loss: 0.5787
Epoch 106/1000
12/12              0s 17ms/step -
accuracy: 0.7116 - loss: 0.5742 - val_accuracy: 0.7094 - val_loss: 0.5786
```

```
Epoch 107/1000
12/12              0s 17ms/step -
accuracy: 0.7342 - loss: 0.5403 - val_accuracy: 0.7094 - val_loss: 0.5784
Epoch 108/1000
12/12              0s 17ms/step -
accuracy: 0.7065 - loss: 0.5720 - val_accuracy: 0.7094 - val_loss: 0.5783
Epoch 109/1000
12/12              0s 18ms/step -
accuracy: 0.7440 - loss: 0.5448 - val_accuracy: 0.7094 - val_loss: 0.5782
Epoch 110/1000
12/12              0s 15ms/step -
accuracy: 0.7229 - loss: 0.5614 - val_accuracy: 0.7094 - val_loss: 0.5780
Epoch 111/1000
12/12              0s 16ms/step -
accuracy: 0.7035 - loss: 0.5748 - val_accuracy: 0.7094 - val_loss: 0.5779
Epoch 112/1000
12/12              0s 13ms/step -
accuracy: 0.7394 - loss: 0.5463 - val_accuracy: 0.7094 - val_loss: 0.5778
Epoch 113/1000
12/12              0s 23ms/step -
accuracy: 0.7137 - loss: 0.5659 - val_accuracy: 0.7094 - val_loss: 0.5777
Epoch 114/1000
12/12              0s 10ms/step -
accuracy: 0.6999 - loss: 0.5716 - val_accuracy: 0.7094 - val_loss: 0.5776
Epoch 115/1000
12/12              0s 18ms/step -
accuracy: 0.7293 - loss: 0.5435 - val_accuracy: 0.7094 - val_loss: 0.5774
Epoch 116/1000
12/12              0s 18ms/step -
accuracy: 0.7324 - loss: 0.5528 - val_accuracy: 0.7094 - val_loss: 0.5773
Epoch 117/1000
12/12              0s 15ms/step -
accuracy: 0.7033 - loss: 0.5745 - val_accuracy: 0.7094 - val_loss: 0.5772
Epoch 118/1000
12/12              0s 19ms/step -
accuracy: 0.7162 - loss: 0.5614 - val_accuracy: 0.7094 - val_loss: 0.5771
Epoch 119/1000
12/12              0s 27ms/step -
accuracy: 0.7384 - loss: 0.5389 - val_accuracy: 0.7094 - val_loss: 0.5770
Epoch 120/1000
12/12              0s 14ms/step -
accuracy: 0.7021 - loss: 0.5812 - val_accuracy: 0.7094 - val_loss: 0.5768
Epoch 121/1000
12/12              0s 18ms/step -
accuracy: 0.6727 - loss: 0.5976 - val_accuracy: 0.7094 - val_loss: 0.5767
Epoch 122/1000
12/12              0s 32ms/step -
accuracy: 0.7056 - loss: 0.5703 - val_accuracy: 0.7094 - val_loss: 0.5766
```

```
Epoch 123/1000
12/12              0s 16ms/step -
accuracy: 0.6931 - loss: 0.5838 - val_accuracy: 0.7094 - val_loss: 0.5765
Epoch 124/1000
12/12              0s 19ms/step -
accuracy: 0.7041 - loss: 0.5732 - val_accuracy: 0.7094 - val_loss: 0.5764
Epoch 125/1000
12/12              0s 19ms/step -
accuracy: 0.7313 - loss: 0.5496 - val_accuracy: 0.7094 - val_loss: 0.5763
Epoch 126/1000
12/12              0s 22ms/step -
accuracy: 0.7130 - loss: 0.5653 - val_accuracy: 0.7094 - val_loss: 0.5762
Epoch 127/1000
12/12              0s 20ms/step -
accuracy: 0.6849 - loss: 0.5912 - val_accuracy: 0.7094 - val_loss: 0.5760
Epoch 128/1000
12/12              0s 20ms/step -
accuracy: 0.7190 - loss: 0.5490 - val_accuracy: 0.7094 - val_loss: 0.5759
Epoch 129/1000
12/12              0s 19ms/step -
accuracy: 0.7136 - loss: 0.5646 - val_accuracy: 0.7094 - val_loss: 0.5758
Epoch 130/1000
12/12              0s 20ms/step -
accuracy: 0.7158 - loss: 0.5635 - val_accuracy: 0.7094 - val_loss: 0.5756
Epoch 131/1000
12/12              0s 20ms/step -
accuracy: 0.7264 - loss: 0.5482 - val_accuracy: 0.7094 - val_loss: 0.5755
Epoch 132/1000
12/12              0s 19ms/step -
accuracy: 0.6877 - loss: 0.5866 - val_accuracy: 0.7094 - val_loss: 0.5754
Epoch 133/1000
12/12              0s 19ms/step -
accuracy: 0.6971 - loss: 0.5692 - val_accuracy: 0.7094 - val_loss: 0.5753
Epoch 134/1000
12/12              0s 20ms/step -
accuracy: 0.7145 - loss: 0.5637 - val_accuracy: 0.7094 - val_loss: 0.5752
Epoch 135/1000
12/12              0s 18ms/step -
accuracy: 0.7416 - loss: 0.5368 - val_accuracy: 0.7094 - val_loss: 0.5751
Epoch 136/1000
12/12              0s 17ms/step -
accuracy: 0.6988 - loss: 0.5710 - val_accuracy: 0.7094 - val_loss: 0.5750
Epoch 137/1000
12/12              0s 19ms/step -
accuracy: 0.7123 - loss: 0.5615 - val_accuracy: 0.7094 - val_loss: 0.5748
Epoch 138/1000
12/12              0s 19ms/step -
accuracy: 0.7155 - loss: 0.5692 - val_accuracy: 0.7094 - val_loss: 0.5747
```

```
Epoch 139/1000
12/12            0s 19ms/step -
accuracy: 0.7002 - loss: 0.5613 - val_accuracy: 0.7094 - val_loss: 0.5746
Epoch 140/1000
12/12            0s 18ms/step -
accuracy: 0.7250 - loss: 0.5466 - val_accuracy: 0.7094 - val_loss: 0.5745
Epoch 141/1000
12/12            0s 19ms/step -
accuracy: 0.7099 - loss: 0.5734 - val_accuracy: 0.7094 - val_loss: 0.5744
Epoch 142/1000
12/12            0s 18ms/step -
accuracy: 0.7168 - loss: 0.5668 - val_accuracy: 0.7094 - val_loss: 0.5743
Epoch 143/1000
12/12            0s 19ms/step -
accuracy: 0.7142 - loss: 0.5613 - val_accuracy: 0.7094 - val_loss: 0.5742
Epoch 144/1000
12/12            0s 20ms/step -
accuracy: 0.7347 - loss: 0.5357 - val_accuracy: 0.7094 - val_loss: 0.5741
Epoch 145/1000
12/12            0s 20ms/step -
accuracy: 0.7083 - loss: 0.5645 - val_accuracy: 0.7094 - val_loss: 0.5740
Epoch 146/1000
12/12            0s 21ms/step -
accuracy: 0.7312 - loss: 0.5560 - val_accuracy: 0.7094 - val_loss: 0.5738
Epoch 147/1000
12/12            0s 19ms/step -
accuracy: 0.7006 - loss: 0.5618 - val_accuracy: 0.7094 - val_loss: 0.5737
Epoch 148/1000
12/12            0s 20ms/step -
accuracy: 0.6851 - loss: 0.5880 - val_accuracy: 0.7094 - val_loss: 0.5736
Epoch 149/1000
12/12            0s 18ms/step -
accuracy: 0.7100 - loss: 0.5642 - val_accuracy: 0.7094 - val_loss: 0.5735
Epoch 150/1000
12/12            0s 28ms/step -
accuracy: 0.7273 - loss: 0.5496 - val_accuracy: 0.7094 - val_loss: 0.5734
Epoch 151/1000
12/12            0s 24ms/step -
accuracy: 0.7407 - loss: 0.5390 - val_accuracy: 0.7094 - val_loss: 0.5733
Epoch 152/1000
12/12            0s 21ms/step -
accuracy: 0.7256 - loss: 0.5525 - val_accuracy: 0.7094 - val_loss: 0.5731
Epoch 153/1000
12/12            0s 20ms/step -
accuracy: 0.7121 - loss: 0.5678 - val_accuracy: 0.7094 - val_loss: 0.5731
Epoch 154/1000
12/12            0s 22ms/step -
accuracy: 0.7203 - loss: 0.5521 - val_accuracy: 0.7094 - val_loss: 0.5730
```

```
Epoch 155/1000
12/12              0s 18ms/step -
accuracy: 0.7158 - loss: 0.5576 - val_accuracy: 0.7094 - val_loss: 0.5728
Epoch 156/1000
12/12              0s 23ms/step -
accuracy: 0.7244 - loss: 0.5542 - val_accuracy: 0.7094 - val_loss: 0.5727
Epoch 157/1000
12/12              0s 20ms/step -
accuracy: 0.7055 - loss: 0.5654 - val_accuracy: 0.7094 - val_loss: 0.5726
Epoch 158/1000
12/12              0s 17ms/step -
accuracy: 0.7174 - loss: 0.5613 - val_accuracy: 0.7094 - val_loss: 0.5725
Epoch 159/1000
12/12              0s 19ms/step -
accuracy: 0.7112 - loss: 0.5635 - val_accuracy: 0.7094 - val_loss: 0.5724
Epoch 160/1000
12/12              0s 18ms/step -
accuracy: 0.7446 - loss: 0.5349 - val_accuracy: 0.7094 - val_loss: 0.5723
Epoch 161/1000
12/12              0s 20ms/step -
accuracy: 0.7130 - loss: 0.5664 - val_accuracy: 0.7094 - val_loss: 0.5722
Epoch 162/1000
12/12              0s 17ms/step -
accuracy: 0.7076 - loss: 0.5656 - val_accuracy: 0.7094 - val_loss: 0.5721
Epoch 163/1000
12/12              0s 18ms/step -
accuracy: 0.6902 - loss: 0.5761 - val_accuracy: 0.7094 - val_loss: 0.5720
Epoch 164/1000
12/12              0s 14ms/step -
accuracy: 0.7390 - loss: 0.5414 - val_accuracy: 0.7094 - val_loss: 0.5719
Epoch 165/1000
12/12              0s 18ms/step -
accuracy: 0.7297 - loss: 0.5466 - val_accuracy: 0.7094 - val_loss: 0.5718
Epoch 166/1000
12/12              0s 17ms/step -
accuracy: 0.7256 - loss: 0.5446 - val_accuracy: 0.7094 - val_loss: 0.5717
Epoch 167/1000
12/12              0s 17ms/step -
accuracy: 0.7222 - loss: 0.5501 - val_accuracy: 0.7094 - val_loss: 0.5716
Epoch 168/1000
12/12              0s 17ms/step -
accuracy: 0.7080 - loss: 0.5524 - val_accuracy: 0.7094 - val_loss: 0.5714
Epoch 169/1000
12/12              0s 17ms/step -
accuracy: 0.6957 - loss: 0.5773 - val_accuracy: 0.7094 - val_loss: 0.5714
Epoch 170/1000
12/12              0s 17ms/step -
accuracy: 0.7217 - loss: 0.5556 - val_accuracy: 0.7094 - val_loss: 0.5713
```

```
Epoch 171/1000
12/12              0s 17ms/step -
accuracy: 0.6919 - loss: 0.5732 - val_accuracy: 0.7094 - val_loss: 0.5712
Epoch 172/1000
12/12              0s 21ms/step -
accuracy: 0.7219 - loss: 0.5531 - val_accuracy: 0.7094 - val_loss: 0.5711
Epoch 173/1000
12/12              0s 10ms/step -
accuracy: 0.6810 - loss: 0.5794 - val_accuracy: 0.7094 - val_loss: 0.5710
Epoch 174/1000
12/12              0s 11ms/step -
accuracy: 0.7014 - loss: 0.5757 - val_accuracy: 0.7094 - val_loss: 0.5709
Epoch 175/1000
12/12              0s 15ms/step -
accuracy: 0.7072 - loss: 0.5641 - val_accuracy: 0.7094 - val_loss: 0.5708
Epoch 176/1000
12/12              0s 16ms/step -
accuracy: 0.7216 - loss: 0.5410 - val_accuracy: 0.7094 - val_loss: 0.5707
Epoch 177/1000
12/12              0s 12ms/step -
accuracy: 0.7144 - loss: 0.5615 - val_accuracy: 0.7094 - val_loss: 0.5705
Epoch 178/1000
12/12              0s 16ms/step -
accuracy: 0.7082 - loss: 0.5605 - val_accuracy: 0.7179 - val_loss: 0.5704
Epoch 179/1000
12/12              0s 15ms/step -
accuracy: 0.7317 - loss: 0.5376 - val_accuracy: 0.7179 - val_loss: 0.5703
Epoch 180/1000
12/12              0s 14ms/step -
accuracy: 0.7236 - loss: 0.5448 - val_accuracy: 0.7179 - val_loss: 0.5702
Epoch 181/1000
12/12              0s 9ms/step -
accuracy: 0.7039 - loss: 0.5663 - val_accuracy: 0.7179 - val_loss: 0.5701
Epoch 182/1000
12/12              0s 16ms/step -
accuracy: 0.7061 - loss: 0.5789 - val_accuracy: 0.7179 - val_loss: 0.5700
Epoch 183/1000
12/12              0s 16ms/step -
accuracy: 0.7026 - loss: 0.5576 - val_accuracy: 0.7179 - val_loss: 0.5699
Epoch 184/1000
12/12              0s 17ms/step -
accuracy: 0.6940 - loss: 0.5751 - val_accuracy: 0.7179 - val_loss: 0.5698
Epoch 185/1000
12/12              0s 8ms/step -
accuracy: 0.7066 - loss: 0.5672 - val_accuracy: 0.7179 - val_loss: 0.5697
Epoch 186/1000
12/12              0s 16ms/step -
accuracy: 0.7232 - loss: 0.5528 - val_accuracy: 0.7179 - val_loss: 0.5696
```

```
Epoch 187/1000
12/12              0s 12ms/step -
accuracy: 0.7172 - loss: 0.5542 - val_accuracy: 0.7179 - val_loss: 0.5695
Epoch 188/1000
12/12              0s 18ms/step -
accuracy: 0.7247 - loss: 0.5363 - val_accuracy: 0.7179 - val_loss: 0.5694
Epoch 189/1000
12/12              0s 9ms/step -
accuracy: 0.7250 - loss: 0.5425 - val_accuracy: 0.7179 - val_loss: 0.5693
Epoch 190/1000
12/12              0s 17ms/step -
accuracy: 0.7437 - loss: 0.5247 - val_accuracy: 0.7179 - val_loss: 0.5692
Epoch 191/1000
12/12              0s 22ms/step -
accuracy: 0.6884 - loss: 0.5767 - val_accuracy: 0.7179 - val_loss: 0.5691
Epoch 192/1000
12/12              0s 7ms/step -
accuracy: 0.6827 - loss: 0.5726 - val_accuracy: 0.7179 - val_loss: 0.5690
Epoch 193/1000
12/12              0s 8ms/step -
accuracy: 0.7196 - loss: 0.5499 - val_accuracy: 0.7179 - val_loss: 0.5689
Epoch 194/1000
12/12              0s 14ms/step -
accuracy: 0.7156 - loss: 0.5568 - val_accuracy: 0.7179 - val_loss: 0.5688
Epoch 195/1000
12/12              0s 8ms/step -
accuracy: 0.7262 - loss: 0.5444 - val_accuracy: 0.7179 - val_loss: 0.5687
Epoch 196/1000
12/12              0s 17ms/step -
accuracy: 0.6963 - loss: 0.5612 - val_accuracy: 0.7179 - val_loss: 0.5686
Epoch 197/1000
12/12              0s 11ms/step -
accuracy: 0.6936 - loss: 0.5749 - val_accuracy: 0.7179 - val_loss: 0.5686
Epoch 198/1000
12/12              0s 9ms/step -
accuracy: 0.7186 - loss: 0.5582 - val_accuracy: 0.7179 - val_loss: 0.5684
Epoch 199/1000
12/12              0s 14ms/step -
accuracy: 0.7164 - loss: 0.5471 - val_accuracy: 0.7179 - val_loss: 0.5683
Epoch 200/1000
12/12              0s 21ms/step -
accuracy: 0.7089 - loss: 0.5650 - val_accuracy: 0.7179 - val_loss: 0.5682
Epoch 201/1000
12/12              0s 9ms/step -
accuracy: 0.6744 - loss: 0.5971 - val_accuracy: 0.7179 - val_loss: 0.5682
Epoch 202/1000
12/12              0s 8ms/step -
accuracy: 0.7016 - loss: 0.5630 - val_accuracy: 0.7179 - val_loss: 0.5681
```

```
Epoch 203/1000
12/12            0s 8ms/step -
accuracy: 0.7025 - loss: 0.5668 - val_accuracy: 0.7179 - val_loss: 0.5680
Epoch 204/1000
12/12            0s 8ms/step -
accuracy: 0.7030 - loss: 0.5623 - val_accuracy: 0.7179 - val_loss: 0.5679
Epoch 205/1000
12/12            0s 9ms/step -
accuracy: 0.7311 - loss: 0.5408 - val_accuracy: 0.7179 - val_loss: 0.5677
Epoch 206/1000
12/12            0s 12ms/step -
accuracy: 0.7085 - loss: 0.5504 - val_accuracy: 0.7179 - val_loss: 0.5676
Epoch 207/1000
12/12            0s 10ms/step -
accuracy: 0.7260 - loss: 0.5440 - val_accuracy: 0.7179 - val_loss: 0.5676
Epoch 208/1000
12/12            0s 8ms/step -
accuracy: 0.7198 - loss: 0.5418 - val_accuracy: 0.7179 - val_loss: 0.5674
Epoch 209/1000
12/12            0s 9ms/step -
accuracy: 0.7334 - loss: 0.5353 - val_accuracy: 0.7179 - val_loss: 0.5674
Epoch 210/1000
12/12            0s 12ms/step -
accuracy: 0.6974 - loss: 0.5727 - val_accuracy: 0.7179 - val_loss: 0.5673
Epoch 211/1000
12/12            0s 7ms/step -
accuracy: 0.7252 - loss: 0.5377 - val_accuracy: 0.7179 - val_loss: 0.5672
Epoch 212/1000
12/12            0s 10ms/step -
accuracy: 0.7275 - loss: 0.5469 - val_accuracy: 0.7179 - val_loss: 0.5671
Epoch 213/1000
12/12            0s 9ms/step -
accuracy: 0.7296 - loss: 0.5381 - val_accuracy: 0.7179 - val_loss: 0.5670
Epoch 214/1000
12/12            0s 12ms/step -
accuracy: 0.7417 - loss: 0.5233 - val_accuracy: 0.7179 - val_loss: 0.5669
Epoch 215/1000
12/12            0s 10ms/step -
accuracy: 0.6965 - loss: 0.5652 - val_accuracy: 0.7179 - val_loss: 0.5669
Epoch 216/1000
12/12            0s 9ms/step -
accuracy: 0.7099 - loss: 0.5579 - val_accuracy: 0.7179 - val_loss: 0.5668
Epoch 217/1000
12/12            0s 9ms/step -
accuracy: 0.7119 - loss: 0.5670 - val_accuracy: 0.7179 - val_loss: 0.5666
Epoch 218/1000
12/12            0s 11ms/step -
accuracy: 0.7373 - loss: 0.5332 - val_accuracy: 0.7179 - val_loss: 0.5666
```

```
Epoch 219/1000
12/12            0s 8ms/step -
accuracy: 0.7152 - loss: 0.5483 - val_accuracy: 0.7179 - val_loss: 0.5665
Epoch 220/1000
12/12            0s 13ms/step -
accuracy: 0.7079 - loss: 0.5551 - val_accuracy: 0.7179 - val_loss: 0.5664
Epoch 221/1000
12/12            0s 9ms/step -
accuracy: 0.7165 - loss: 0.5525 - val_accuracy: 0.7179 - val_loss: 0.5663
Epoch 222/1000
12/12            0s 11ms/step -
accuracy: 0.7407 - loss: 0.5290 - val_accuracy: 0.7094 - val_loss: 0.5662
Epoch 223/1000
12/12            0s 16ms/step -
accuracy: 0.7299 - loss: 0.5433 - val_accuracy: 0.7094 - val_loss: 0.5661
Epoch 224/1000
12/12            0s 15ms/step -
accuracy: 0.6951 - loss: 0.5647 - val_accuracy: 0.7094 - val_loss: 0.5660
Epoch 225/1000
12/12            0s 11ms/step -
accuracy: 0.7305 - loss: 0.5350 - val_accuracy: 0.7094 - val_loss: 0.5659
Epoch 226/1000
12/12            0s 15ms/step -
accuracy: 0.7382 - loss: 0.5331 - val_accuracy: 0.7094 - val_loss: 0.5658
Epoch 227/1000
12/12            0s 9ms/step -
accuracy: 0.7218 - loss: 0.5339 - val_accuracy: 0.7094 - val_loss: 0.5658
Epoch 228/1000
12/12            0s 9ms/step -
accuracy: 0.7181 - loss: 0.5416 - val_accuracy: 0.7094 - val_loss: 0.5657
Epoch 229/1000
12/12            0s 9ms/step -
accuracy: 0.7255 - loss: 0.5413 - val_accuracy: 0.7094 - val_loss: 0.5656
Epoch 230/1000
12/12            0s 10ms/step -
accuracy: 0.7035 - loss: 0.5466 - val_accuracy: 0.7094 - val_loss: 0.5655
Epoch 231/1000
12/12            0s 9ms/step -
accuracy: 0.7411 - loss: 0.5268 - val_accuracy: 0.7094 - val_loss: 0.5654
Epoch 232/1000
12/12            0s 14ms/step -
accuracy: 0.7128 - loss: 0.5486 - val_accuracy: 0.7094 - val_loss: 0.5653
Epoch 233/1000
12/12            0s 8ms/step -
accuracy: 0.7078 - loss: 0.5470 - val_accuracy: 0.7094 - val_loss: 0.5652
Epoch 234/1000
12/12            0s 10ms/step -
accuracy: 0.7062 - loss: 0.5598 - val_accuracy: 0.7094 - val_loss: 0.5651
```

```
Epoch 235/1000
12/12              0s 19ms/step -
accuracy: 0.7084 - loss: 0.5555 - val_accuracy: 0.7094 - val_loss: 0.5650
Epoch 236/1000
12/12              0s 13ms/step -
accuracy: 0.7447 - loss: 0.5323 - val_accuracy: 0.7094 - val_loss: 0.5649
Epoch 237/1000
12/12              0s 8ms/step -
accuracy: 0.7119 - loss: 0.5570 - val_accuracy: 0.7094 - val_loss: 0.5648
Epoch 238/1000
12/12              0s 8ms/step -
accuracy: 0.7241 - loss: 0.5417 - val_accuracy: 0.7094 - val_loss: 0.5648
Epoch 239/1000
12/12              0s 17ms/step -
accuracy: 0.6935 - loss: 0.5648 - val_accuracy: 0.7094 - val_loss: 0.5647
Epoch 240/1000
12/12              0s 17ms/step -
accuracy: 0.7082 - loss: 0.5488 - val_accuracy: 0.7094 - val_loss: 0.5646
Epoch 241/1000
12/12              0s 21ms/step -
accuracy: 0.7464 - loss: 0.5336 - val_accuracy: 0.7094 - val_loss: 0.5645
Epoch 242/1000
12/12              0s 8ms/step -
accuracy: 0.7320 - loss: 0.5350 - val_accuracy: 0.7094 - val_loss: 0.5644
Epoch 243/1000
12/12              0s 17ms/step -
accuracy: 0.7133 - loss: 0.5338 - val_accuracy: 0.7094 - val_loss: 0.5643
Epoch 244/1000
12/12              0s 17ms/step -
accuracy: 0.7197 - loss: 0.5525 - val_accuracy: 0.7094 - val_loss: 0.5642
Epoch 245/1000
12/12              0s 19ms/step -
accuracy: 0.7198 - loss: 0.5443 - val_accuracy: 0.7094 - val_loss: 0.5641
Epoch 246/1000
12/12              0s 17ms/step -
accuracy: 0.7228 - loss: 0.5454 - val_accuracy: 0.7094 - val_loss: 0.5640
Epoch 247/1000
12/12              0s 14ms/step -
accuracy: 0.6892 - loss: 0.5557 - val_accuracy: 0.7094 - val_loss: 0.5640
Epoch 248/1000
12/12              0s 16ms/step -
accuracy: 0.7324 - loss: 0.5416 - val_accuracy: 0.7094 - val_loss: 0.5639
Epoch 249/1000
12/12              0s 17ms/step -
accuracy: 0.6745 - loss: 0.5717 - val_accuracy: 0.7094 - val_loss: 0.5638
Epoch 250/1000
12/12              0s 15ms/step -
accuracy: 0.6821 - loss: 0.5764 - val_accuracy: 0.7094 - val_loss: 0.5637
```

```
Epoch 251/1000
12/12              0s 11ms/step -
accuracy: 0.7396 - loss: 0.5304 - val_accuracy: 0.7094 - val_loss: 0.5637
Epoch 252/1000
12/12              0s 18ms/step -
accuracy: 0.7214 - loss: 0.5428 - val_accuracy: 0.7094 - val_loss: 0.5636
Epoch 253/1000
12/12              0s 11ms/step -
accuracy: 0.7203 - loss: 0.5396 - val_accuracy: 0.7094 - val_loss: 0.5635
Epoch 254/1000
12/12              0s 17ms/step -
accuracy: 0.7243 - loss: 0.5364 - val_accuracy: 0.7094 - val_loss: 0.5634
Epoch 255/1000
12/12              0s 16ms/step -
accuracy: 0.7048 - loss: 0.5611 - val_accuracy: 0.7094 - val_loss: 0.5633
Epoch 256/1000
12/12              0s 17ms/step -
accuracy: 0.6959 - loss: 0.5707 - val_accuracy: 0.7094 - val_loss: 0.5632
Epoch 257/1000
12/12              0s 14ms/step -
accuracy: 0.7199 - loss: 0.5373 - val_accuracy: 0.7094 - val_loss: 0.5632
Epoch 258/1000
12/12              0s 7ms/step -
accuracy: 0.7473 - loss: 0.5118 - val_accuracy: 0.7094 - val_loss: 0.5631
Epoch 259/1000
12/12              0s 22ms/step -
accuracy: 0.7197 - loss: 0.5422 - val_accuracy: 0.7094 - val_loss: 0.5630
Epoch 260/1000
12/12              0s 12ms/step -
accuracy: 0.7248 - loss: 0.5304 - val_accuracy: 0.7094 - val_loss: 0.5629
Epoch 261/1000
12/12              0s 18ms/step -
accuracy: 0.7241 - loss: 0.5400 - val_accuracy: 0.7094 - val_loss: 0.5628
Epoch 262/1000
12/12              0s 8ms/step -
accuracy: 0.7040 - loss: 0.5486 - val_accuracy: 0.7094 - val_loss: 0.5627
Epoch 263/1000
12/12              0s 9ms/step -
accuracy: 0.7313 - loss: 0.5366 - val_accuracy: 0.7094 - val_loss: 0.5626
Epoch 264/1000
12/12              0s 11ms/step -
accuracy: 0.7407 - loss: 0.5207 - val_accuracy: 0.7094 - val_loss: 0.5625
Epoch 265/1000
12/12              0s 17ms/step -
accuracy: 0.7266 - loss: 0.5433 - val_accuracy: 0.7094 - val_loss: 0.5625
Epoch 266/1000
12/12              0s 13ms/step -
accuracy: 0.7024 - loss: 0.5521 - val_accuracy: 0.7094 - val_loss: 0.5624
```

```
Epoch 267/1000
12/12          0s 9ms/step -
accuracy: 0.6960 - loss: 0.5596 - val_accuracy: 0.7094 - val_loss: 0.5623
Epoch 268/1000
12/12          0s 13ms/step -
accuracy: 0.7129 - loss: 0.5422 - val_accuracy: 0.7094 - val_loss: 0.5623
Epoch 269/1000
12/12          0s 10ms/step -
accuracy: 0.7231 - loss: 0.5457 - val_accuracy: 0.7094 - val_loss: 0.5622
Epoch 270/1000
12/12          0s 8ms/step -
accuracy: 0.7071 - loss: 0.5606 - val_accuracy: 0.7094 - val_loss: 0.5621
Epoch 271/1000
12/12          0s 8ms/step -
accuracy: 0.7129 - loss: 0.5442 - val_accuracy: 0.7094 - val_loss: 0.5620
Epoch 272/1000
12/12          0s 13ms/step -
accuracy: 0.7001 - loss: 0.5494 - val_accuracy: 0.7094 - val_loss: 0.5619
Epoch 273/1000
12/12          0s 11ms/step -
accuracy: 0.7129 - loss: 0.5535 - val_accuracy: 0.7094 - val_loss: 0.5619
Epoch 274/1000
12/12          0s 13ms/step -
accuracy: 0.7252 - loss: 0.5449 - val_accuracy: 0.7094 - val_loss: 0.5618
Epoch 275/1000
12/12          0s 9ms/step -
accuracy: 0.7321 - loss: 0.5227 - val_accuracy: 0.7094 - val_loss: 0.5617
Epoch 276/1000
12/12          0s 9ms/step -
accuracy: 0.6744 - loss: 0.5756 - val_accuracy: 0.7094 - val_loss: 0.5617
Epoch 277/1000
12/12          0s 9ms/step -
accuracy: 0.7201 - loss: 0.5494 - val_accuracy: 0.7094 - val_loss: 0.5616
Epoch 278/1000
12/12          0s 9ms/step -
accuracy: 0.6989 - loss: 0.5614 - val_accuracy: 0.7094 - val_loss: 0.5615
Epoch 279/1000
12/12          0s 18ms/step -
accuracy: 0.7128 - loss: 0.5513 - val_accuracy: 0.7094 - val_loss: 0.5614
Epoch 280/1000
12/12          0s 17ms/step -
accuracy: 0.7046 - loss: 0.5476 - val_accuracy: 0.7094 - val_loss: 0.5613
Epoch 281/1000
12/12          0s 10ms/step -
accuracy: 0.6918 - loss: 0.5497 - val_accuracy: 0.7094 - val_loss: 0.5613
Epoch 282/1000
12/12          0s 16ms/step -
accuracy: 0.7060 - loss: 0.5448 - val_accuracy: 0.7094 - val_loss: 0.5612
```

```
Epoch 283/1000
12/12            0s 17ms/step -
accuracy: 0.7121 - loss: 0.5409 - val_accuracy: 0.7094 - val_loss: 0.5611
Epoch 284/1000
12/12            0s 17ms/step -
accuracy: 0.7246 - loss: 0.5268 - val_accuracy: 0.7094 - val_loss: 0.5610
Epoch 285/1000
12/12            0s 15ms/step -
accuracy: 0.7004 - loss: 0.5614 - val_accuracy: 0.7094 - val_loss: 0.5609
Epoch 286/1000
12/12            0s 10ms/step -
accuracy: 0.7284 - loss: 0.5321 - val_accuracy: 0.7094 - val_loss: 0.5608
Epoch 287/1000
12/12            0s 8ms/step -
accuracy: 0.7216 - loss: 0.5254 - val_accuracy: 0.7094 - val_loss: 0.5607
Epoch 288/1000
12/12            0s 16ms/step -
accuracy: 0.7421 - loss: 0.5118 - val_accuracy: 0.7094 - val_loss: 0.5606
Epoch 289/1000
12/12            0s 15ms/step -
accuracy: 0.7103 - loss: 0.5425 - val_accuracy: 0.7094 - val_loss: 0.5606
Epoch 290/1000
12/12            0s 17ms/step -
accuracy: 0.7087 - loss: 0.5499 - val_accuracy: 0.7094 - val_loss: 0.5605
Epoch 291/1000
12/12            0s 8ms/step -
accuracy: 0.7386 - loss: 0.5170 - val_accuracy: 0.7094 - val_loss: 0.5604
Epoch 292/1000
12/12            0s 13ms/step -
accuracy: 0.7191 - loss: 0.5304 - val_accuracy: 0.7094 - val_loss: 0.5603
Epoch 293/1000
12/12            0s 14ms/step -
accuracy: 0.7240 - loss: 0.5437 - val_accuracy: 0.7094 - val_loss: 0.5602
Epoch 294/1000
12/12            0s 17ms/step -
accuracy: 0.6897 - loss: 0.5647 - val_accuracy: 0.7094 - val_loss: 0.5601
Epoch 295/1000
12/12            0s 8ms/step -
accuracy: 0.6887 - loss: 0.5679 - val_accuracy: 0.7094 - val_loss: 0.5601
Epoch 296/1000
12/12            0s 12ms/step -
accuracy: 0.7017 - loss: 0.5472 - val_accuracy: 0.7094 - val_loss: 0.5600
Epoch 297/1000
12/12            0s 9ms/step -
accuracy: 0.6855 - loss: 0.5712 - val_accuracy: 0.7094 - val_loss: 0.5600
Epoch 298/1000
12/12            0s 9ms/step -
accuracy: 0.7337 - loss: 0.5298 - val_accuracy: 0.7094 - val_loss: 0.5599
```

```
Epoch 299/1000
12/12                0s 13ms/step -
accuracy: 0.7255 - loss: 0.5259 - val_accuracy: 0.7094 - val_loss: 0.5598
Epoch 300/1000
12/12                0s 14ms/step -
accuracy: 0.7442 - loss: 0.5260 - val_accuracy: 0.7094 - val_loss: 0.5598
Epoch 301/1000
12/12                0s 11ms/step -
accuracy: 0.7182 - loss: 0.5322 - val_accuracy: 0.7094 - val_loss: 0.5597
Epoch 302/1000
12/12                0s 7ms/step -
accuracy: 0.7094 - loss: 0.5432 - val_accuracy: 0.7094 - val_loss: 0.5596
Epoch 303/1000
12/12                0s 15ms/step -
accuracy: 0.6905 - loss: 0.5634 - val_accuracy: 0.7094 - val_loss: 0.5595
Epoch 304/1000
12/12                0s 18ms/step -
accuracy: 0.7242 - loss: 0.5271 - val_accuracy: 0.7094 - val_loss: 0.5594
Epoch 305/1000
12/12                0s 14ms/step -
accuracy: 0.7417 - loss: 0.5277 - val_accuracy: 0.7094 - val_loss: 0.5594
Epoch 306/1000
12/12                0s 10ms/step -
accuracy: 0.7226 - loss: 0.5458 - val_accuracy: 0.7094 - val_loss: 0.5593
Epoch 307/1000
12/12                0s 16ms/step -
accuracy: 0.7114 - loss: 0.5379 - val_accuracy: 0.7094 - val_loss: 0.5592
Epoch 308/1000
12/12                0s 17ms/step -
accuracy: 0.7122 - loss: 0.5339 - val_accuracy: 0.7094 - val_loss: 0.5591
Epoch 309/1000
12/12                0s 17ms/step -
accuracy: 0.6905 - loss: 0.5628 - val_accuracy: 0.7094 - val_loss: 0.5591
Epoch 310/1000
12/12                0s 18ms/step -
accuracy: 0.7262 - loss: 0.5223 - val_accuracy: 0.7094 - val_loss: 0.5590
Epoch 311/1000
12/12                0s 17ms/step -
accuracy: 0.6897 - loss: 0.5670 - val_accuracy: 0.7094 - val_loss: 0.5590
Epoch 312/1000
12/12                0s 16ms/step -
accuracy: 0.7122 - loss: 0.5354 - val_accuracy: 0.7094 - val_loss: 0.5589
Epoch 313/1000
12/12                0s 15ms/step -
accuracy: 0.6844 - loss: 0.5799 - val_accuracy: 0.7094 - val_loss: 0.5588
Epoch 314/1000
12/12                0s 8ms/step -
accuracy: 0.7117 - loss: 0.5598 - val_accuracy: 0.7094 - val_loss: 0.5588
```

```
Epoch 315/1000
12/12              0s 11ms/step -
accuracy: 0.7005 - loss: 0.5613 - val_accuracy: 0.7094 - val_loss: 0.5587
Epoch 316/1000
12/12              0s 18ms/step -
accuracy: 0.7148 - loss: 0.5420 - val_accuracy: 0.7094 - val_loss: 0.5586
Epoch 317/1000
12/12              0s 15ms/step -
accuracy: 0.7105 - loss: 0.5445 - val_accuracy: 0.7094 - val_loss: 0.5586
Epoch 318/1000
12/12              0s 17ms/step -
accuracy: 0.7211 - loss: 0.5481 - val_accuracy: 0.7094 - val_loss: 0.5585
Epoch 319/1000
12/12              0s 9ms/step -
accuracy: 0.6913 - loss: 0.5575 - val_accuracy: 0.7094 - val_loss: 0.5584
Epoch 320/1000
12/12              0s 15ms/step -
accuracy: 0.7251 - loss: 0.5389 - val_accuracy: 0.7094 - val_loss: 0.5583
Epoch 321/1000
12/12              0s 17ms/step -
accuracy: 0.6901 - loss: 0.5590 - val_accuracy: 0.7094 - val_loss: 0.5583
Epoch 322/1000
12/12              0s 16ms/step -
accuracy: 0.7445 - loss: 0.5115 - val_accuracy: 0.7094 - val_loss: 0.5582
Epoch 323/1000
12/12              0s 9ms/step -
accuracy: 0.7318 - loss: 0.5231 - val_accuracy: 0.7094 - val_loss: 0.5581
Epoch 324/1000
12/12              0s 17ms/step -
accuracy: 0.7134 - loss: 0.5493 - val_accuracy: 0.7094 - val_loss: 0.5580
Epoch 325/1000
12/12              0s 17ms/step -
accuracy: 0.7368 - loss: 0.5298 - val_accuracy: 0.7094 - val_loss: 0.5579
Epoch 326/1000
12/12              0s 17ms/step -
accuracy: 0.6970 - loss: 0.5511 - val_accuracy: 0.7094 - val_loss: 0.5578
Epoch 327/1000
12/12              0s 16ms/step -
accuracy: 0.7034 - loss: 0.5381 - val_accuracy: 0.7094 - val_loss: 0.5577
Epoch 328/1000
12/12              0s 18ms/step -
accuracy: 0.7212 - loss: 0.5367 - val_accuracy: 0.7094 - val_loss: 0.5577
Epoch 329/1000
12/12              0s 14ms/step -
accuracy: 0.6960 - loss: 0.5502 - val_accuracy: 0.7094 - val_loss: 0.5576
Epoch 330/1000
12/12              0s 18ms/step -
accuracy: 0.7546 - loss: 0.5131 - val_accuracy: 0.7094 - val_loss: 0.5575
```

```
Epoch 331/1000
12/12          0s 10ms/step -
accuracy: 0.7024 - loss: 0.5563 - val_accuracy: 0.7094 - val_loss: 0.5574
Epoch 332/1000
12/12          0s 8ms/step -
accuracy: 0.7076 - loss: 0.5471 - val_accuracy: 0.7094 - val_loss: 0.5574
Epoch 333/1000
12/12          0s 13ms/step -
accuracy: 0.7013 - loss: 0.5481 - val_accuracy: 0.7094 - val_loss: 0.5573
Epoch 334/1000
12/12          0s 8ms/step -
accuracy: 0.7311 - loss: 0.5413 - val_accuracy: 0.7094 - val_loss: 0.5572
Epoch 335/1000
12/12          0s 7ms/step -
accuracy: 0.7447 - loss: 0.5101 - val_accuracy: 0.7094 - val_loss: 0.5572
Epoch 336/1000
12/12          0s 16ms/step -
accuracy: 0.6995 - loss: 0.5559 - val_accuracy: 0.7094 - val_loss: 0.5571
Epoch 337/1000
12/12          0s 15ms/step -
accuracy: 0.7257 - loss: 0.5305 - val_accuracy: 0.7094 - val_loss: 0.5570
Epoch 338/1000
12/12          0s 17ms/step -
accuracy: 0.6804 - loss: 0.5625 - val_accuracy: 0.7094 - val_loss: 0.5569
Epoch 339/1000
12/12          0s 18ms/step -
accuracy: 0.7154 - loss: 0.5489 - val_accuracy: 0.7094 - val_loss: 0.5569
Epoch 340/1000
12/12          0s 16ms/step -
accuracy: 0.6973 - loss: 0.5506 - val_accuracy: 0.7094 - val_loss: 0.5569
Epoch 341/1000
12/12          0s 18ms/step -
accuracy: 0.6932 - loss: 0.5721 - val_accuracy: 0.7094 - val_loss: 0.5568
Epoch 342/1000
12/12          0s 16ms/step -
accuracy: 0.6869 - loss: 0.5558 - val_accuracy: 0.7094 - val_loss: 0.5567
Epoch 343/1000
12/12          0s 18ms/step -
accuracy: 0.6781 - loss: 0.5806 - val_accuracy: 0.7094 - val_loss: 0.5567
Epoch 344/1000
12/12          0s 10ms/step -
accuracy: 0.7155 - loss: 0.5472 - val_accuracy: 0.7094 - val_loss: 0.5566
Epoch 345/1000
12/12          0s 18ms/step -
accuracy: 0.7015 - loss: 0.5476 - val_accuracy: 0.7094 - val_loss: 0.5565
Epoch 346/1000
12/12          0s 17ms/step -
accuracy: 0.7058 - loss: 0.5375 - val_accuracy: 0.7094 - val_loss: 0.5564
```

```
Epoch 347/1000
12/12             0s 18ms/step -
accuracy: 0.7177 - loss: 0.5412 - val_accuracy: 0.7094 - val_loss: 0.5563
Epoch 348/1000
12/12             0s 17ms/step -
accuracy: 0.6962 - loss: 0.5512 - val_accuracy: 0.7094 - val_loss: 0.5562
Epoch 349/1000
12/12             0s 13ms/step -
accuracy: 0.6974 - loss: 0.5420 - val_accuracy: 0.7094 - val_loss: 0.5562
Epoch 350/1000
12/12             0s 13ms/step -
accuracy: 0.7056 - loss: 0.5467 - val_accuracy: 0.7094 - val_loss: 0.5562
Epoch 351/1000
12/12             0s 17ms/step -
accuracy: 0.7295 - loss: 0.5281 - val_accuracy: 0.7094 - val_loss: 0.5560
Epoch 352/1000
12/12             0s 18ms/step -
accuracy: 0.7126 - loss: 0.5357 - val_accuracy: 0.7094 - val_loss: 0.5559
Epoch 353/1000
12/12             0s 16ms/step -
accuracy: 0.7212 - loss: 0.5420 - val_accuracy: 0.7179 - val_loss: 0.5558
Epoch 354/1000
12/12             0s 16ms/step -
accuracy: 0.6936 - loss: 0.5601 - val_accuracy: 0.7094 - val_loss: 0.5558
Epoch 355/1000
12/12             0s 8ms/step -
accuracy: 0.7186 - loss: 0.5288 - val_accuracy: 0.7094 - val_loss: 0.5557
Epoch 356/1000
12/12             0s 12ms/step -
accuracy: 0.7148 - loss: 0.5397 - val_accuracy: 0.7094 - val_loss: 0.5557
Epoch 357/1000
12/12             0s 16ms/step -
accuracy: 0.6779 - loss: 0.5640 - val_accuracy: 0.7094 - val_loss: 0.5556
Epoch 358/1000
12/12             0s 18ms/step -
accuracy: 0.7099 - loss: 0.5376 - val_accuracy: 0.7094 - val_loss: 0.5555
Epoch 359/1000
12/12             0s 18ms/step -
accuracy: 0.7773 - loss: 0.4986 - val_accuracy: 0.7179 - val_loss: 0.5554
Epoch 360/1000
12/12             0s 17ms/step -
accuracy: 0.7183 - loss: 0.5378 - val_accuracy: 0.7179 - val_loss: 0.5553
Epoch 361/1000
12/12             0s 16ms/step -
accuracy: 0.7246 - loss: 0.5287 - val_accuracy: 0.7179 - val_loss: 0.5552
Epoch 362/1000
12/12             0s 8ms/step -
accuracy: 0.7329 - loss: 0.5337 - val_accuracy: 0.7179 - val_loss: 0.5552
```

```
Epoch 363/1000
12/12          0s 13ms/step -
accuracy: 0.7312 - loss: 0.5221 - val_accuracy: 0.7179 - val_loss: 0.5551
Epoch 364/1000
12/12          0s 17ms/step -
accuracy: 0.7057 - loss: 0.5460 - val_accuracy: 0.7179 - val_loss: 0.5550
Epoch 365/1000
12/12          0s 15ms/step -
accuracy: 0.7045 - loss: 0.5534 - val_accuracy: 0.7179 - val_loss: 0.5550
Epoch 366/1000
12/12          0s 8ms/step -
accuracy: 0.7272 - loss: 0.5288 - val_accuracy: 0.7179 - val_loss: 0.5549
Epoch 367/1000
12/12          0s 22ms/step -
accuracy: 0.6979 - loss: 0.5456 - val_accuracy: 0.7179 - val_loss: 0.5548
Epoch 368/1000
12/12          0s 17ms/step -
accuracy: 0.6929 - loss: 0.5595 - val_accuracy: 0.7179 - val_loss: 0.5548
Epoch 369/1000
12/12          0s 16ms/step -
accuracy: 0.7361 - loss: 0.5362 - val_accuracy: 0.7179 - val_loss: 0.5548
Epoch 370/1000
12/12          0s 18ms/step -
accuracy: 0.6926 - loss: 0.5711 - val_accuracy: 0.7179 - val_loss: 0.5547
Epoch 371/1000
12/12          0s 15ms/step -
accuracy: 0.6932 - loss: 0.5645 - val_accuracy: 0.7179 - val_loss: 0.5547
Epoch 372/1000
12/12          0s 17ms/step -
accuracy: 0.7002 - loss: 0.5528 - val_accuracy: 0.7179 - val_loss: 0.5546
Epoch 373/1000
12/12          0s 13ms/step -
accuracy: 0.7129 - loss: 0.5344 - val_accuracy: 0.7179 - val_loss: 0.5545
Epoch 374/1000
12/12          0s 13ms/step -
accuracy: 0.7030 - loss: 0.5640 - val_accuracy: 0.7179 - val_loss: 0.5544
Epoch 375/1000
12/12          0s 17ms/step -
accuracy: 0.7403 - loss: 0.5260 - val_accuracy: 0.7179 - val_loss: 0.5543
Epoch 376/1000
12/12          0s 6ms/step -
accuracy: 0.7000 - loss: 0.5439 - val_accuracy: 0.7265 - val_loss: 0.5542
Epoch 377/1000
12/12          0s 16ms/step -
accuracy: 0.7127 - loss: 0.5523 - val_accuracy: 0.7179 - val_loss: 0.5542
Epoch 378/1000
12/12          0s 11ms/step -
accuracy: 0.7228 - loss: 0.5351 - val_accuracy: 0.7265 - val_loss: 0.5541
```

```
Epoch 379/1000
12/12            0s 12ms/step -
accuracy: 0.7146 - loss: 0.5321 - val_accuracy: 0.7265 - val_loss: 0.5540
Epoch 380/1000
12/12            0s 15ms/step -
accuracy: 0.7110 - loss: 0.5222 - val_accuracy: 0.7179 - val_loss: 0.5540
Epoch 381/1000
12/12            0s 18ms/step -
accuracy: 0.7337 - loss: 0.5204 - val_accuracy: 0.7179 - val_loss: 0.5539
Epoch 382/1000
12/12            0s 14ms/step -
accuracy: 0.7340 - loss: 0.5223 - val_accuracy: 0.7179 - val_loss: 0.5539
Epoch 383/1000
12/12            0s 17ms/step -
accuracy: 0.7288 - loss: 0.5422 - val_accuracy: 0.7179 - val_loss: 0.5539
Epoch 384/1000
12/12            0s 15ms/step -
accuracy: 0.7242 - loss: 0.5356 - val_accuracy: 0.7179 - val_loss: 0.5538
Epoch 385/1000
12/12            0s 17ms/step -
accuracy: 0.7138 - loss: 0.5531 - val_accuracy: 0.7265 - val_loss: 0.5537
Epoch 386/1000
12/12            0s 19ms/step -
accuracy: 0.7139 - loss: 0.5507 - val_accuracy: 0.7265 - val_loss: 0.5536
Epoch 387/1000
12/12            0s 17ms/step -
accuracy: 0.6869 - loss: 0.5516 - val_accuracy: 0.7265 - val_loss: 0.5536
Epoch 388/1000
12/12            0s 17ms/step -
accuracy: 0.7089 - loss: 0.5538 - val_accuracy: 0.7265 - val_loss: 0.5535
Epoch 389/1000
12/12            0s 16ms/step -
accuracy: 0.7302 - loss: 0.5294 - val_accuracy: 0.7265 - val_loss: 0.5534
Epoch 390/1000
12/12            0s 17ms/step -
accuracy: 0.6972 - loss: 0.5554 - val_accuracy: 0.7265 - val_loss: 0.5534
Epoch 391/1000
12/12            0s 17ms/step -
accuracy: 0.7109 - loss: 0.5565 - val_accuracy: 0.7265 - val_loss: 0.5533
Epoch 392/1000
12/12            0s 13ms/step -
accuracy: 0.7275 - loss: 0.5361 - val_accuracy: 0.7265 - val_loss: 0.5532
Epoch 393/1000
12/12            0s 7ms/step -
accuracy: 0.7049 - loss: 0.5482 - val_accuracy: 0.7265 - val_loss: 0.5531
Epoch 394/1000
12/12            0s 14ms/step -
accuracy: 0.7299 - loss: 0.5299 - val_accuracy: 0.7265 - val_loss: 0.5531
```

```
Epoch 395/1000
12/12              0s 19ms/step -
accuracy: 0.7228 - loss: 0.5402 - val_accuracy: 0.7265 - val_loss: 0.5530
Epoch 396/1000
12/12              0s 8ms/step -
accuracy: 0.7054 - loss: 0.5605 - val_accuracy: 0.7265 - val_loss: 0.5529
Epoch 397/1000
12/12              0s 28ms/step -
accuracy: 0.6863 - loss: 0.5562 - val_accuracy: 0.7265 - val_loss: 0.5529
Epoch 398/1000
12/12              0s 9ms/step -
accuracy: 0.7135 - loss: 0.5322 - val_accuracy: 0.7265 - val_loss: 0.5528
Epoch 399/1000
12/12              0s 9ms/step -
accuracy: 0.7146 - loss: 0.5428 - val_accuracy: 0.7265 - val_loss: 0.5528
Epoch 400/1000
12/12              0s 12ms/step -
accuracy: 0.7273 - loss: 0.5303 - val_accuracy: 0.7265 - val_loss: 0.5527
Epoch 401/1000
12/12              0s 8ms/step -
accuracy: 0.6972 - loss: 0.5470 - val_accuracy: 0.7265 - val_loss: 0.5526
Epoch 402/1000
12/12              0s 8ms/step -
accuracy: 0.7052 - loss: 0.5429 - val_accuracy: 0.7265 - val_loss: 0.5526
Epoch 403/1000
12/12              0s 12ms/step -
accuracy: 0.7072 - loss: 0.5436 - val_accuracy: 0.7265 - val_loss: 0.5526
Epoch 404/1000
12/12              0s 13ms/step -
accuracy: 0.7033 - loss: 0.5560 - val_accuracy: 0.7265 - val_loss: 0.5525
Epoch 405/1000
12/12              0s 9ms/step -
accuracy: 0.7095 - loss: 0.5395 - val_accuracy: 0.7265 - val_loss: 0.5524
Epoch 406/1000
12/12              0s 25ms/step -
accuracy: 0.7017 - loss: 0.5461 - val_accuracy: 0.7265 - val_loss: 0.5523
Epoch 407/1000
12/12              0s 10ms/step -
accuracy: 0.6904 - loss: 0.5438 - val_accuracy: 0.7265 - val_loss: 0.5524
Epoch 408/1000
12/12              0s 8ms/step -
accuracy: 0.6737 - loss: 0.5731 - val_accuracy: 0.7265 - val_loss: 0.5524
Epoch 409/1000
12/12              0s 9ms/step -
accuracy: 0.6980 - loss: 0.5557 - val_accuracy: 0.7265 - val_loss: 0.5523
Epoch 410/1000
12/12              0s 8ms/step -
accuracy: 0.6979 - loss: 0.5502 - val_accuracy: 0.7265 - val_loss: 0.5522
```

```
Epoch 411/1000
12/12          0s 10ms/step -
accuracy: 0.7022 - loss: 0.5434 - val_accuracy: 0.7265 - val_loss: 0.5521
Epoch 412/1000
12/12          0s 31ms/step -
accuracy: 0.7290 - loss: 0.5180 - val_accuracy: 0.7265 - val_loss: 0.5521
Epoch 413/1000
12/12          0s 9ms/step -
accuracy: 0.7193 - loss: 0.5410 - val_accuracy: 0.7265 - val_loss: 0.5520
Epoch 414/1000
12/12          0s 11ms/step -
accuracy: 0.7214 - loss: 0.5253 - val_accuracy: 0.7265 - val_loss: 0.5519
Epoch 415/1000
12/12          0s 10ms/step -
accuracy: 0.6868 - loss: 0.5619 - val_accuracy: 0.7265 - val_loss: 0.5518
Epoch 416/1000
12/12          0s 11ms/step -
accuracy: 0.7266 - loss: 0.5318 - val_accuracy: 0.7265 - val_loss: 0.5517
Epoch 417/1000
12/12          0s 19ms/step -
accuracy: 0.7089 - loss: 0.5528 - val_accuracy: 0.7265 - val_loss: 0.5517
Epoch 418/1000
12/12          0s 24ms/step -
accuracy: 0.7273 - loss: 0.5335 - val_accuracy: 0.7265 - val_loss: 0.5516
Epoch 419/1000
12/12          0s 10ms/step -
accuracy: 0.7180 - loss: 0.5266 - val_accuracy: 0.7265 - val_loss: 0.5515
Epoch 420/1000
12/12          0s 8ms/step -
accuracy: 0.6797 - loss: 0.5665 - val_accuracy: 0.7265 - val_loss: 0.5514
Epoch 421/1000
12/12          0s 9ms/step -
accuracy: 0.6956 - loss: 0.5485 - val_accuracy: 0.7265 - val_loss: 0.5515
Epoch 422/1000
12/12          0s 12ms/step -
accuracy: 0.7327 - loss: 0.5299 - val_accuracy: 0.7265 - val_loss: 0.5513
Epoch 423/1000
12/12          0s 10ms/step -
accuracy: 0.7007 - loss: 0.5466 - val_accuracy: 0.7265 - val_loss: 0.5513
Epoch 424/1000
12/12          0s 10ms/step -
accuracy: 0.7154 - loss: 0.5252 - val_accuracy: 0.7265 - val_loss: 0.5512
Epoch 425/1000
12/12          0s 19ms/step -
accuracy: 0.7207 - loss: 0.5329 - val_accuracy: 0.7265 - val_loss: 0.5512
Epoch 426/1000
12/12          0s 22ms/step -
accuracy: 0.7431 - loss: 0.5143 - val_accuracy: 0.7265 - val_loss: 0.5511
```

```
Epoch 427/1000
12/12            1s 55ms/step -
accuracy: 0.7480 - loss: 0.5125 - val_accuracy: 0.7179 - val_loss: 0.5509
Epoch 428/1000
12/12            0s 17ms/step -
accuracy: 0.7093 - loss: 0.5476 - val_accuracy: 0.7179 - val_loss: 0.5509
Epoch 429/1000
12/12            0s 19ms/step -
accuracy: 0.6881 - loss: 0.5680 - val_accuracy: 0.7179 - val_loss: 0.5508
Epoch 430/1000
12/12            0s 20ms/step -
accuracy: 0.7176 - loss: 0.5296 - val_accuracy: 0.7179 - val_loss: 0.5508
Epoch 431/1000
12/12            0s 24ms/step -
accuracy: 0.6998 - loss: 0.5382 - val_accuracy: 0.7179 - val_loss: 0.5507
Epoch 432/1000
12/12            0s 19ms/step -
accuracy: 0.7131 - loss: 0.5495 - val_accuracy: 0.7265 - val_loss: 0.5507
Epoch 433/1000
12/12            0s 33ms/step -
accuracy: 0.7162 - loss: 0.5377 - val_accuracy: 0.7265 - val_loss: 0.5507
Epoch 434/1000
12/12            0s 18ms/step -
accuracy: 0.7133 - loss: 0.5550 - val_accuracy: 0.7265 - val_loss: 0.5507
Epoch 435/1000
12/12            0s 25ms/step -
accuracy: 0.7002 - loss: 0.5440 - val_accuracy: 0.7265 - val_loss: 0.5506
Epoch 436/1000
12/12            0s 24ms/step -
accuracy: 0.7000 - loss: 0.5443 - val_accuracy: 0.7265 - val_loss: 0.5505
Epoch 437/1000
12/12            0s 22ms/step -
accuracy: 0.7161 - loss: 0.5443 - val_accuracy: 0.7179 - val_loss: 0.5504
Epoch 438/1000
12/12            0s 27ms/step -
accuracy: 0.6527 - loss: 0.5738 - val_accuracy: 0.7265 - val_loss: 0.5504
Epoch 439/1000
12/12            0s 19ms/step -
accuracy: 0.6989 - loss: 0.5547 - val_accuracy: 0.7265 - val_loss: 0.5503
Epoch 440/1000
12/12            0s 18ms/step -
accuracy: 0.7486 - loss: 0.5165 - val_accuracy: 0.7265 - val_loss: 0.5502
Epoch 441/1000
12/12            0s 19ms/step -
accuracy: 0.7206 - loss: 0.5246 - val_accuracy: 0.7265 - val_loss: 0.5502
Epoch 442/1000
12/12            0s 18ms/step -
accuracy: 0.7242 - loss: 0.5322 - val_accuracy: 0.7179 - val_loss: 0.5501
```

```
Epoch 443/1000
12/12              0s 18ms/step -
accuracy: 0.7307 - loss: 0.5297 - val_accuracy: 0.7179 - val_loss: 0.5500
Epoch 444/1000
12/12              0s 18ms/step -
accuracy: 0.7170 - loss: 0.5278 - val_accuracy: 0.7179 - val_loss: 0.5499
Epoch 445/1000
12/12              0s 18ms/step -
accuracy: 0.7160 - loss: 0.5277 - val_accuracy: 0.7179 - val_loss: 0.5498
Epoch 446/1000
12/12              0s 18ms/step -
accuracy: 0.7133 - loss: 0.5343 - val_accuracy: 0.7179 - val_loss: 0.5497
Epoch 447/1000
12/12              0s 12ms/step -
accuracy: 0.7095 - loss: 0.5407 - val_accuracy: 0.7179 - val_loss: 0.5497
Epoch 448/1000
12/12              0s 9ms/step -
accuracy: 0.7561 - loss: 0.4935 - val_accuracy: 0.7179 - val_loss: 0.5496
Epoch 449/1000
12/12              0s 23ms/step -
accuracy: 0.7045 - loss: 0.5480 - val_accuracy: 0.7179 - val_loss: 0.5495
Epoch 450/1000
12/12              0s 11ms/step -
accuracy: 0.6958 - loss: 0.5528 - val_accuracy: 0.7179 - val_loss: 0.5495
Epoch 451/1000
12/12              0s 11ms/step -
accuracy: 0.7023 - loss: 0.5435 - val_accuracy: 0.7265 - val_loss: 0.5494
Epoch 452/1000
12/12              0s 20ms/step -
accuracy: 0.7326 - loss: 0.5280 - val_accuracy: 0.7265 - val_loss: 0.5493
Epoch 453/1000
12/12              0s 17ms/step -
accuracy: 0.7312 - loss: 0.5117 - val_accuracy: 0.7265 - val_loss: 0.5493
Epoch 454/1000
12/12              0s 16ms/step -
accuracy: 0.7291 - loss: 0.5205 - val_accuracy: 0.7265 - val_loss: 0.5492
Epoch 455/1000
12/12              0s 19ms/step -
accuracy: 0.6998 - loss: 0.5357 - val_accuracy: 0.7179 - val_loss: 0.5492
Epoch 456/1000
12/12              0s 14ms/step -
accuracy: 0.7201 - loss: 0.5314 - val_accuracy: 0.7265 - val_loss: 0.5491
Epoch 457/1000
12/12              0s 11ms/step -
accuracy: 0.6938 - loss: 0.5344 - val_accuracy: 0.7179 - val_loss: 0.5491
Epoch 458/1000
12/12              0s 14ms/step -
accuracy: 0.7189 - loss: 0.5377 - val_accuracy: 0.7265 - val_loss: 0.5490
```

```
Epoch 459/1000
12/12                0s 17ms/step -
accuracy: 0.7191 - loss: 0.5357 - val_accuracy: 0.7265 - val_loss: 0.5489
Epoch 460/1000
12/12                0s 15ms/step -
accuracy: 0.7107 - loss: 0.5285 - val_accuracy: 0.7179 - val_loss: 0.5489
Epoch 461/1000
12/12                0s 12ms/step -
accuracy: 0.6742 - loss: 0.5589 - val_accuracy: 0.7179 - val_loss: 0.5489
Epoch 462/1000
12/12                0s 8ms/step -
accuracy: 0.7132 - loss: 0.5322 - val_accuracy: 0.7179 - val_loss: 0.5488
Epoch 463/1000
12/12                0s 12ms/step -
accuracy: 0.7360 - loss: 0.5142 - val_accuracy: 0.7265 - val_loss: 0.5486
Epoch 464/1000
12/12                0s 16ms/step -
accuracy: 0.7372 - loss: 0.5046 - val_accuracy: 0.7265 - val_loss: 0.5486
Epoch 465/1000
12/12                0s 16ms/step -
accuracy: 0.7223 - loss: 0.5235 - val_accuracy: 0.7265 - val_loss: 0.5486
Epoch 466/1000
12/12                0s 14ms/step -
accuracy: 0.6825 - loss: 0.5502 - val_accuracy: 0.7179 - val_loss: 0.5486
Epoch 467/1000
12/12                0s 8ms/step -
accuracy: 0.6952 - loss: 0.5594 - val_accuracy: 0.7179 - val_loss: 0.5485
Epoch 468/1000
12/12                0s 9ms/step -
accuracy: 0.7587 - loss: 0.5000 - val_accuracy: 0.7265 - val_loss: 0.5484
Epoch 469/1000
12/12                0s 12ms/step -
accuracy: 0.7397 - loss: 0.5129 - val_accuracy: 0.7265 - val_loss: 0.5483
Epoch 470/1000
12/12                0s 9ms/step -
accuracy: 0.6776 - loss: 0.5667 - val_accuracy: 0.7265 - val_loss: 0.5483
Epoch 471/1000
12/12                0s 18ms/step -
accuracy: 0.7436 - loss: 0.5089 - val_accuracy: 0.7265 - val_loss: 0.5481
Epoch 472/1000
12/12                0s 8ms/step -
accuracy: 0.6845 - loss: 0.5697 - val_accuracy: 0.7265 - val_loss: 0.5482
Epoch 473/1000
12/12                0s 10ms/step -
accuracy: 0.6860 - loss: 0.5552 - val_accuracy: 0.7265 - val_loss: 0.5482
Epoch 474/1000
12/12                0s 17ms/step -
accuracy: 0.7360 - loss: 0.5135 - val_accuracy: 0.7265 - val_loss: 0.5480
```

```
Epoch 475/1000
12/12            0s 16ms/step -
accuracy: 0.6909 - loss: 0.5578 - val_accuracy: 0.7265 - val_loss: 0.5479
Epoch 476/1000
12/12            0s 15ms/step -
accuracy: 0.7176 - loss: 0.5306 - val_accuracy: 0.7265 - val_loss: 0.5480
Epoch 477/1000
12/12            0s 23ms/step -
accuracy: 0.7153 - loss: 0.5285 - val_accuracy: 0.7265 - val_loss: 0.5478
Epoch 478/1000
12/12            0s 8ms/step -
accuracy: 0.7091 - loss: 0.5463 - val_accuracy: 0.7265 - val_loss: 0.5478
Epoch 479/1000
12/12            0s 19ms/step -
accuracy: 0.7221 - loss: 0.5239 - val_accuracy: 0.7265 - val_loss: 0.5478
Epoch 480/1000
12/12            0s 9ms/step -
accuracy: 0.7079 - loss: 0.5266 - val_accuracy: 0.7265 - val_loss: 0.5476
Epoch 481/1000
12/12            0s 15ms/step -
accuracy: 0.7058 - loss: 0.5327 - val_accuracy: 0.7265 - val_loss: 0.5476
Epoch 482/1000
12/12            0s 14ms/step -
accuracy: 0.7303 - loss: 0.5130 - val_accuracy: 0.7265 - val_loss: 0.5475
Epoch 483/1000
12/12            0s 15ms/step -
accuracy: 0.7153 - loss: 0.5385 - val_accuracy: 0.7265 - val_loss: 0.5475
Epoch 484/1000
12/12            0s 16ms/step -
accuracy: 0.7363 - loss: 0.5103 - val_accuracy: 0.7265 - val_loss: 0.5474
Epoch 485/1000
12/12            0s 18ms/step -
accuracy: 0.7102 - loss: 0.5405 - val_accuracy: 0.7265 - val_loss: 0.5474
Epoch 486/1000
12/12            0s 18ms/step -
accuracy: 0.7096 - loss: 0.5287 - val_accuracy: 0.7265 - val_loss: 0.5473
Epoch 487/1000
12/12            0s 19ms/step -
accuracy: 0.7173 - loss: 0.5079 - val_accuracy: 0.7265 - val_loss: 0.5472
Epoch 488/1000
12/12            0s 12ms/step -
accuracy: 0.6591 - loss: 0.5724 - val_accuracy: 0.7265 - val_loss: 0.5472
Epoch 489/1000
12/12            0s 11ms/step -
accuracy: 0.7330 - loss: 0.5246 - val_accuracy: 0.7265 - val_loss: 0.5471
Epoch 490/1000
12/12            0s 15ms/step -
accuracy: 0.7259 - loss: 0.5176 - val_accuracy: 0.7265 - val_loss: 0.5471
```

```
Epoch 491/1000
12/12          0s 20ms/step -
accuracy: 0.7153 - loss: 0.5329 - val_accuracy: 0.7265 - val_loss: 0.5470
Epoch 492/1000
12/12          0s 18ms/step -
accuracy: 0.7362 - loss: 0.5107 - val_accuracy: 0.7265 - val_loss: 0.5469
Epoch 493/1000
12/12          0s 18ms/step -
accuracy: 0.7205 - loss: 0.5395 - val_accuracy: 0.7265 - val_loss: 0.5469
Epoch 494/1000
12/12          0s 9ms/step -
accuracy: 0.6916 - loss: 0.5546 - val_accuracy: 0.7265 - val_loss: 0.5469
Epoch 495/1000
12/12          0s 16ms/step -
accuracy: 0.7236 - loss: 0.5414 - val_accuracy: 0.7265 - val_loss: 0.5467
Epoch 496/1000
12/12          0s 17ms/step -
accuracy: 0.7112 - loss: 0.5333 - val_accuracy: 0.7265 - val_loss: 0.5466
Epoch 497/1000
12/12          0s 16ms/step -
accuracy: 0.6981 - loss: 0.5329 - val_accuracy: 0.7265 - val_loss: 0.5466
Epoch 498/1000
12/12          0s 20ms/step -
accuracy: 0.7351 - loss: 0.5025 - val_accuracy: 0.7265 - val_loss: 0.5466
Epoch 499/1000
12/12          0s 19ms/step -
accuracy: 0.7180 - loss: 0.5180 - val_accuracy: 0.7265 - val_loss: 0.5465
Epoch 500/1000
12/12          0s 16ms/step -
accuracy: 0.7132 - loss: 0.5408 - val_accuracy: 0.7265 - val_loss: 0.5464
Epoch 501/1000
12/12          0s 8ms/step -
accuracy: 0.7228 - loss: 0.5134 - val_accuracy: 0.7265 - val_loss: 0.5464
Epoch 502/1000
12/12          0s 14ms/step -
accuracy: 0.7069 - loss: 0.5327 - val_accuracy: 0.7265 - val_loss: 0.5464
Epoch 503/1000
12/12          0s 15ms/step -
accuracy: 0.7067 - loss: 0.5283 - val_accuracy: 0.7265 - val_loss: 0.5463
Epoch 504/1000
12/12          0s 17ms/step -
accuracy: 0.7209 - loss: 0.5223 - val_accuracy: 0.7265 - val_loss: 0.5462
Epoch 505/1000
12/12          0s 14ms/step -
accuracy: 0.7257 - loss: 0.5142 - val_accuracy: 0.7265 - val_loss: 0.5462
Epoch 506/1000
12/12          0s 19ms/step -
accuracy: 0.7195 - loss: 0.5277 - val_accuracy: 0.7265 - val_loss: 0.5461
```

```
Epoch 507/1000
12/12              0s 19ms/step -
accuracy: 0.7186 - loss: 0.5249 - val_accuracy: 0.7265 - val_loss: 0.5461
Epoch 508/1000
12/12              0s 17ms/step -
accuracy: 0.7027 - loss: 0.5329 - val_accuracy: 0.7265 - val_loss: 0.5460
Epoch 509/1000
12/12              0s 14ms/step -
accuracy: 0.6978 - loss: 0.5496 - val_accuracy: 0.7265 - val_loss: 0.5460
Epoch 510/1000
12/12              0s 14ms/step -
accuracy: 0.6875 - loss: 0.5539 - val_accuracy: 0.7265 - val_loss: 0.5459
Epoch 511/1000
12/12              0s 11ms/step -
accuracy: 0.7215 - loss: 0.5252 - val_accuracy: 0.7265 - val_loss: 0.5458
Epoch 512/1000
12/12              0s 18ms/step -
accuracy: 0.7115 - loss: 0.5307 - val_accuracy: 0.7265 - val_loss: 0.5457
Epoch 513/1000
12/12              0s 19ms/step -
accuracy: 0.6827 - loss: 0.5633 - val_accuracy: 0.7265 - val_loss: 0.5458
Epoch 514/1000
12/12              0s 16ms/step -
accuracy: 0.7050 - loss: 0.5361 - val_accuracy: 0.7265 - val_loss: 0.5457
Epoch 515/1000
12/12              0s 20ms/step -
accuracy: 0.7095 - loss: 0.5409 - val_accuracy: 0.7265 - val_loss: 0.5456
Epoch 516/1000
12/12              0s 20ms/step -
accuracy: 0.6912 - loss: 0.5435 - val_accuracy: 0.7265 - val_loss: 0.5456
Epoch 517/1000
12/12              0s 18ms/step -
accuracy: 0.7212 - loss: 0.5151 - val_accuracy: 0.7265 - val_loss: 0.5455
Epoch 518/1000
12/12              0s 19ms/step -
accuracy: 0.7162 - loss: 0.5445 - val_accuracy: 0.7265 - val_loss: 0.5454
Epoch 519/1000
12/12              0s 9ms/step -
accuracy: 0.7360 - loss: 0.5115 - val_accuracy: 0.7265 - val_loss: 0.5454
Epoch 520/1000
12/12              0s 8ms/step -
accuracy: 0.7187 - loss: 0.5236 - val_accuracy: 0.7265 - val_loss: 0.5453
Epoch 521/1000
12/12              0s 11ms/step -
accuracy: 0.6924 - loss: 0.5431 - val_accuracy: 0.7265 - val_loss: 0.5453
Epoch 522/1000
12/12              0s 17ms/step -
accuracy: 0.6908 - loss: 0.5465 - val_accuracy: 0.7265 - val_loss: 0.5454
```

```
Epoch 523/1000
12/12          0s 9ms/step -
accuracy: 0.7267 - loss: 0.5193 - val_accuracy: 0.7265 - val_loss: 0.5452
Epoch 524/1000
12/12          0s 14ms/step -
accuracy: 0.6852 - loss: 0.5556 - val_accuracy: 0.7265 - val_loss: 0.5452
Epoch 525/1000
12/12          0s 16ms/step -
accuracy: 0.7203 - loss: 0.5223 - val_accuracy: 0.7265 - val_loss: 0.5450
Epoch 526/1000
12/12          0s 21ms/step -
accuracy: 0.7245 - loss: 0.5146 - val_accuracy: 0.7265 - val_loss: 0.5451
Epoch 527/1000
12/12          0s 8ms/step -
accuracy: 0.7327 - loss: 0.5161 - val_accuracy: 0.7265 - val_loss: 0.5450
Epoch 528/1000
12/12          0s 8ms/step -
accuracy: 0.6851 - loss: 0.5601 - val_accuracy: 0.7265 - val_loss: 0.5449
Epoch 529/1000
12/12          0s 13ms/step -
accuracy: 0.6927 - loss: 0.5353 - val_accuracy: 0.7265 - val_loss: 0.5449
Epoch 530/1000
12/12          0s 18ms/step -
accuracy: 0.7058 - loss: 0.5329 - val_accuracy: 0.7265 - val_loss: 0.5449
Epoch 531/1000
12/12          0s 15ms/step -
accuracy: 0.7187 - loss: 0.5215 - val_accuracy: 0.7265 - val_loss: 0.5448
Epoch 532/1000
12/12          0s 18ms/step -
accuracy: 0.7227 - loss: 0.5158 - val_accuracy: 0.7265 - val_loss: 0.5447
Epoch 533/1000
12/12          0s 18ms/step -
accuracy: 0.7414 - loss: 0.5104 - val_accuracy: 0.7265 - val_loss: 0.5445
Epoch 534/1000
12/12          0s 18ms/step -
accuracy: 0.7058 - loss: 0.5297 - val_accuracy: 0.7265 - val_loss: 0.5446
Epoch 535/1000
12/12          0s 18ms/step -
accuracy: 0.7145 - loss: 0.5390 - val_accuracy: 0.7265 - val_loss: 0.5445
Epoch 536/1000
12/12          0s 18ms/step -
accuracy: 0.7312 - loss: 0.5165 - val_accuracy: 0.7265 - val_loss: 0.5444
Epoch 537/1000
12/12          0s 20ms/step -
accuracy: 0.7119 - loss: 0.5223 - val_accuracy: 0.7265 - val_loss: 0.5444
Epoch 538/1000
12/12          0s 8ms/step -
accuracy: 0.7044 - loss: 0.5385 - val_accuracy: 0.7265 - val_loss: 0.5444
```

```
Epoch 539/1000
12/12              0s 21ms/step -
accuracy: 0.7095 - loss: 0.5319 - val_accuracy: 0.7265 - val_loss: 0.5444
Epoch 540/1000
12/12              0s 12ms/step -
accuracy: 0.7332 - loss: 0.5140 - val_accuracy: 0.7265 - val_loss: 0.5443
Epoch 541/1000
12/12              0s 14ms/step -
accuracy: 0.7259 - loss: 0.5090 - val_accuracy: 0.7179 - val_loss: 0.5441
Epoch 542/1000
12/12              0s 15ms/step -
accuracy: 0.7395 - loss: 0.5059 - val_accuracy: 0.7179 - val_loss: 0.5441
Epoch 543/1000
12/12              0s 18ms/step -
accuracy: 0.7217 - loss: 0.5135 - val_accuracy: 0.7179 - val_loss: 0.5440
Epoch 544/1000
12/12              0s 10ms/step -
accuracy: 0.7336 - loss: 0.5131 - val_accuracy: 0.7179 - val_loss: 0.5439
Epoch 545/1000
12/12              0s 9ms/step -
accuracy: 0.6946 - loss: 0.5486 - val_accuracy: 0.7179 - val_loss: 0.5438
Epoch 546/1000
12/12              0s 18ms/step -
accuracy: 0.7399 - loss: 0.5104 - val_accuracy: 0.7179 - val_loss: 0.5438
Epoch 547/1000
12/12              0s 9ms/step -
accuracy: 0.7489 - loss: 0.5195 - val_accuracy: 0.7179 - val_loss: 0.5437
Epoch 548/1000
12/12              0s 17ms/step -
accuracy: 0.7013 - loss: 0.5408 - val_accuracy: 0.7179 - val_loss: 0.5437
Epoch 549/1000
12/12              0s 9ms/step -
accuracy: 0.7241 - loss: 0.5145 - val_accuracy: 0.7179 - val_loss: 0.5436
Epoch 550/1000
12/12              0s 14ms/step -
accuracy: 0.6987 - loss: 0.5227 - val_accuracy: 0.7179 - val_loss: 0.5436
Epoch 551/1000
12/12              0s 14ms/step -
accuracy: 0.7233 - loss: 0.5225 - val_accuracy: 0.7179 - val_loss: 0.5435
Epoch 552/1000
12/12              0s 16ms/step -
accuracy: 0.7331 - loss: 0.5187 - val_accuracy: 0.7179 - val_loss: 0.5434
Epoch 553/1000
12/12              0s 9ms/step -
accuracy: 0.6961 - loss: 0.5552 - val_accuracy: 0.7179 - val_loss: 0.5434
Epoch 554/1000
12/12              0s 9ms/step -
accuracy: 0.7029 - loss: 0.5412 - val_accuracy: 0.7179 - val_loss: 0.5434
```

```
Epoch 555/1000
12/12              0s 10ms/step -
accuracy: 0.7124 - loss: 0.5303 - val_accuracy: 0.7179 - val_loss: 0.5433
Epoch 556/1000
12/12              0s 12ms/step -
accuracy: 0.6985 - loss: 0.5429 - val_accuracy: 0.7179 - val_loss: 0.5433
Epoch 557/1000
12/12              0s 10ms/step -
accuracy: 0.6955 - loss: 0.5433 - val_accuracy: 0.7179 - val_loss: 0.5434
Epoch 558/1000
12/12              0s 8ms/step -
accuracy: 0.6944 - loss: 0.5462 - val_accuracy: 0.7265 - val_loss: 0.5433
Epoch 559/1000
12/12              0s 14ms/step -
accuracy: 0.6849 - loss: 0.5417 - val_accuracy: 0.7179 - val_loss: 0.5432
Epoch 560/1000
12/12              0s 18ms/step -
accuracy: 0.7183 - loss: 0.5413 - val_accuracy: 0.7179 - val_loss: 0.5431
Epoch 561/1000
12/12              0s 11ms/step -
accuracy: 0.7127 - loss: 0.5433 - val_accuracy: 0.7179 - val_loss: 0.5431
Epoch 562/1000
12/12              0s 9ms/step -
accuracy: 0.7204 - loss: 0.5207 - val_accuracy: 0.7179 - val_loss: 0.5430
Epoch 563/1000
12/12              0s 18ms/step -
accuracy: 0.7321 - loss: 0.5129 - val_accuracy: 0.7179 - val_loss: 0.5429
Epoch 564/1000
12/12              0s 10ms/step -
accuracy: 0.7077 - loss: 0.5190 - val_accuracy: 0.7179 - val_loss: 0.5429
Epoch 565/1000
12/12              0s 19ms/step -
accuracy: 0.6993 - loss: 0.5371 - val_accuracy: 0.7179 - val_loss: 0.5429
Epoch 566/1000
12/12              0s 11ms/step -
accuracy: 0.7390 - loss: 0.5102 - val_accuracy: 0.7179 - val_loss: 0.5428
Epoch 567/1000
12/12              0s 13ms/step -
accuracy: 0.6940 - loss: 0.5475 - val_accuracy: 0.7179 - val_loss: 0.5428
Epoch 568/1000
12/12              0s 9ms/step -
accuracy: 0.7189 - loss: 0.5280 - val_accuracy: 0.7179 - val_loss: 0.5427
Epoch 569/1000
12/12              0s 11ms/step -
accuracy: 0.7253 - loss: 0.5158 - val_accuracy: 0.7179 - val_loss: 0.5426
Epoch 570/1000
12/12              0s 7ms/step -
accuracy: 0.7069 - loss: 0.5308 - val_accuracy: 0.7179 - val_loss: 0.5425
```

```
Epoch 571/1000
12/12              0s 13ms/step -
accuracy: 0.6956 - loss: 0.5521 - val_accuracy: 0.7179 - val_loss: 0.5425
Epoch 572/1000
12/12              0s 11ms/step -
accuracy: 0.6879 - loss: 0.5487 - val_accuracy: 0.7179 - val_loss: 0.5425
Epoch 573/1000
12/12              0s 11ms/step -
accuracy: 0.6974 - loss: 0.5458 - val_accuracy: 0.7179 - val_loss: 0.5424
Epoch 574/1000
12/12              0s 9ms/step -
accuracy: 0.7260 - loss: 0.5072 - val_accuracy: 0.7179 - val_loss: 0.5423
Epoch 575/1000
12/12              0s 14ms/step -
accuracy: 0.7184 - loss: 0.5496 - val_accuracy: 0.7179 - val_loss: 0.5423
Epoch 576/1000
12/12              0s 12ms/step -
accuracy: 0.7129 - loss: 0.5351 - val_accuracy: 0.7179 - val_loss: 0.5422
Epoch 577/1000
12/12              0s 23ms/step -
accuracy: 0.7058 - loss: 0.5362 - val_accuracy: 0.7179 - val_loss: 0.5421
Epoch 578/1000
12/12              0s 9ms/step -
accuracy: 0.7549 - loss: 0.4977 - val_accuracy: 0.7179 - val_loss: 0.5420
Epoch 579/1000
12/12              0s 8ms/step -
accuracy: 0.7041 - loss: 0.5337 - val_accuracy: 0.7179 - val_loss: 0.5420
Epoch 580/1000
12/12              0s 8ms/step -
accuracy: 0.7190 - loss: 0.5253 - val_accuracy: 0.7179 - val_loss: 0.5420
Epoch 581/1000
12/12              0s 8ms/step -
accuracy: 0.7136 - loss: 0.5152 - val_accuracy: 0.7179 - val_loss: 0.5420
Epoch 582/1000
12/12              0s 10ms/step -
accuracy: 0.6963 - loss: 0.5519 - val_accuracy: 0.7179 - val_loss: 0.5420
Epoch 583/1000
12/12              0s 8ms/step -
accuracy: 0.7257 - loss: 0.5151 - val_accuracy: 0.7179 - val_loss: 0.5419
Epoch 584/1000
12/12              0s 10ms/step -
accuracy: 0.7120 - loss: 0.5212 - val_accuracy: 0.7179 - val_loss: 0.5418
Epoch 585/1000
12/12              0s 10ms/step -
accuracy: 0.7295 - loss: 0.5114 - val_accuracy: 0.7179 - val_loss: 0.5417
Epoch 586/1000
12/12              0s 16ms/step -
accuracy: 0.7262 - loss: 0.5165 - val_accuracy: 0.7179 - val_loss: 0.5416
```

```
Epoch 587/1000
12/12              0s 8ms/step -
accuracy: 0.7273 - loss: 0.5169 - val_accuracy: 0.7179 - val_loss: 0.5415
Epoch 588/1000
12/12              0s 14ms/step -
accuracy: 0.7155 - loss: 0.5424 - val_accuracy: 0.7179 - val_loss: 0.5414
Epoch 589/1000
12/12              0s 10ms/step -
accuracy: 0.7054 - loss: 0.5480 - val_accuracy: 0.7179 - val_loss: 0.5415
Epoch 590/1000
12/12              0s 11ms/step -
accuracy: 0.7473 - loss: 0.5090 - val_accuracy: 0.7179 - val_loss: 0.5414
Epoch 591/1000
12/12              0s 13ms/step -
accuracy: 0.7165 - loss: 0.5384 - val_accuracy: 0.7179 - val_loss: 0.5413
Epoch 592/1000
12/12              0s 8ms/step -
accuracy: 0.7334 - loss: 0.5249 - val_accuracy: 0.7179 - val_loss: 0.5412
Epoch 593/1000
12/12              0s 9ms/step -
accuracy: 0.7040 - loss: 0.5258 - val_accuracy: 0.7179 - val_loss: 0.5412
Epoch 594/1000
12/12              0s 10ms/step -
accuracy: 0.7320 - loss: 0.5148 - val_accuracy: 0.7179 - val_loss: 0.5411
Epoch 595/1000
12/12              0s 8ms/step -
accuracy: 0.6789 - loss: 0.5603 - val_accuracy: 0.7179 - val_loss: 0.5410
Epoch 596/1000
12/12              0s 11ms/step -
accuracy: 0.7168 - loss: 0.5211 - val_accuracy: 0.7179 - val_loss: 0.5410
Epoch 597/1000
12/12              0s 18ms/step -
accuracy: 0.7175 - loss: 0.5336 - val_accuracy: 0.7179 - val_loss: 0.5410
Epoch 598/1000
12/12              0s 20ms/step -
accuracy: 0.7339 - loss: 0.5079 - val_accuracy: 0.7179 - val_loss: 0.5409
Epoch 599/1000
12/12              0s 21ms/step -
accuracy: 0.7018 - loss: 0.5343 - val_accuracy: 0.7179 - val_loss: 0.5409
Epoch 600/1000
12/12              0s 18ms/step -
accuracy: 0.7229 - loss: 0.5217 - val_accuracy: 0.7179 - val_loss: 0.5408
Epoch 601/1000
12/12              0s 21ms/step -
accuracy: 0.7118 - loss: 0.5323 - val_accuracy: 0.7179 - val_loss: 0.5408
Epoch 602/1000
12/12              0s 18ms/step -
accuracy: 0.7174 - loss: 0.5309 - val_accuracy: 0.7179 - val_loss: 0.5408
```

```
Epoch 603/1000
12/12          0s 22ms/step -
accuracy: 0.7391 - loss: 0.5032 - val_accuracy: 0.7179 - val_loss: 0.5408
Epoch 604/1000
12/12          0s 19ms/step -
accuracy: 0.6778 - loss: 0.5536 - val_accuracy: 0.7179 - val_loss: 0.5407
Epoch 605/1000
12/12          0s 20ms/step -
accuracy: 0.7339 - loss: 0.5089 - val_accuracy: 0.7179 - val_loss: 0.5407
Epoch 606/1000
12/12          0s 20ms/step -
accuracy: 0.7114 - loss: 0.5295 - val_accuracy: 0.7179 - val_loss: 0.5406
Epoch 607/1000
12/12          1s 45ms/step -
accuracy: 0.7052 - loss: 0.5228 - val_accuracy: 0.7179 - val_loss: 0.5405
Epoch 608/1000
12/12          0s 20ms/step -
accuracy: 0.7284 - loss: 0.5217 - val_accuracy: 0.7179 - val_loss: 0.5404
Epoch 609/1000
12/12          0s 21ms/step -
accuracy: 0.7025 - loss: 0.5269 - val_accuracy: 0.7179 - val_loss: 0.5404
Epoch 610/1000
12/12          0s 19ms/step -
accuracy: 0.7096 - loss: 0.5328 - val_accuracy: 0.7179 - val_loss: 0.5403
Epoch 611/1000
12/12          0s 19ms/step -
accuracy: 0.7258 - loss: 0.5272 - val_accuracy: 0.7179 - val_loss: 0.5402
Epoch 612/1000
12/12          0s 30ms/step -
accuracy: 0.7278 - loss: 0.5139 - val_accuracy: 0.7179 - val_loss: 0.5402
Epoch 613/1000
12/12          0s 19ms/step -
accuracy: 0.7171 - loss: 0.5328 - val_accuracy: 0.7179 - val_loss: 0.5401
Epoch 614/1000
12/12          0s 23ms/step -
accuracy: 0.7267 - loss: 0.5244 - val_accuracy: 0.7179 - val_loss: 0.5401
Epoch 615/1000
12/12          0s 17ms/step -
accuracy: 0.7128 - loss: 0.5284 - val_accuracy: 0.7179 - val_loss: 0.5400
Epoch 616/1000
12/12          0s 20ms/step -
accuracy: 0.7109 - loss: 0.5398 - val_accuracy: 0.7179 - val_loss: 0.5400
Epoch 617/1000
12/12          0s 18ms/step -
accuracy: 0.6961 - loss: 0.5443 - val_accuracy: 0.7179 - val_loss: 0.5400
Epoch 618/1000
12/12          0s 19ms/step -
accuracy: 0.7226 - loss: 0.5244 - val_accuracy: 0.7179 - val_loss: 0.5399
```

```
Epoch 619/1000
12/12            0s 24ms/step -
accuracy: 0.6976 - loss: 0.5351 - val_accuracy: 0.7179 - val_loss: 0.5398
Epoch 620/1000
12/12            0s 21ms/step -
accuracy: 0.7171 - loss: 0.5326 - val_accuracy: 0.7179 - val_loss: 0.5398
Epoch 621/1000
12/12            0s 24ms/step -
accuracy: 0.7174 - loss: 0.5233 - val_accuracy: 0.7179 - val_loss: 0.5398
Epoch 622/1000
12/12            0s 24ms/step -
accuracy: 0.7176 - loss: 0.5269 - val_accuracy: 0.7179 - val_loss: 0.5398
Epoch 623/1000
12/12            0s 18ms/step -
accuracy: 0.6972 - loss: 0.5509 - val_accuracy: 0.7179 - val_loss: 0.5397
Epoch 624/1000
12/12            0s 21ms/step -
accuracy: 0.7247 - loss: 0.5125 - val_accuracy: 0.7179 - val_loss: 0.5396
Epoch 625/1000
12/12            0s 18ms/step -
accuracy: 0.7271 - loss: 0.5118 - val_accuracy: 0.7179 - val_loss: 0.5395
Epoch 626/1000
12/12            0s 19ms/step -
accuracy: 0.7459 - loss: 0.5036 - val_accuracy: 0.7179 - val_loss: 0.5395
Epoch 627/1000
12/12            0s 22ms/step -
accuracy: 0.7421 - loss: 0.5176 - val_accuracy: 0.7179 - val_loss: 0.5395
Epoch 628/1000
12/12            0s 18ms/step -
accuracy: 0.7229 - loss: 0.5228 - val_accuracy: 0.7179 - val_loss: 0.5395
Epoch 629/1000
12/12            0s 19ms/step -
accuracy: 0.7133 - loss: 0.5277 - val_accuracy: 0.7179 - val_loss: 0.5394
Epoch 630/1000
12/12            0s 22ms/step -
accuracy: 0.7174 - loss: 0.5181 - val_accuracy: 0.7179 - val_loss: 0.5394
Epoch 631/1000
12/12            0s 22ms/step -
accuracy: 0.7117 - loss: 0.5439 - val_accuracy: 0.7179 - val_loss: 0.5393
Epoch 632/1000
12/12            0s 31ms/step -
accuracy: 0.7336 - loss: 0.5032 - val_accuracy: 0.7179 - val_loss: 0.5392
Epoch 633/1000
12/12            0s 21ms/step -
accuracy: 0.7253 - loss: 0.5143 - val_accuracy: 0.7179 - val_loss: 0.5392
Epoch 634/1000
12/12            0s 21ms/step -
accuracy: 0.6990 - loss: 0.5459 - val_accuracy: 0.7179 - val_loss: 0.5392
```

```
Epoch 635/1000
12/12              0s 21ms/step -
accuracy: 0.7287 - loss: 0.5167 - val_accuracy: 0.7179 - val_loss: 0.5392
Epoch 636/1000
12/12              0s 19ms/step -
accuracy: 0.7331 - loss: 0.5095 - val_accuracy: 0.7179 - val_loss: 0.5391
Epoch 637/1000
12/12              0s 23ms/step -
accuracy: 0.7099 - loss: 0.5336 - val_accuracy: 0.7179 - val_loss: 0.5391
Epoch 638/1000
12/12              0s 19ms/step -
accuracy: 0.7080 - loss: 0.5267 - val_accuracy: 0.7179 - val_loss: 0.5390
Epoch 639/1000
12/12              0s 21ms/step -
accuracy: 0.7291 - loss: 0.5137 - val_accuracy: 0.7179 - val_loss: 0.5389
Epoch 640/1000
12/12              0s 22ms/step -
accuracy: 0.7311 - loss: 0.5271 - val_accuracy: 0.7179 - val_loss: 0.5387
Epoch 641/1000
12/12              0s 19ms/step -
accuracy: 0.7146 - loss: 0.5288 - val_accuracy: 0.7179 - val_loss: 0.5388
Epoch 642/1000
12/12              0s 22ms/step -
accuracy: 0.6888 - loss: 0.5622 - val_accuracy: 0.7179 - val_loss: 0.5387
Epoch 643/1000
12/12              0s 20ms/step -
accuracy: 0.7318 - loss: 0.5115 - val_accuracy: 0.7179 - val_loss: 0.5387
Epoch 644/1000
12/12              0s 22ms/step -
accuracy: 0.7081 - loss: 0.5302 - val_accuracy: 0.7179 - val_loss: 0.5386
Epoch 645/1000
12/12              0s 21ms/step -
accuracy: 0.6955 - loss: 0.5414 - val_accuracy: 0.7179 - val_loss: 0.5386
Epoch 646/1000
12/12              0s 21ms/step -
accuracy: 0.7326 - loss: 0.5178 - val_accuracy: 0.7179 - val_loss: 0.5386
Epoch 647/1000
12/12              0s 35ms/step -
accuracy: 0.7162 - loss: 0.5367 - val_accuracy: 0.7179 - val_loss: 0.5385
Epoch 648/1000
12/12              0s 19ms/step -
accuracy: 0.7126 - loss: 0.5314 - val_accuracy: 0.7179 - val_loss: 0.5384
Epoch 649/1000
12/12              0s 19ms/step -
accuracy: 0.7044 - loss: 0.5257 - val_accuracy: 0.7179 - val_loss: 0.5384
Epoch 650/1000
12/12              0s 19ms/step -
accuracy: 0.7058 - loss: 0.5330 - val_accuracy: 0.7179 - val_loss: 0.5384
```

```
Epoch 651/1000
12/12              0s 16ms/step -
accuracy: 0.7257 - loss: 0.5114 - val_accuracy: 0.7179 - val_loss: 0.5383
Epoch 652/1000
12/12              0s 17ms/step -
accuracy: 0.6880 - loss: 0.5262 - val_accuracy: 0.7179 - val_loss: 0.5383
Epoch 653/1000
12/12              0s 17ms/step -
accuracy: 0.7205 - loss: 0.5162 - val_accuracy: 0.7179 - val_loss: 0.5382
Epoch 654/1000
12/12              0s 19ms/step -
accuracy: 0.7155 - loss: 0.5371 - val_accuracy: 0.7179 - val_loss: 0.5382
Epoch 655/1000
12/12              0s 21ms/step -
accuracy: 0.7034 - loss: 0.5393 - val_accuracy: 0.7179 - val_loss: 0.5382
Epoch 656/1000
12/12              0s 18ms/step -
accuracy: 0.6928 - loss: 0.5465 - val_accuracy: 0.7179 - val_loss: 0.5382
Epoch 657/1000
12/12              0s 14ms/step -
accuracy: 0.7197 - loss: 0.5214 - val_accuracy: 0.7179 - val_loss: 0.5381
Epoch 658/1000
12/12              0s 29ms/step -
accuracy: 0.7061 - loss: 0.5339 - val_accuracy: 0.7179 - val_loss: 0.5381
Epoch 659/1000
12/12              0s 15ms/step -
accuracy: 0.7249 - loss: 0.5199 - val_accuracy: 0.7179 - val_loss: 0.5379
Epoch 660/1000
12/12              0s 15ms/step -
accuracy: 0.6945 - loss: 0.5364 - val_accuracy: 0.7179 - val_loss: 0.5379
Epoch 661/1000
12/12              0s 16ms/step -
accuracy: 0.7343 - loss: 0.5103 - val_accuracy: 0.7179 - val_loss: 0.5378
Epoch 662/1000
12/12              0s 15ms/step -
accuracy: 0.7094 - loss: 0.5279 - val_accuracy: 0.7179 - val_loss: 0.5377
Epoch 663/1000
12/12              0s 13ms/step -
accuracy: 0.7424 - loss: 0.5069 - val_accuracy: 0.7179 - val_loss: 0.5376
Epoch 664/1000
12/12              0s 15ms/step -
accuracy: 0.7156 - loss: 0.5310 - val_accuracy: 0.7179 - val_loss: 0.5376
Epoch 665/1000
12/12              0s 19ms/step -
accuracy: 0.6973 - loss: 0.5361 - val_accuracy: 0.7179 - val_loss: 0.5376
Epoch 666/1000
12/12              0s 15ms/step -
accuracy: 0.6817 - loss: 0.5539 - val_accuracy: 0.7179 - val_loss: 0.5377
```

```
Epoch 667/1000
12/12              0s 18ms/step -
accuracy: 0.7028 - loss: 0.5430 - val_accuracy: 0.7179 - val_loss: 0.5376
Epoch 668/1000
12/12              0s 32ms/step -
accuracy: 0.7325 - loss: 0.5083 - val_accuracy: 0.7179 - val_loss: 0.5375
Epoch 669/1000
12/12              0s 19ms/step -
accuracy: 0.7303 - loss: 0.5121 - val_accuracy: 0.7179 - val_loss: 0.5374
Epoch 670/1000
12/12              0s 17ms/step -
accuracy: 0.7076 - loss: 0.5360 - val_accuracy: 0.7179 - val_loss: 0.5374
Epoch 671/1000
12/12              0s 22ms/step -
accuracy: 0.7129 - loss: 0.5387 - val_accuracy: 0.7179 - val_loss: 0.5373
Epoch 672/1000
12/12              0s 23ms/step -
accuracy: 0.7057 - loss: 0.5250 - val_accuracy: 0.7179 - val_loss: 0.5373
Epoch 673/1000
12/12              0s 20ms/step -
accuracy: 0.7129 - loss: 0.5208 - val_accuracy: 0.7179 - val_loss: 0.5373
Epoch 674/1000
12/12              0s 19ms/step -
accuracy: 0.7296 - loss: 0.5045 - val_accuracy: 0.7179 - val_loss: 0.5372
Epoch 675/1000
12/12              0s 21ms/step -
accuracy: 0.6931 - loss: 0.5348 - val_accuracy: 0.7179 - val_loss: 0.5372
Epoch 676/1000
12/12              0s 24ms/step -
accuracy: 0.7227 - loss: 0.5213 - val_accuracy: 0.7179 - val_loss: 0.5372
Epoch 677/1000
12/12              0s 18ms/step -
accuracy: 0.7386 - loss: 0.5145 - val_accuracy: 0.7179 - val_loss: 0.5371
Epoch 678/1000
12/12              0s 21ms/step -
accuracy: 0.6917 - loss: 0.5342 - val_accuracy: 0.7179 - val_loss: 0.5371
Epoch 679/1000
12/12              0s 24ms/step -
accuracy: 0.7167 - loss: 0.5197 - val_accuracy: 0.7179 - val_loss: 0.5370
Epoch 680/1000
12/12              0s 17ms/step -
accuracy: 0.7276 - loss: 0.5138 - val_accuracy: 0.7179 - val_loss: 0.5369
Epoch 681/1000
12/12              0s 21ms/step -
accuracy: 0.7271 - loss: 0.5210 - val_accuracy: 0.7179 - val_loss: 0.5368
Epoch 682/1000
12/12              0s 20ms/step -
accuracy: 0.7251 - loss: 0.5120 - val_accuracy: 0.7179 - val_loss: 0.5368
```

```
Epoch 683/1000
12/12              0s 20ms/step -
accuracy: 0.7309 - loss: 0.5246 - val_accuracy: 0.7179 - val_loss: 0.5368
Epoch 684/1000
12/12              0s 22ms/step -
accuracy: 0.7443 - loss: 0.5002 - val_accuracy: 0.7179 - val_loss: 0.5368
Epoch 685/1000
12/12              0s 19ms/step -
accuracy: 0.7074 - loss: 0.5203 - val_accuracy: 0.7179 - val_loss: 0.5367
Epoch 686/1000
12/12              0s 19ms/step -
accuracy: 0.7097 - loss: 0.5246 - val_accuracy: 0.7179 - val_loss: 0.5367
Epoch 687/1000
12/12              0s 18ms/step -
accuracy: 0.7210 - loss: 0.5274 - val_accuracy: 0.7179 - val_loss: 0.5367
Epoch 688/1000
12/12              0s 27ms/step -
accuracy: 0.7191 - loss: 0.5325 - val_accuracy: 0.7179 - val_loss: 0.5366
Epoch 689/1000
12/12              0s 19ms/step -
accuracy: 0.6915 - loss: 0.5365 - val_accuracy: 0.7179 - val_loss: 0.5366
Epoch 690/1000
12/12              0s 18ms/step -
accuracy: 0.6967 - loss: 0.5305 - val_accuracy: 0.7179 - val_loss: 0.5366
Epoch 691/1000
12/12              0s 17ms/step -
accuracy: 0.7252 - loss: 0.5292 - val_accuracy: 0.7179 - val_loss: 0.5365
Epoch 692/1000
12/12              0s 18ms/step -
accuracy: 0.7023 - loss: 0.5226 - val_accuracy: 0.7179 - val_loss: 0.5365
Epoch 693/1000
12/12              0s 19ms/step -
accuracy: 0.7111 - loss: 0.5430 - val_accuracy: 0.7179 - val_loss: 0.5364
Epoch 694/1000
12/12              0s 22ms/step -
accuracy: 0.7544 - loss: 0.5064 - val_accuracy: 0.7179 - val_loss: 0.5363
Epoch 695/1000
12/12              0s 34ms/step -
accuracy: 0.7095 - loss: 0.5238 - val_accuracy: 0.7179 - val_loss: 0.5362
Epoch 696/1000
12/12              0s 20ms/step -
accuracy: 0.6956 - loss: 0.5456 - val_accuracy: 0.7179 - val_loss: 0.5363
Epoch 697/1000
12/12              0s 25ms/step -
accuracy: 0.7062 - loss: 0.5378 - val_accuracy: 0.7179 - val_loss: 0.5363
Epoch 698/1000
12/12              0s 19ms/step -
accuracy: 0.6798 - loss: 0.5457 - val_accuracy: 0.7179 - val_loss: 0.5362
```

```
Epoch 699/1000
12/12              0s 22ms/step -
accuracy: 0.6994 - loss: 0.5251 - val_accuracy: 0.7179 - val_loss: 0.5362
Epoch 700/1000
12/12              0s 24ms/step -
accuracy: 0.7390 - loss: 0.5102 - val_accuracy: 0.7179 - val_loss: 0.5360
Epoch 701/1000
12/12              0s 23ms/step -
accuracy: 0.6798 - loss: 0.5378 - val_accuracy: 0.7179 - val_loss: 0.5360
Epoch 702/1000
12/12              0s 19ms/step -
accuracy: 0.7135 - loss: 0.5329 - val_accuracy: 0.7179 - val_loss: 0.5359
Epoch 703/1000
12/12              0s 21ms/step -
accuracy: 0.6949 - loss: 0.5374 - val_accuracy: 0.7179 - val_loss: 0.5360
Epoch 704/1000
12/12              0s 26ms/step -
accuracy: 0.7499 - loss: 0.5036 - val_accuracy: 0.7179 - val_loss: 0.5357
Epoch 705/1000
12/12              0s 19ms/step -
accuracy: 0.7011 - loss: 0.5495 - val_accuracy: 0.7179 - val_loss: 0.5358
Epoch 706/1000
12/12              0s 20ms/step -
accuracy: 0.7123 - loss: 0.5127 - val_accuracy: 0.7179 - val_loss: 0.5357
Epoch 707/1000
12/12              0s 20ms/step -
accuracy: 0.6913 - loss: 0.5320 - val_accuracy: 0.7179 - val_loss: 0.5357
Epoch 708/1000
12/12              0s 18ms/step -
accuracy: 0.7285 - loss: 0.5216 - val_accuracy: 0.7179 - val_loss: 0.5356
Epoch 709/1000
12/12              0s 19ms/step -
accuracy: 0.7453 - loss: 0.4930 - val_accuracy: 0.7179 - val_loss: 0.5354
Epoch 710/1000
12/12              0s 19ms/step -
accuracy: 0.6939 - loss: 0.5389 - val_accuracy: 0.7179 - val_loss: 0.5354
Epoch 711/1000
12/12              0s 22ms/step -
accuracy: 0.6946 - loss: 0.5438 - val_accuracy: 0.7179 - val_loss: 0.5355
Epoch 712/1000
12/12              0s 19ms/step -
accuracy: 0.7041 - loss: 0.5220 - val_accuracy: 0.7179 - val_loss: 0.5354
Epoch 713/1000
12/12              0s 20ms/step -
accuracy: 0.7068 - loss: 0.5256 - val_accuracy: 0.7179 - val_loss: 0.5355
Epoch 714/1000
12/12              0s 20ms/step -
accuracy: 0.7043 - loss: 0.5250 - val_accuracy: 0.7179 - val_loss: 0.5355
```

```
Epoch 715/1000
12/12              0s 18ms/step -
accuracy: 0.6917 - loss: 0.5567 - val_accuracy: 0.7179 - val_loss: 0.5355
Epoch 716/1000
12/12              0s 22ms/step -
accuracy: 0.7207 - loss: 0.5310 - val_accuracy: 0.7179 - val_loss: 0.5355
Epoch 717/1000
12/12              0s 20ms/step -
accuracy: 0.7072 - loss: 0.5416 - val_accuracy: 0.7179 - val_loss: 0.5354
Epoch 718/1000
12/12              0s 18ms/step -
accuracy: 0.7167 - loss: 0.5048 - val_accuracy: 0.7179 - val_loss: 0.5353
Epoch 719/1000
12/12              0s 19ms/step -
accuracy: 0.6857 - loss: 0.5507 - val_accuracy: 0.7179 - val_loss: 0.5353
Epoch 720/1000
12/12              0s 19ms/step -
accuracy: 0.7292 - loss: 0.5125 - val_accuracy: 0.7179 - val_loss: 0.5351
Epoch 721/1000
12/12              0s 9ms/step -
accuracy: 0.7163 - loss: 0.5310 - val_accuracy: 0.7179 - val_loss: 0.5351
Epoch 722/1000
12/12              0s 16ms/step -
accuracy: 0.7214 - loss: 0.5226 - val_accuracy: 0.7179 - val_loss: 0.5350
Epoch 723/1000
12/12              0s 18ms/step -
accuracy: 0.7331 - loss: 0.5190 - val_accuracy: 0.7179 - val_loss: 0.5349
Epoch 724/1000
12/12              0s 17ms/step -
accuracy: 0.7076 - loss: 0.5337 - val_accuracy: 0.7179 - val_loss: 0.5350
Epoch 725/1000
12/12              0s 11ms/step -
accuracy: 0.7036 - loss: 0.5238 - val_accuracy: 0.7179 - val_loss: 0.5350
Epoch 726/1000
12/12              0s 18ms/step -
accuracy: 0.7276 - loss: 0.5180 - val_accuracy: 0.7179 - val_loss: 0.5350
Epoch 727/1000
12/12              0s 19ms/step -
accuracy: 0.7196 - loss: 0.5170 - val_accuracy: 0.7179 - val_loss: 0.5348
Epoch 728/1000
12/12              0s 18ms/step -
accuracy: 0.7615 - loss: 0.4834 - val_accuracy: 0.7179 - val_loss: 0.5347
Epoch 729/1000
12/12              0s 18ms/step -
accuracy: 0.6907 - loss: 0.5318 - val_accuracy: 0.7179 - val_loss: 0.5347
Epoch 730/1000
12/12              0s 19ms/step -
accuracy: 0.7248 - loss: 0.5046 - val_accuracy: 0.7179 - val_loss: 0.5347
```

```
Epoch 731/1000
12/12              0s 18ms/step -
accuracy: 0.7180 - loss: 0.5209 - val_accuracy: 0.7179 - val_loss: 0.5347
Epoch 732/1000
12/12              0s 22ms/step -
accuracy: 0.7344 - loss: 0.5011 - val_accuracy: 0.7179 - val_loss: 0.5346
Epoch 733/1000
12/12              0s 9ms/step -
accuracy: 0.6908 - loss: 0.5385 - val_accuracy: 0.7179 - val_loss: 0.5347
Epoch 734/1000
12/12              0s 17ms/step -
accuracy: 0.6946 - loss: 0.5447 - val_accuracy: 0.7179 - val_loss: 0.5345
Epoch 735/1000
12/12              0s 18ms/step -
accuracy: 0.7071 - loss: 0.5033 - val_accuracy: 0.7179 - val_loss: 0.5344
Epoch 736/1000
12/12              0s 19ms/step -
accuracy: 0.7255 - loss: 0.5115 - val_accuracy: 0.7179 - val_loss: 0.5343
Epoch 737/1000
12/12              0s 15ms/step -
accuracy: 0.6984 - loss: 0.5205 - val_accuracy: 0.7179 - val_loss: 0.5343
Epoch 738/1000
12/12              0s 18ms/step -
accuracy: 0.6873 - loss: 0.5678 - val_accuracy: 0.7179 - val_loss: 0.5344
Epoch 739/1000
12/12              0s 17ms/step -
accuracy: 0.7034 - loss: 0.5323 - val_accuracy: 0.7179 - val_loss: 0.5344
Epoch 740/1000
12/12              0s 19ms/step -
accuracy: 0.6932 - loss: 0.5394 - val_accuracy: 0.7179 - val_loss: 0.5344
Epoch 741/1000
12/12              0s 15ms/step -
accuracy: 0.7027 - loss: 0.5320 - val_accuracy: 0.7179 - val_loss: 0.5342
Epoch 742/1000
12/12              0s 12ms/step -
accuracy: 0.6778 - loss: 0.5479 - val_accuracy: 0.7179 - val_loss: 0.5342
Epoch 743/1000
12/12              0s 14ms/step -
accuracy: 0.7209 - loss: 0.5178 - val_accuracy: 0.7179 - val_loss: 0.5341
Epoch 744/1000
12/12              0s 12ms/step -
accuracy: 0.6962 - loss: 0.5268 - val_accuracy: 0.7179 - val_loss: 0.5341
Epoch 745/1000
12/12              0s 19ms/step -
accuracy: 0.7130 - loss: 0.5182 - val_accuracy: 0.7179 - val_loss: 0.5340
Epoch 746/1000
12/12              0s 18ms/step -
accuracy: 0.7102 - loss: 0.5373 - val_accuracy: 0.7179 - val_loss: 0.5339
```

```
Epoch 747/1000
12/12             0s 19ms/step -
accuracy: 0.7210 - loss: 0.5145 - val_accuracy: 0.7179 - val_loss: 0.5338
Epoch 748/1000
12/12             0s 18ms/step -
accuracy: 0.7205 - loss: 0.5166 - val_accuracy: 0.7179 - val_loss: 0.5339
Epoch 749/1000
12/12             0s 17ms/step -
accuracy: 0.7217 - loss: 0.5142 - val_accuracy: 0.7179 - val_loss: 0.5339
Epoch 750/1000
12/12             0s 17ms/step -
accuracy: 0.7389 - loss: 0.4974 - val_accuracy: 0.7179 - val_loss: 0.5338
Epoch 751/1000
12/12             0s 7ms/step -
accuracy: 0.7076 - loss: 0.5320 - val_accuracy: 0.7179 - val_loss: 0.5338
Epoch 752/1000
12/12             0s 16ms/step -
accuracy: 0.7320 - loss: 0.5104 - val_accuracy: 0.7179 - val_loss: 0.5337
Epoch 753/1000
12/12             0s 18ms/step -
accuracy: 0.7151 - loss: 0.5236 - val_accuracy: 0.7179 - val_loss: 0.5336
Epoch 754/1000
12/12             0s 18ms/step -
accuracy: 0.7169 - loss: 0.5062 - val_accuracy: 0.7179 - val_loss: 0.5335
Epoch 755/1000
12/12             0s 18ms/step -
accuracy: 0.6861 - loss: 0.5472 - val_accuracy: 0.7265 - val_loss: 0.5334
Epoch 756/1000
12/12             0s 18ms/step -
accuracy: 0.7225 - loss: 0.5034 - val_accuracy: 0.7179 - val_loss: 0.5334
Epoch 757/1000
12/12             0s 18ms/step -
accuracy: 0.7200 - loss: 0.5174 - val_accuracy: 0.7179 - val_loss: 0.5335
Epoch 758/1000
12/12             0s 18ms/step -
accuracy: 0.7374 - loss: 0.5146 - val_accuracy: 0.7179 - val_loss: 0.5334
Epoch 759/1000
12/12             0s 22ms/step -
accuracy: 0.7302 - loss: 0.5232 - val_accuracy: 0.7265 - val_loss: 0.5332
Epoch 760/1000
12/12             0s 8ms/step -
accuracy: 0.7093 - loss: 0.5179 - val_accuracy: 0.7265 - val_loss: 0.5331
Epoch 761/1000
12/12             0s 11ms/step -
accuracy: 0.7181 - loss: 0.5200 - val_accuracy: 0.7265 - val_loss: 0.5332
Epoch 762/1000
12/12             0s 14ms/step -
accuracy: 0.7295 - loss: 0.5080 - val_accuracy: 0.7179 - val_loss: 0.5332
```

```
Epoch 763/1000
12/12              0s 18ms/step -
accuracy: 0.7069 - loss: 0.5136 - val_accuracy: 0.7179 - val_loss: 0.5331
Epoch 764/1000
12/12              0s 17ms/step -
accuracy: 0.7209 - loss: 0.5153 - val_accuracy: 0.7179 - val_loss: 0.5332
Epoch 765/1000
12/12              0s 20ms/step -
accuracy: 0.7191 - loss: 0.5081 - val_accuracy: 0.7179 - val_loss: 0.5331
Epoch 766/1000
12/12              0s 9ms/step -
accuracy: 0.7412 - loss: 0.4904 - val_accuracy: 0.7265 - val_loss: 0.5330
Epoch 767/1000
12/12              0s 10ms/step -
accuracy: 0.6902 - loss: 0.5360 - val_accuracy: 0.7179 - val_loss: 0.5330
Epoch 768/1000
12/12              0s 12ms/step -
accuracy: 0.6924 - loss: 0.5578 - val_accuracy: 0.7179 - val_loss: 0.5330
Epoch 769/1000
12/12              0s 8ms/step -
accuracy: 0.7375 - loss: 0.5049 - val_accuracy: 0.7179 - val_loss: 0.5329
Epoch 770/1000
12/12              0s 18ms/step -
accuracy: 0.7030 - loss: 0.5309 - val_accuracy: 0.7179 - val_loss: 0.5329
Epoch 771/1000
12/12              0s 13ms/step -
accuracy: 0.6868 - loss: 0.5385 - val_accuracy: 0.7179 - val_loss: 0.5329
Epoch 772/1000
12/12              0s 9ms/step -
accuracy: 0.7259 - loss: 0.5092 - val_accuracy: 0.7179 - val_loss: 0.5329
Epoch 773/1000
12/12              0s 14ms/step -
accuracy: 0.7063 - loss: 0.5219 - val_accuracy: 0.7179 - val_loss: 0.5329
Epoch 774/1000
12/12              0s 20ms/step -
accuracy: 0.7307 - loss: 0.5152 - val_accuracy: 0.7179 - val_loss: 0.5328
Epoch 775/1000
12/12              0s 19ms/step -
accuracy: 0.6970 - loss: 0.5279 - val_accuracy: 0.7179 - val_loss: 0.5329
Epoch 776/1000
12/12              0s 13ms/step -
accuracy: 0.7004 - loss: 0.5341 - val_accuracy: 0.7179 - val_loss: 0.5328
Epoch 777/1000
12/12              0s 19ms/step -
accuracy: 0.7199 - loss: 0.4996 - val_accuracy: 0.7179 - val_loss: 0.5327
Epoch 778/1000
12/12              0s 13ms/step -
accuracy: 0.7442 - loss: 0.4986 - val_accuracy: 0.7179 - val_loss: 0.5326
```

```
Epoch 779/1000
12/12          0s 13ms/step -
accuracy: 0.6824 - loss: 0.5444 - val_accuracy: 0.7179 - val_loss: 0.5327
Epoch 780/1000
12/12          0s 21ms/step -
accuracy: 0.7034 - loss: 0.5290 - val_accuracy: 0.7179 - val_loss: 0.5327
Epoch 781/1000
12/12          0s 9ms/step -
accuracy: 0.7102 - loss: 0.5225 - val_accuracy: 0.7179 - val_loss: 0.5325
Epoch 782/1000
12/12          0s 13ms/step -
accuracy: 0.6984 - loss: 0.5464 - val_accuracy: 0.7179 - val_loss: 0.5325
Epoch 783/1000
12/12          0s 10ms/step -
accuracy: 0.7170 - loss: 0.5176 - val_accuracy: 0.7179 - val_loss: 0.5325
Epoch 784/1000
12/12          0s 8ms/step -
accuracy: 0.6918 - loss: 0.5264 - val_accuracy: 0.7179 - val_loss: 0.5326
Epoch 785/1000
12/12          0s 17ms/step -
accuracy: 0.6715 - loss: 0.5510 - val_accuracy: 0.7179 - val_loss: 0.5326
Epoch 786/1000
12/12          0s 10ms/step -
accuracy: 0.6992 - loss: 0.5347 - val_accuracy: 0.7179 - val_loss: 0.5326
Epoch 787/1000
12/12          0s 14ms/step -
accuracy: 0.7081 - loss: 0.5299 - val_accuracy: 0.7179 - val_loss: 0.5325
Epoch 788/1000
12/12          0s 9ms/step -
accuracy: 0.7237 - loss: 0.5013 - val_accuracy: 0.7179 - val_loss: 0.5325
Epoch 789/1000
12/12          0s 15ms/step -
accuracy: 0.7094 - loss: 0.5149 - val_accuracy: 0.7179 - val_loss: 0.5324
Epoch 790/1000
12/12          0s 17ms/step -
accuracy: 0.6883 - loss: 0.5541 - val_accuracy: 0.7179 - val_loss: 0.5324
Epoch 791/1000
12/12          0s 18ms/step -
accuracy: 0.7192 - loss: 0.5279 - val_accuracy: 0.7179 - val_loss: 0.5321
Epoch 792/1000
12/12          0s 12ms/step -
accuracy: 0.6907 - loss: 0.5353 - val_accuracy: 0.7179 - val_loss: 0.5320
Epoch 793/1000
12/12          0s 19ms/step -
accuracy: 0.7133 - loss: 0.5299 - val_accuracy: 0.7179 - val_loss: 0.5320
Epoch 794/1000
12/12          0s 10ms/step -
accuracy: 0.6939 - loss: 0.5305 - val_accuracy: 0.7179 - val_loss: 0.5320
```

```
Epoch 795/1000
12/12          0s 12ms/step -
accuracy: 0.7290 - loss: 0.5031 - val_accuracy: 0.7265 - val_loss: 0.5319
Epoch 796/1000
12/12          0s 10ms/step -
accuracy: 0.7276 - loss: 0.4980 - val_accuracy: 0.7179 - val_loss: 0.5319
Epoch 797/1000
12/12          0s 8ms/step -
accuracy: 0.6847 - loss: 0.5523 - val_accuracy: 0.7179 - val_loss: 0.5321
Epoch 798/1000
12/12          0s 14ms/step -
accuracy: 0.6979 - loss: 0.5370 - val_accuracy: 0.7179 - val_loss: 0.5320
Epoch 799/1000
12/12          0s 15ms/step -
accuracy: 0.7361 - loss: 0.5031 - val_accuracy: 0.7179 - val_loss: 0.5318
Epoch 800/1000
12/12          0s 13ms/step -
accuracy: 0.7182 - loss: 0.5251 - val_accuracy: 0.7265 - val_loss: 0.5316
Epoch 801/1000
12/12          0s 9ms/step -
accuracy: 0.6857 - loss: 0.5404 - val_accuracy: 0.7179 - val_loss: 0.5319
Epoch 802/1000
12/12          0s 9ms/step -
accuracy: 0.7167 - loss: 0.5138 - val_accuracy: 0.7179 - val_loss: 0.5318
Epoch 803/1000
12/12          0s 10ms/step -
accuracy: 0.7080 - loss: 0.5311 - val_accuracy: 0.7265 - val_loss: 0.5316
Epoch 804/1000
12/12          0s 15ms/step -
accuracy: 0.7310 - loss: 0.4938 - val_accuracy: 0.7350 - val_loss: 0.5314
Epoch 805/1000
12/12          0s 8ms/step -
accuracy: 0.7260 - loss: 0.5019 - val_accuracy: 0.7265 - val_loss: 0.5314
Epoch 806/1000
12/12          0s 8ms/step -
accuracy: 0.7391 - loss: 0.4936 - val_accuracy: 0.7265 - val_loss: 0.5314
Epoch 807/1000
12/12          0s 16ms/step -
accuracy: 0.6858 - loss: 0.5433 - val_accuracy: 0.7179 - val_loss: 0.5315
Epoch 808/1000
12/12          0s 18ms/step -
accuracy: 0.7053 - loss: 0.5328 - val_accuracy: 0.7265 - val_loss: 0.5313
Epoch 809/1000
12/12          0s 15ms/step -
accuracy: 0.6902 - loss: 0.5552 - val_accuracy: 0.7179 - val_loss: 0.5314
Epoch 810/1000
12/12          0s 9ms/step -
accuracy: 0.7310 - loss: 0.5151 - val_accuracy: 0.7265 - val_loss: 0.5313
```

```
Epoch 811/1000
12/12            0s 9ms/step -
accuracy: 0.7466 - loss: 0.5013 - val_accuracy: 0.7436 - val_loss: 0.5311
Epoch 812/1000
12/12            0s 11ms/step -
accuracy: 0.6806 - loss: 0.5609 - val_accuracy: 0.7350 - val_loss: 0.5311
Epoch 813/1000
12/12            0s 9ms/step -
accuracy: 0.7089 - loss: 0.5158 - val_accuracy: 0.7436 - val_loss: 0.5310
Epoch 814/1000
12/12            0s 9ms/step -
accuracy: 0.7142 - loss: 0.5095 - val_accuracy: 0.7265 - val_loss: 0.5311
Epoch 815/1000
12/12            0s 15ms/step -
accuracy: 0.7093 - loss: 0.5339 - val_accuracy: 0.7179 - val_loss: 0.5312
Epoch 816/1000
12/12            0s 9ms/step -
accuracy: 0.7238 - loss: 0.4994 - val_accuracy: 0.7265 - val_loss: 0.5310
Epoch 817/1000
12/12            0s 17ms/step -
accuracy: 0.7045 - loss: 0.5460 - val_accuracy: 0.7265 - val_loss: 0.5310
Epoch 818/1000
12/12            0s 10ms/step -
accuracy: 0.7159 - loss: 0.5146 - val_accuracy: 0.7265 - val_loss: 0.5310
Epoch 819/1000
12/12            0s 12ms/step -
accuracy: 0.7118 - loss: 0.5129 - val_accuracy: 0.7265 - val_loss: 0.5310
Epoch 820/1000
12/12            0s 15ms/step -
accuracy: 0.7124 - loss: 0.5175 - val_accuracy: 0.7265 - val_loss: 0.5310
Epoch 821/1000
12/12            0s 10ms/step -
accuracy: 0.7209 - loss: 0.5149 - val_accuracy: 0.7179 - val_loss: 0.5310
Epoch 822/1000
12/12            0s 15ms/step -
accuracy: 0.7157 - loss: 0.5263 - val_accuracy: 0.7265 - val_loss: 0.5308
Epoch 823/1000
12/12            0s 10ms/step -
accuracy: 0.7072 - loss: 0.5265 - val_accuracy: 0.7179 - val_loss: 0.5310
Epoch 824/1000
12/12            0s 10ms/step -
accuracy: 0.7025 - loss: 0.5189 - val_accuracy: 0.7179 - val_loss: 0.5309
Epoch 825/1000
12/12            0s 10ms/step -
accuracy: 0.7356 - loss: 0.5100 - val_accuracy: 0.7350 - val_loss: 0.5307
Epoch 826/1000
12/12            0s 15ms/step -
accuracy: 0.7097 - loss: 0.5321 - val_accuracy: 0.7265 - val_loss: 0.5307
```

```
Epoch 827/1000
12/12              0s 14ms/step -
accuracy: 0.6859 - loss: 0.5238 - val_accuracy: 0.7265 - val_loss: 0.5308
Epoch 828/1000
12/12              0s 18ms/step -
accuracy: 0.6854 - loss: 0.5448 - val_accuracy: 0.7179 - val_loss: 0.5308
Epoch 829/1000
12/12              0s 18ms/step -
accuracy: 0.7198 - loss: 0.5111 - val_accuracy: 0.7265 - val_loss: 0.5307
Epoch 830/1000
12/12              0s 21ms/step -
accuracy: 0.7081 - loss: 0.5358 - val_accuracy: 0.7350 - val_loss: 0.5305
Epoch 831/1000
12/12              0s 11ms/step -
accuracy: 0.7181 - loss: 0.5375 - val_accuracy: 0.7350 - val_loss: 0.5305
Epoch 832/1000
12/12              0s 8ms/step -
accuracy: 0.6958 - loss: 0.5347 - val_accuracy: 0.7350 - val_loss: 0.5304
Epoch 833/1000
12/12              0s 13ms/step -
accuracy: 0.7172 - loss: 0.5111 - val_accuracy: 0.7350 - val_loss: 0.5304
Epoch 834/1000
12/12              0s 13ms/step -
accuracy: 0.7233 - loss: 0.5170 - val_accuracy: 0.7265 - val_loss: 0.5304
Epoch 835/1000
12/12              0s 16ms/step -
accuracy: 0.6977 - loss: 0.5319 - val_accuracy: 0.7265 - val_loss: 0.5304
Epoch 836/1000
12/12              0s 19ms/step -
accuracy: 0.7057 - loss: 0.5332 - val_accuracy: 0.7265 - val_loss: 0.5304
Epoch 837/1000
12/12              0s 9ms/step -
accuracy: 0.6903 - loss: 0.5412 - val_accuracy: 0.7179 - val_loss: 0.5305
Epoch 838/1000
12/12              0s 8ms/step -
accuracy: 0.6956 - loss: 0.5272 - val_accuracy: 0.7265 - val_loss: 0.5303
Epoch 839/1000
12/12              0s 19ms/step -
accuracy: 0.7298 - loss: 0.5206 - val_accuracy: 0.7350 - val_loss: 0.5302
Epoch 840/1000
12/12              0s 22ms/step -
accuracy: 0.6980 - loss: 0.5367 - val_accuracy: 0.7350 - val_loss: 0.5301
Epoch 841/1000
12/12              0s 13ms/step -
accuracy: 0.7106 - loss: 0.5102 - val_accuracy: 0.7350 - val_loss: 0.5301
Epoch 842/1000
12/12              0s 13ms/step -
accuracy: 0.7616 - loss: 0.4871 - val_accuracy: 0.7436 - val_loss: 0.5299
```

```
Epoch 843/1000
12/12          0s 18ms/step -
accuracy: 0.6984 - loss: 0.5324 - val_accuracy: 0.7350 - val_loss: 0.5300
Epoch 844/1000
12/12          0s 13ms/step -
accuracy: 0.7297 - loss: 0.5089 - val_accuracy: 0.7350 - val_loss: 0.5299
Epoch 845/1000
12/12          0s 16ms/step -
accuracy: 0.7669 - loss: 0.4809 - val_accuracy: 0.7436 - val_loss: 0.5298
Epoch 846/1000
12/12          0s 20ms/step -
accuracy: 0.7305 - loss: 0.5096 - val_accuracy: 0.7350 - val_loss: 0.5299
Epoch 847/1000
12/12          0s 18ms/step -
accuracy: 0.6966 - loss: 0.5416 - val_accuracy: 0.7350 - val_loss: 0.5299
Epoch 848/1000
12/12          0s 18ms/step -
accuracy: 0.7339 - loss: 0.5126 - val_accuracy: 0.7350 - val_loss: 0.5297
Epoch 849/1000
12/12          0s 15ms/step -
accuracy: 0.7419 - loss: 0.4875 - val_accuracy: 0.7436 - val_loss: 0.5296
Epoch 850/1000
12/12          0s 21ms/step -
accuracy: 0.6811 - loss: 0.5547 - val_accuracy: 0.7350 - val_loss: 0.5297
Epoch 851/1000
12/12          0s 9ms/step -
accuracy: 0.7155 - loss: 0.5299 - val_accuracy: 0.7436 - val_loss: 0.5295
Epoch 852/1000
12/12          0s 13ms/step -
accuracy: 0.7246 - loss: 0.5065 - val_accuracy: 0.7436 - val_loss: 0.5295
Epoch 853/1000
12/12          0s 10ms/step -
accuracy: 0.7356 - loss: 0.5032 - val_accuracy: 0.7436 - val_loss: 0.5295
Epoch 854/1000
12/12          0s 15ms/step -
accuracy: 0.7026 - loss: 0.5289 - val_accuracy: 0.7436 - val_loss: 0.5295
Epoch 855/1000
12/12          0s 19ms/step -
accuracy: 0.7109 - loss: 0.5234 - val_accuracy: 0.7350 - val_loss: 0.5295
Epoch 856/1000
12/12          0s 8ms/step -
accuracy: 0.7106 - loss: 0.5190 - val_accuracy: 0.7436 - val_loss: 0.5295
Epoch 857/1000
12/12          0s 8ms/step -
accuracy: 0.7084 - loss: 0.5204 - val_accuracy: 0.7436 - val_loss: 0.5293
Epoch 858/1000
12/12          0s 19ms/step -
accuracy: 0.7198 - loss: 0.5027 - val_accuracy: 0.7436 - val_loss: 0.5292
```

```
Epoch 859/1000
12/12            0s 18ms/step -
accuracy: 0.7359 - loss: 0.4900 - val_accuracy: 0.7436 - val_loss: 0.5293
Epoch 860/1000
12/12            0s 18ms/step -
accuracy: 0.7473 - loss: 0.4853 - val_accuracy: 0.7436 - val_loss: 0.5292
Epoch 861/1000
12/12            0s 19ms/step -
accuracy: 0.6910 - loss: 0.5473 - val_accuracy: 0.7436 - val_loss: 0.5292
Epoch 862/1000
12/12            0s 18ms/step -
accuracy: 0.7240 - loss: 0.5208 - val_accuracy: 0.7436 - val_loss: 0.5291
Epoch 863/1000
12/12            0s 18ms/step -
accuracy: 0.6932 - loss: 0.5217 - val_accuracy: 0.7350 - val_loss: 0.5293
Epoch 864/1000
12/12            0s 18ms/step -
accuracy: 0.6872 - loss: 0.5590 - val_accuracy: 0.7265 - val_loss: 0.5294
Epoch 865/1000
12/12            0s 8ms/step -
accuracy: 0.7506 - loss: 0.4883 - val_accuracy: 0.7350 - val_loss: 0.5293
Epoch 866/1000
12/12            0s 19ms/step -
accuracy: 0.7307 - loss: 0.5117 - val_accuracy: 0.7350 - val_loss: 0.5292
Epoch 867/1000
12/12            0s 20ms/step -
accuracy: 0.7186 - loss: 0.5078 - val_accuracy: 0.7350 - val_loss: 0.5292
Epoch 868/1000
12/12            0s 9ms/step -
accuracy: 0.7234 - loss: 0.5209 - val_accuracy: 0.7265 - val_loss: 0.5293
Epoch 869/1000
12/12            0s 13ms/step -
accuracy: 0.6924 - loss: 0.5506 - val_accuracy: 0.7265 - val_loss: 0.5293
Epoch 870/1000
12/12            0s 17ms/step -
accuracy: 0.7152 - loss: 0.5211 - val_accuracy: 0.7350 - val_loss: 0.5291
Epoch 871/1000
12/12            0s 15ms/step -
accuracy: 0.7020 - loss: 0.5379 - val_accuracy: 0.7350 - val_loss: 0.5290
Epoch 872/1000
12/12            0s 9ms/step -
accuracy: 0.7059 - loss: 0.5176 - val_accuracy: 0.7350 - val_loss: 0.5289
Epoch 873/1000
12/12            0s 8ms/step -
accuracy: 0.6837 - loss: 0.5356 - val_accuracy: 0.7350 - val_loss: 0.5289
Epoch 874/1000
12/12            0s 9ms/step -
accuracy: 0.6954 - loss: 0.5315 - val_accuracy: 0.7350 - val_loss: 0.5288
```

```
Epoch 875/1000
12/12              0s 9ms/step -
accuracy: 0.7176 - loss: 0.5274 - val_accuracy: 0.7350 - val_loss: 0.5288
Epoch 876/1000
12/12              0s 12ms/step -
accuracy: 0.7041 - loss: 0.5388 - val_accuracy: 0.7350 - val_loss: 0.5288
Epoch 877/1000
12/12              0s 12ms/step -
accuracy: 0.7028 - loss: 0.5502 - val_accuracy: 0.7350 - val_loss: 0.5288
Epoch 878/1000
12/12              0s 17ms/step -
accuracy: 0.6844 - loss: 0.5405 - val_accuracy: 0.7350 - val_loss: 0.5289
Epoch 879/1000
12/12              0s 16ms/step -
accuracy: 0.7017 - loss: 0.5383 - val_accuracy: 0.7350 - val_loss: 0.5288
Epoch 880/1000
12/12              0s 12ms/step -
accuracy: 0.7371 - loss: 0.4890 - val_accuracy: 0.7350 - val_loss: 0.5287
Epoch 881/1000
12/12              0s 16ms/step -
accuracy: 0.6998 - loss: 0.5332 - val_accuracy: 0.7436 - val_loss: 0.5286
Epoch 882/1000
12/12              0s 16ms/step -
accuracy: 0.7066 - loss: 0.5396 - val_accuracy: 0.7436 - val_loss: 0.5285
Epoch 883/1000
12/12              0s 18ms/step -
accuracy: 0.7074 - loss: 0.5237 - val_accuracy: 0.7436 - val_loss: 0.5285
Epoch 884/1000
12/12              0s 19ms/step -
accuracy: 0.7312 - loss: 0.4955 - val_accuracy: 0.7436 - val_loss: 0.5284
Epoch 885/1000
12/12              0s 19ms/step -
accuracy: 0.6977 - loss: 0.5289 - val_accuracy: 0.7436 - val_loss: 0.5283
Epoch 886/1000
12/12              0s 9ms/step -
accuracy: 0.7009 - loss: 0.5265 - val_accuracy: 0.7436 - val_loss: 0.5283
Epoch 887/1000
12/12              0s 7ms/step -
accuracy: 0.7105 - loss: 0.5148 - val_accuracy: 0.7436 - val_loss: 0.5283
Epoch 888/1000
12/12              0s 21ms/step -
accuracy: 0.7409 - loss: 0.4957 - val_accuracy: 0.7436 - val_loss: 0.5281
Epoch 889/1000
12/12              0s 15ms/step -
accuracy: 0.6801 - loss: 0.5480 - val_accuracy: 0.7436 - val_loss: 0.5282
Epoch 890/1000
12/12              0s 9ms/step -
accuracy: 0.7077 - loss: 0.5295 - val_accuracy: 0.7436 - val_loss: 0.5282
```

```
Epoch 891/1000
12/12              0s 18ms/step -
accuracy: 0.7194 - loss: 0.4895 - val_accuracy: 0.7436 - val_loss: 0.5281
Epoch 892/1000
12/12              0s 18ms/step -
accuracy: 0.7234 - loss: 0.4978 - val_accuracy: 0.7436 - val_loss: 0.5281
Epoch 893/1000
12/12              0s 9ms/step -
accuracy: 0.7427 - loss: 0.4997 - val_accuracy: 0.7436 - val_loss: 0.5279
Epoch 894/1000
12/12              0s 9ms/step -
accuracy: 0.6788 - loss: 0.5420 - val_accuracy: 0.7436 - val_loss: 0.5280
Epoch 895/1000
12/12              0s 10ms/step -
accuracy: 0.7056 - loss: 0.5206 - val_accuracy: 0.7436 - val_loss: 0.5280
Epoch 896/1000
12/12              0s 19ms/step -
accuracy: 0.7290 - loss: 0.5193 - val_accuracy: 0.7436 - val_loss: 0.5279
Epoch 897/1000
12/12              0s 19ms/step -
accuracy: 0.7124 - loss: 0.5205 - val_accuracy: 0.7436 - val_loss: 0.5280
Epoch 898/1000
12/12              0s 17ms/step -
accuracy: 0.7158 - loss: 0.5056 - val_accuracy: 0.7436 - val_loss: 0.5278
Epoch 899/1000
12/12              0s 19ms/step -
accuracy: 0.7479 - loss: 0.4985 - val_accuracy: 0.7436 - val_loss: 0.5277
Epoch 900/1000
12/12              0s 7ms/step -
accuracy: 0.7157 - loss: 0.5110 - val_accuracy: 0.7436 - val_loss: 0.5277
Epoch 901/1000
12/12              0s 17ms/step -
accuracy: 0.6839 - loss: 0.5463 - val_accuracy: 0.7436 - val_loss: 0.5278
Epoch 902/1000
12/12              0s 16ms/step -
accuracy: 0.7130 - loss: 0.5149 - val_accuracy: 0.7436 - val_loss: 0.5278
Epoch 903/1000
12/12              0s 20ms/step -
accuracy: 0.7146 - loss: 0.5114 - val_accuracy: 0.7350 - val_loss: 0.5278
Epoch 904/1000
12/12              0s 18ms/step -
accuracy: 0.7330 - loss: 0.5039 - val_accuracy: 0.7436 - val_loss: 0.5277
Epoch 905/1000
12/12              0s 19ms/step -
accuracy: 0.7086 - loss: 0.5229 - val_accuracy: 0.7436 - val_loss: 0.5277
Epoch 906/1000
12/12              0s 15ms/step -
accuracy: 0.6987 - loss: 0.5378 - val_accuracy: 0.7350 - val_loss: 0.5278
```

```
Epoch 907/1000
12/12              0s 15ms/step -
accuracy: 0.7389 - loss: 0.5024 - val_accuracy: 0.7436 - val_loss: 0.5276
Epoch 908/1000
12/12              0s 13ms/step -
accuracy: 0.7246 - loss: 0.5169 - val_accuracy: 0.7436 - val_loss: 0.5274
Epoch 909/1000
12/12              0s 17ms/step -
accuracy: 0.7265 - loss: 0.5087 - val_accuracy: 0.7436 - val_loss: 0.5274
Epoch 910/1000
12/12              0s 10ms/step -
accuracy: 0.7210 - loss: 0.5146 - val_accuracy: 0.7436 - val_loss: 0.5274
Epoch 911/1000
12/12              0s 17ms/step -
accuracy: 0.7544 - loss: 0.4875 - val_accuracy: 0.7436 - val_loss: 0.5274
Epoch 912/1000
12/12              0s 19ms/step -
accuracy: 0.7108 - loss: 0.5203 - val_accuracy: 0.7436 - val_loss: 0.5274
Epoch 913/1000
12/12              0s 18ms/step -
accuracy: 0.7220 - loss: 0.4975 - val_accuracy: 0.7436 - val_loss: 0.5272
Epoch 914/1000
12/12              0s 13ms/step -
accuracy: 0.7267 - loss: 0.5034 - val_accuracy: 0.7436 - val_loss: 0.5272
Epoch 915/1000
12/12              0s 15ms/step -
accuracy: 0.7103 - loss: 0.5164 - val_accuracy: 0.7436 - val_loss: 0.5273
Epoch 916/1000
12/12              0s 10ms/step -
accuracy: 0.7204 - loss: 0.5269 - val_accuracy: 0.7436 - val_loss: 0.5274
Epoch 917/1000
12/12              0s 14ms/step -
accuracy: 0.7159 - loss: 0.5192 - val_accuracy: 0.7436 - val_loss: 0.5273
Epoch 918/1000
12/12              0s 9ms/step -
accuracy: 0.7087 - loss: 0.5094 - val_accuracy: 0.7436 - val_loss: 0.5273
Epoch 919/1000
12/12              0s 9ms/step -
accuracy: 0.7087 - loss: 0.5172 - val_accuracy: 0.7436 - val_loss: 0.5272
Epoch 920/1000
12/12              0s 10ms/step -
accuracy: 0.7304 - loss: 0.4993 - val_accuracy: 0.7436 - val_loss: 0.5270
Epoch 921/1000
12/12              0s 10ms/step -
accuracy: 0.6964 - loss: 0.5288 - val_accuracy: 0.7436 - val_loss: 0.5271
Epoch 922/1000
12/12              0s 8ms/step -
accuracy: 0.7052 - loss: 0.5227 - val_accuracy: 0.7436 - val_loss: 0.5270
```

```
Epoch 923/1000
12/12          0s 8ms/step -
accuracy: 0.6876 - loss: 0.5372 - val_accuracy: 0.7350 - val_loss: 0.5272
Epoch 924/1000
12/12          0s 10ms/step -
accuracy: 0.7248 - loss: 0.5297 - val_accuracy: 0.7436 - val_loss: 0.5271
Epoch 925/1000
12/12          0s 9ms/step -
accuracy: 0.6866 - loss: 0.5196 - val_accuracy: 0.7350 - val_loss: 0.5272
Epoch 926/1000
12/12          0s 9ms/step -
accuracy: 0.7168 - loss: 0.5101 - val_accuracy: 0.7436 - val_loss: 0.5270
Epoch 927/1000
12/12          0s 10ms/step -
accuracy: 0.6880 - loss: 0.5385 - val_accuracy: 0.7436 - val_loss: 0.5269
Epoch 928/1000
12/12          0s 10ms/step -
accuracy: 0.7284 - loss: 0.5048 - val_accuracy: 0.7436 - val_loss: 0.5268
Epoch 929/1000
12/12          0s 10ms/step -
accuracy: 0.7002 - loss: 0.5416 - val_accuracy: 0.7436 - val_loss: 0.5267
Epoch 930/1000
12/12          0s 23ms/step -
accuracy: 0.7101 - loss: 0.5248 - val_accuracy: 0.7436 - val_loss: 0.5268
Epoch 931/1000
12/12          0s 10ms/step -
accuracy: 0.7292 - loss: 0.4972 - val_accuracy: 0.7436 - val_loss: 0.5268
Epoch 932/1000
12/12          0s 10ms/step -
accuracy: 0.7203 - loss: 0.5164 - val_accuracy: 0.7436 - val_loss: 0.5267
Epoch 933/1000
12/12          0s 9ms/step -
accuracy: 0.7089 - loss: 0.5366 - val_accuracy: 0.7350 - val_loss: 0.5268
Epoch 934/1000
12/12          0s 10ms/step -
accuracy: 0.7167 - loss: 0.5352 - val_accuracy: 0.7436 - val_loss: 0.5267
Epoch 935/1000
12/12          0s 11ms/step -
accuracy: 0.7098 - loss: 0.5197 - val_accuracy: 0.7436 - val_loss: 0.5266
Epoch 936/1000
12/12          0s 17ms/step -
accuracy: 0.6980 - loss: 0.5281 - val_accuracy: 0.7436 - val_loss: 0.5265
Epoch 937/1000
12/12          0s 15ms/step -
accuracy: 0.7021 - loss: 0.5262 - val_accuracy: 0.7436 - val_loss: 0.5264
Epoch 938/1000
12/12          0s 18ms/step -
accuracy: 0.7182 - loss: 0.5346 - val_accuracy: 0.7436 - val_loss: 0.5264
```

```
Epoch 939/1000
12/12              0s 9ms/step -
accuracy: 0.7366 - loss: 0.5003 - val_accuracy: 0.7436 - val_loss: 0.5264
Epoch 940/1000
12/12              0s 9ms/step -
accuracy: 0.7267 - loss: 0.5089 - val_accuracy: 0.7436 - val_loss: 0.5264
Epoch 941/1000
12/12              0s 12ms/step -
accuracy: 0.7144 - loss: 0.5115 - val_accuracy: 0.7436 - val_loss: 0.5264
Epoch 942/1000
12/12              0s 16ms/step -
accuracy: 0.7053 - loss: 0.5296 - val_accuracy: 0.7436 - val_loss: 0.5264
Epoch 943/1000
12/12              0s 11ms/step -
accuracy: 0.7205 - loss: 0.5224 - val_accuracy: 0.7436 - val_loss: 0.5263
Epoch 944/1000
12/12              0s 11ms/step -
accuracy: 0.7128 - loss: 0.5201 - val_accuracy: 0.7436 - val_loss: 0.5263
Epoch 945/1000
12/12              0s 7ms/step -
accuracy: 0.7208 - loss: 0.5185 - val_accuracy: 0.7436 - val_loss: 0.5262
Epoch 946/1000
12/12              0s 13ms/step -
accuracy: 0.7286 - loss: 0.5149 - val_accuracy: 0.7436 - val_loss: 0.5261
Epoch 947/1000
12/12              0s 18ms/step -
accuracy: 0.7188 - loss: 0.5129 - val_accuracy: 0.7436 - val_loss: 0.5261
Epoch 948/1000
12/12              0s 17ms/step -
accuracy: 0.6864 - loss: 0.5418 - val_accuracy: 0.7436 - val_loss: 0.5263
Epoch 949/1000
12/12              0s 18ms/step -
accuracy: 0.7190 - loss: 0.5231 - val_accuracy: 0.7436 - val_loss: 0.5262
Epoch 950/1000
12/12              0s 18ms/step -
accuracy: 0.7028 - loss: 0.5389 - val_accuracy: 0.7436 - val_loss: 0.5261
Epoch 951/1000
12/12              0s 18ms/step -
accuracy: 0.7289 - loss: 0.5087 - val_accuracy: 0.7436 - val_loss: 0.5259
Epoch 952/1000
12/12              0s 17ms/step -
accuracy: 0.6956 - loss: 0.5285 - val_accuracy: 0.7436 - val_loss: 0.5259
Epoch 953/1000
12/12              0s 12ms/step -
accuracy: 0.7155 - loss: 0.5187 - val_accuracy: 0.7436 - val_loss: 0.5259
Epoch 954/1000
12/12              0s 18ms/step -
accuracy: 0.7108 - loss: 0.5207 - val_accuracy: 0.7436 - val_loss: 0.5259
```

```
Epoch 955/1000
12/12                0s 18ms/step -
accuracy: 0.6978 - loss: 0.5340 - val_accuracy: 0.7436 - val_loss: 0.5258
Epoch 956/1000
12/12                0s 19ms/step -
accuracy: 0.7085 - loss: 0.5178 - val_accuracy: 0.7436 - val_loss: 0.5259
Epoch 957/1000
12/12                0s 19ms/step -
accuracy: 0.7402 - loss: 0.5109 - val_accuracy: 0.7436 - val_loss: 0.5258
Epoch 958/1000
12/12                0s 19ms/step -
accuracy: 0.7124 - loss: 0.5154 - val_accuracy: 0.7350 - val_loss: 0.5260
Epoch 959/1000
12/12                0s 18ms/step -
accuracy: 0.6986 - loss: 0.5309 - val_accuracy: 0.7436 - val_loss: 0.5258
Epoch 960/1000
12/12                0s 8ms/step -
accuracy: 0.7268 - loss: 0.5121 - val_accuracy: 0.7436 - val_loss: 0.5257
Epoch 961/1000
12/12                0s 17ms/step -
accuracy: 0.7118 - loss: 0.5167 - val_accuracy: 0.7436 - val_loss: 0.5257
Epoch 962/1000
12/12                0s 19ms/step -
accuracy: 0.7325 - loss: 0.5202 - val_accuracy: 0.7436 - val_loss: 0.5256
Epoch 963/1000
12/12                0s 18ms/step -
accuracy: 0.7095 - loss: 0.5133 - val_accuracy: 0.7436 - val_loss: 0.5255
Epoch 964/1000
12/12                0s 18ms/step -
accuracy: 0.7116 - loss: 0.5103 - val_accuracy: 0.7436 - val_loss: 0.5256
Epoch 965/1000
12/12                0s 18ms/step -
accuracy: 0.7319 - loss: 0.5071 - val_accuracy: 0.7436 - val_loss: 0.5256
Epoch 966/1000
12/12                0s 18ms/step -
accuracy: 0.7237 - loss: 0.5017 - val_accuracy: 0.7436 - val_loss: 0.5254
Epoch 967/1000
12/12                0s 8ms/step -
accuracy: 0.7035 - loss: 0.5175 - val_accuracy: 0.7436 - val_loss: 0.5256
Epoch 968/1000
12/12                0s 8ms/step -
accuracy: 0.7076 - loss: 0.5155 - val_accuracy: 0.7436 - val_loss: 0.5254
Epoch 969/1000
12/12                0s 9ms/step -
accuracy: 0.7134 - loss: 0.5227 - val_accuracy: 0.7436 - val_loss: 0.5255
Epoch 970/1000
12/12                0s 11ms/step -
accuracy: 0.6996 - loss: 0.5409 - val_accuracy: 0.7436 - val_loss: 0.5254
```

```
Epoch 971/1000
12/12              0s 14ms/step -
accuracy: 0.7131 - loss: 0.5256 - val_accuracy: 0.7436 - val_loss: 0.5254
Epoch 972/1000
12/12              0s 18ms/step -
accuracy: 0.7266 - loss: 0.5028 - val_accuracy: 0.7436 - val_loss: 0.5253
Epoch 973/1000
12/12              0s 17ms/step -
accuracy: 0.7028 - loss: 0.5363 - val_accuracy: 0.7436 - val_loss: 0.5254
Epoch 974/1000
12/12              0s 9ms/step -
accuracy: 0.7205 - loss: 0.5161 - val_accuracy: 0.7436 - val_loss: 0.5253
Epoch 975/1000
12/12              0s 10ms/step -
accuracy: 0.7193 - loss: 0.5192 - val_accuracy: 0.7436 - val_loss: 0.5252
Epoch 976/1000
12/12              0s 18ms/step -
accuracy: 0.6747 - loss: 0.5323 - val_accuracy: 0.7436 - val_loss: 0.5253
Epoch 977/1000
12/12              0s 9ms/step -
accuracy: 0.7047 - loss: 0.5300 - val_accuracy: 0.7350 - val_loss: 0.5253
Epoch 978/1000
12/12              0s 9ms/step -
accuracy: 0.6679 - loss: 0.5472 - val_accuracy: 0.7350 - val_loss: 0.5254
Epoch 979/1000
12/12              0s 19ms/step -
accuracy: 0.7389 - loss: 0.4818 - val_accuracy: 0.7436 - val_loss: 0.5252
Epoch 980/1000
12/12              0s 8ms/step -
accuracy: 0.7190 - loss: 0.5247 - val_accuracy: 0.7436 - val_loss: 0.5252
Epoch 981/1000
12/12              0s 17ms/step -
accuracy: 0.7006 - loss: 0.5256 - val_accuracy: 0.7436 - val_loss: 0.5251
Epoch 982/1000
12/12              0s 19ms/step -
accuracy: 0.6782 - loss: 0.5580 - val_accuracy: 0.7350 - val_loss: 0.5252
Epoch 983/1000
12/12              0s 20ms/step -
accuracy: 0.7164 - loss: 0.5267 - val_accuracy: 0.7436 - val_loss: 0.5250
Epoch 984/1000
12/12              0s 11ms/step -
accuracy: 0.7191 - loss: 0.5199 - val_accuracy: 0.7436 - val_loss: 0.5250
Epoch 985/1000
12/12              0s 14ms/step -
accuracy: 0.7261 - loss: 0.5071 - val_accuracy: 0.7436 - val_loss: 0.5250
Epoch 986/1000
12/12              0s 10ms/step -
accuracy: 0.7071 - loss: 0.5270 - val_accuracy: 0.7436 - val_loss: 0.5250
```

```
Epoch 987/1000
12/12              0s 14ms/step -
accuracy: 0.7201 - loss: 0.5067 - val_accuracy: 0.7436 - val_loss: 0.5249
Epoch 988/1000
12/12              0s 11ms/step -
accuracy: 0.7299 - loss: 0.5049 - val_accuracy: 0.7436 - val_loss: 0.5248
Epoch 989/1000
12/12              0s 9ms/step -
accuracy: 0.7005 - loss: 0.5330 - val_accuracy: 0.7436 - val_loss: 0.5249
Epoch 990/1000
12/12              0s 10ms/step -
accuracy: 0.7471 - loss: 0.4999 - val_accuracy: 0.7436 - val_loss: 0.5246
Epoch 991/1000
12/12              0s 9ms/step -
accuracy: 0.7430 - loss: 0.5097 - val_accuracy: 0.7436 - val_loss: 0.5246
Epoch 992/1000
12/12              0s 13ms/step -
accuracy: 0.7187 - loss: 0.5161 - val_accuracy: 0.7436 - val_loss: 0.5247
Epoch 993/1000
12/12              0s 18ms/step -
accuracy: 0.7111 - loss: 0.5291 - val_accuracy: 0.7436 - val_loss: 0.5248
Epoch 994/1000
12/12              0s 18ms/step -
accuracy: 0.7127 - loss: 0.5174 - val_accuracy: 0.7436 - val_loss: 0.5247
Epoch 995/1000
12/12              0s 15ms/step -
accuracy: 0.7099 - loss: 0.5214 - val_accuracy: 0.7436 - val_loss: 0.5245
Epoch 996/1000
12/12              0s 16ms/step -
accuracy: 0.7047 - loss: 0.5243 - val_accuracy: 0.7436 - val_loss: 0.5245
Epoch 997/1000
12/12              0s 14ms/step -
accuracy: 0.7219 - loss: 0.5243 - val_accuracy: 0.7436 - val_loss: 0.5245
Epoch 998/1000
12/12              0s 9ms/step -
accuracy: 0.7313 - loss: 0.5222 - val_accuracy: 0.7436 - val_loss: 0.5244
Epoch 999/1000
12/12              0s 20ms/step -
accuracy: 0.7121 - loss: 0.5202 - val_accuracy: 0.7436 - val_loss: 0.5245
Epoch 1000/1000
12/12              0s 21ms/step -
accuracy: 0.7048 - loss: 0.5107 - val_accuracy: 0.7436 - val_loss: 0.5244
```

```python
[25]: val_acc = history.history['val_accuracy'][-1]
      print(f"Final accuracy using tanh activation function {val_acc*100:.2f}%")
```

```
Final accuracy using tanh activation function 74.36%
```

```
[26]: plt.plot(history.history['accuracy'], label='Train Accuracy')
      plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
      plt.xlabel('Epochs')
      plt.ylabel('Accuracy')
      plt.title('Model Accuracy Over Epochs with tanh activation')
      plt.legend()
      plt.show()
```
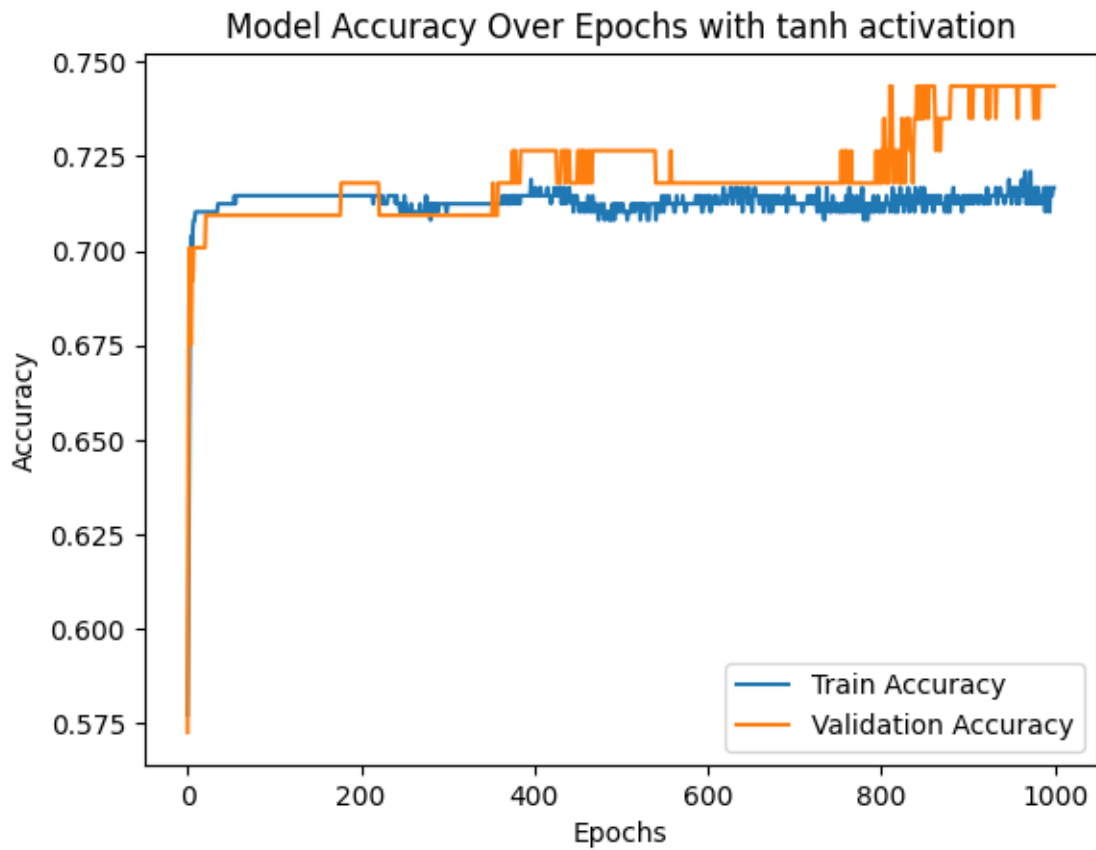

activation function	batch size	accuracy
sigmoid	50	70.94%
relu	25	74.36%
tanh	40	74.36%

0.4 Question:3 Next let us try a multi class classification problem where we will work with the mnist dataset. It contains **70000** handwritten images of digits from 0 to 9. So its a 10 class classification problem. Lets try to create a model that can do the classification task.

```python
[33]: import keras
      from keras.datasets import mnist
      from keras.models import Sequential
      from keras.layers import Dense, Flatten
      from keras.optimizers import SGD
      import matplotlib.pyplot as plt

      batch_size = 128
      num_classes = 10
      epochs = 10
      (x_train,y_train), (x_test,y_test) = mnist.load_data()
      plt.imshow(x_train[3])
      plt.show()
      # print(x_train[3])
```
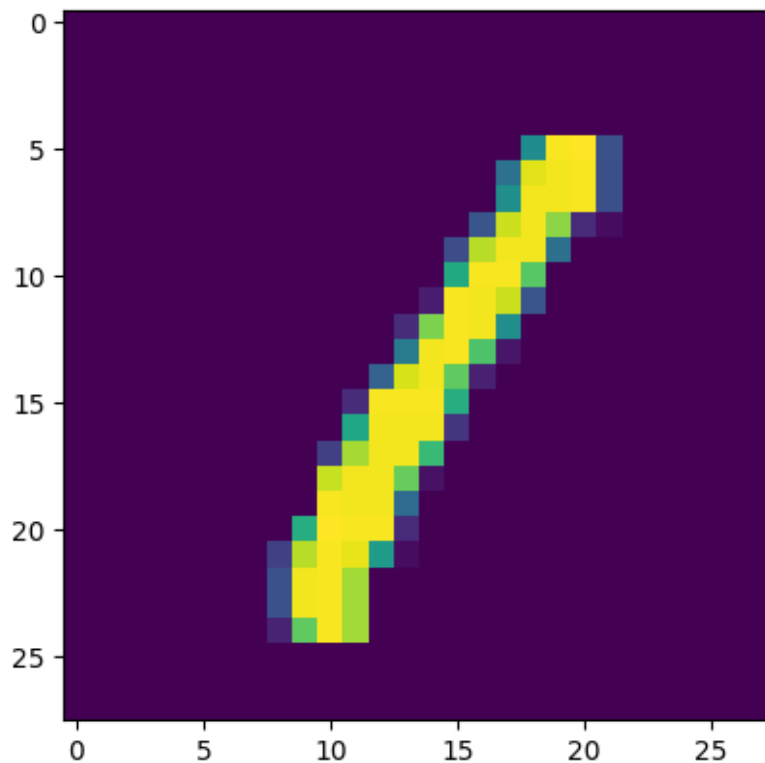
0.4.1 Converting all the values in the array in the range of 0 to 1 for better training by the neural network.

```
[35]: x_train = x_train/255
      x_test = x_test/255
```

0.4.2 Making the artificial neural network

```
[48]: model = Sequential()
      model.add(Flatten(input_shape = (28,28)))
      model.add(Dense(128, activation = 'relu'))
      model.add(Dense(32, activation = 'relu'))
      model.add(Dense(10, activation = 'softmax'))
```

```
[49]: model.summary()
```

Model: "sequential_7"

Layer (type)	Output Shape	Param #
flatten_2 (Flatten)	(None, 784)	0
dense_13 (Dense)	(None, 128)	100,480
dense_14 (Dense)	(None, 32)	4,128
dense_15 (Dense)	(None, 10)	330

Total params: 104,938 (409.91 KB)

Trainable params: 104,938 (409.91 KB)

Non-trainable params: 0 (0.00 B)

```
[54]: model.compile(loss = 'sparse_categorical_crossentropy',␣
       ↪optimizer='Adam',metrics=['accuracy'])
```

-

0.4.3 If we use sparse_categorical_crossentropy we need not one hot encode the output variable , whereas if we use categorical_crossentropy we need to one hot encode the output variable

```python
[55]: history = model.fit(x_train,y_train, batch_size = batch_size, epochs = 10,
       ↪validation_split=0.2, verbose=1)
```

```
Epoch 1/10
375/375              4s 8ms/step -
accuracy: 0.9985 - loss: 0.0041 - val_accuracy: 0.9765 - val_loss: 0.1371
Epoch 2/10
375/375              2s 6ms/step -
accuracy: 0.9988 - loss: 0.0038 - val_accuracy: 0.9743 - val_loss: 0.1469
Epoch 3/10
375/375              3s 8ms/step -
accuracy: 0.9969 - loss: 0.0092 - val_accuracy: 0.9746 - val_loss: 0.1387
Epoch 4/10
375/375              3s 9ms/step -
accuracy: 0.9989 - loss: 0.0029 - val_accuracy: 0.9778 - val_loss: 0.1339
Epoch 5/10
375/375              3s 9ms/step -
accuracy: 0.9998 - loss: 0.0014 - val_accuracy: 0.9776 - val_loss: 0.1308
Epoch 6/10
375/375              4s 9ms/step -
accuracy: 1.0000 - loss: 3.7422e-04 - val_accuracy: 0.9781 - val_loss: 0.1303
Epoch 7/10
375/375              3s 9ms/step -
accuracy: 1.0000 - loss: 1.8339e-04 - val_accuracy: 0.9787 - val_loss: 0.1324
Epoch 8/10
375/375              3s 9ms/step -
accuracy: 1.0000 - loss: 1.3987e-04 - val_accuracy: 0.9783 - val_loss: 0.1314
Epoch 9/10
375/375              3s 9ms/step -
accuracy: 1.0000 - loss: 1.2087e-04 - val_accuracy: 0.9783 - val_loss: 0.1328
Epoch 10/10
375/375              3s 9ms/step -
accuracy: 1.0000 - loss: 1.0478e-04 - val_accuracy: 0.9787 - val_loss: 0.1337
```

```python
[56]: y_prob = model.predict(x_test)
      y_pred = y_prob.argmax(axis = 1)
```
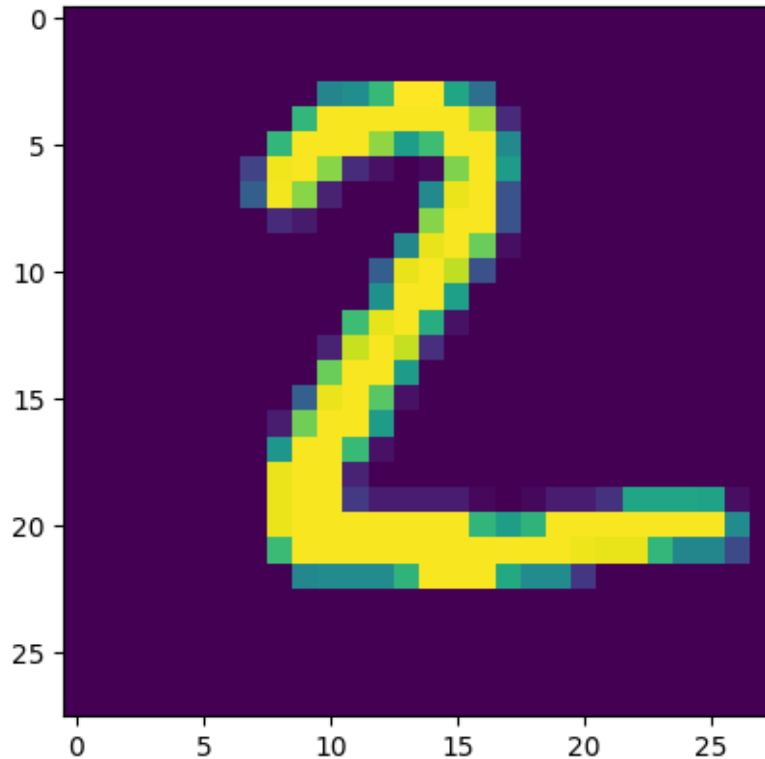
```
313/313              1s 4ms/step
```

```python
[57]: from sklearn.metrics import accuracy_score
      print(f"Accuracy:{accuracy_score(y_test,y_pred)*100:.2f}%")
```

```
Accuracy:98.00%
```

0.4.4 Checking the results

```
[60]: plt.imshow(x_test[1])
      plt.show()
```



```
[61]: model.predict(x_test[1].reshape(1,28,28)).argmax(axis = 1)
```

```
1/1                     0s 102ms/step
```

```
[61]: array([2])
```

0.5 Question:4 Next our task is to write a scratch code for a simple feed forward network that does a task. This model has inputs as [0, 0, 1], [0, 1, 1], [1, 0, 1], [1, 1, 1] and the expected output as [0], [1], [1], [0] in each case. So there are three features in our dataset as you see above. The activation function is to be taken as sigmoid. The architecture is like we have only one hidden layer and an output layer with one neuron. Take the error function as $(1/2)(y - y\hat{})2$

```
[64]: import numpy as np

      # sigmoid activation function
```

```python
def sigmoid(x):
    return 1 / (1 + np.exp(-x))

# derivative of sigmoid function
def sigmoid_derivative(x):
    return x*(1-x)

# mean squared error loss
def mse_loss(y_true,y_pred):
    return 0.5*np.mean((y_true-y_pred)**2)

# Input dataset (XOR gate inputs with bias term)

x = np.array([[0,0,1],
              [0,1,1],
              [1,0,1],
              [1,1,1]])

# output labels
y = np.array([[0],
              [1],
              [1],
              [0]])

# seed for reproducibility
np.random.seed(1)

# Initialize weights randomly with mean 0
input_size = 3  # 3 input features
hidden_size = 2 # 2 hidden layers
output_size = 1 # 1 output neuron

# Weights
w1 = 2 * np.random.random((input_size, hidden_size))-1
w2 = 2 * np.random.random((hidden_size, output_size))-1

# Biases
b1 = np.zeros((1, hidden_size))
b2 = np.zeros((1, output_size))

# Learning rate
lr = 0.1

# Training loop
for epoch in range(10000):

    ##------------- Forward pass --------------------
```

```python
    a1 = np.dot(x,w1) + b1
    h1 = sigmoid(a1)    # activation of hidden layer

    a2 = np.dot(h1,w2) + b2
    output = sigmoid(a2) # final prediction

    # loss calculation
    loss = mse_loss(y,output)

    ##-------------- Back propagation ---------------
    # output layer error
    output_error = output - y
    output_delta = output_error * sigmoid_derivative(output)

    ## hidden layer error
    hidden_error = np.dot(output_delta, w2.T)
    hidden_delta = hidden_error * sigmoid_derivative(h1)

    ##------------Updating weights and biases -----------
    w2 -= lr * np.dot(h1.T,output_delta)
    b2 -= lr * np.sum(output_delta, axis = 0, keepdims = True)

    w1 -= lr * np.dot(x.T, hidden_delta)
    b1 -= lr * np.sum(hidden_delta, axis = 0, keepdims = True)

    # Print loss every 1000 epochs
    if epoch % 1000 == 0:
        print(f"Epoch {epoch}, Loss: {loss:.4f}")

# --------- Final Output ---------
print("\nFinal predictions after training:")
print(output.round(3))
```

```
Epoch 0, Loss: 0.1267
Epoch 1000, Loss: 0.1215
Epoch 2000, Loss: 0.1029
Epoch 3000, Loss: 0.0905
Epoch 4000, Loss: 0.0828
Epoch 5000, Loss: 0.0433
Epoch 6000, Loss: 0.0105
Epoch 7000, Loss: 0.0049
Epoch 8000, Loss: 0.0031
Epoch 9000, Loss: 0.0022

Final predictions after training:
[[0.049]
 [0.945]
```

```
     [0.945]
     [0.071]]
```

[65]:
```python
y_pred_binary = (output > 0.5).astype(int)
print("Predicted labels:", y_pred_binary.ravel())
print("True labels:     ", y.ravel())
```

```
Predicted labels: [0 1 1 0]
True labels:      [0 1 1 0]
```