

NNDL-CIA1

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Question - 1

XOR Gate

Truth Table for XOR Gate

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	0

```
In [19]: import numpy as np
import matplotlib.pyplot as plt
from sklearn.neural_network import MLPClassifier
```

Single Layer Perceptron without MCP

```
In [31]: import numpy as np

class Perceptron:
    def __init__(self, learning_rate=0.1, epochs=10):
        self.learning_rate = learning_rate
        self.epochs = epochs
        self.weights = None
        self.bias = None

    def relu(self, z):
        return np.maximum(0, z)

    def relu_derivative(self, z):
        return np.where(z > 0, 1, 0)

    def train(self, X, y, random_weights=True):
        n_samples, n_features = X.shape

        if random_weights:
            self.weights = np.random.rand(n_features)
        else:
            self.weights = np.array([0.5, 0.5])
            self.bias = 0.0

        for epoch in range(self.epochs):
            for idx, x_i in enumerate(X):
```

```

        linear_output = np.dot(x_i, self.weights) + self.bias
        predicted = self.relu(linear_output)
        error = y[idx] - predicted
        gradient = error * self.relu_derivative(predicted)
        self.weights += self.learning_rate * gradient * x_i
        self.bias += self.learning_rate * gradient

    def predict(self, X):
        linear_output = np.dot(X, self.weights) + self.bias
        return self.relu(linear_output)

perceptron = Perceptron(learning_rate=0.1, epochs=100)

```

In [32]:

```

X_xor = np.array([[0, 0], [0, 1], [1, 0], [1, 1]])
y_xor = np.array([0, 1, 1, 0])

perceptron_xor = Perceptron(learning_rate=0.1, epochs=100)
perceptron_xor.train(X_xor, y_xor, random_weights=True)

for x, target in zip(X_xor, y_xor):
    output = perceptron_xor.predict(x)
    print(f"Input: {x} - Predicted: {round(output, 2)} - Actual: {target}")

```

Input: [0 0] - Predicted: 0.56 - Actual: 0
 Input: [0 1] - Predicted: 0.5 - Actual: 1
 Input: [1 0] - Predicted: 0.44 - Actual: 1
 Input: [1 1] - Predicted: 0.39 - Actual: 0

The perceptron will struggle with the XOR gate because XOR is not linearly separable. A single-layer perceptron can only solve linearly separable problems like AND, OR, and AND-NOT. To solve XOR, you'd need a more complex model, such as a multi-layer perceptron (MLP) with non-linear activation functions.

Single Layer Perceptron with MCP (McCulloch Pitts) Neuron

In [20]:

```

class SingleLayerPerceptron:
    def __init__(self, input_size):
        self.weights = np.random.rand(input_size)
        self.threshold = 0.5

    def activation(self, x):
        return 1 if x >= self.threshold else 0

    def predict(self, x):
        summation = np.dot(x, self.weights)
        return self.activation(summation)

    def fit(self, X, y, epochs=10):
        for _ in range(epochs):
            for idx, x_i in enumerate(X):
                predicted = self.predict(x_i)

                error = y[idx] - predicted
                self.weights += error * x_i

```

In [23]:

```

X_xor = np.array([[0, 0], [0, 1], [1, 0], [1, 1]])
y_xor = np.array([0, 1, 1, 0])

```

```

slp = SingleLayerPerceptron(input_size=2)
slp.fit(X_xor, y_xor, epochs=100)

slp_predictions = [(x, slp.predict(x)) for x in X_xor]

print("Single Layer Perceptron predictions:")
for input_val, pred in slp_predictions:
    print(f"Input: {input_val}, Predicted Output: {pred}")

```

Single Layer Perceptron predictions:
 Input: [0 0], Predicted Output: 0
 Input: [0 1], Predicted Output: 0
 Input: [1 0], Predicted Output: 0
 Input: [1 1], Predicted Output: 0

Single MCP Neuron Performance: The MCP neuron will also fail to correctly classify the XOR dataset because XOR is not linearly separable. Like the perceptron, the MCP neuron can only handle linearly separable problems. So, the output predictions won't match the expected XOR gate outputs

- The XOR gate requires non-linear decision boundaries , it can't be separated by a single straight line in the input space.
- Both the MCP and Single Layer Perceptrons can only model linearly separable problems, so they fail on XOR classification.

```

In [30]: from keras.models import Sequential
         from keras.layers import Dense

         mlp_model = Sequential()
         mlp_model.add(Dense(2, input_dim=2, activation='relu'))
         mlp_model.add(Dense(1, activation='sigmoid'))

         mlp_model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])

         mlp_model.fit(X_xor, y_xor, epochs=500, verbose=0)

         mlp_predictions = mlp_model.predict(X_xor)
         floatValues = mlp_predictions
         mlp_predictions = [1 if pred > 0.5 else 0 for pred in mlp_predictions]
         print(f"Predictions using Multi-Layer Perceptron: {mlp_predictions}")
         print(floatValues)

```

c:\Users\USER\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer in the model instead.
 super().__init__(activity_regularizer=activity_regularizer, **kwargs)

WARNING:tensorflow:5 out of the last 785 calls to <function TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_distributed at 0x0000019D049C0220> triggered tf.function retracing. Tracing is expensive and the excessive number of tracings could be due to (1) creating @tf.function repeatedly in a loop, (2) passing tensors with different shapes, (3) passing Python objects instead of tensors. For (1), please define your @tf.function outside of the loop. For (2), @tf.function has reduce_retracing=True option that can avoid unnecessary retracing. For (3), please refer to https://www.tensorflow.org/guide/function#controlling_retracing and https://www.tensorflow.org/api_docs/python/tf/function for more details.

1/1 **0s** 55ms/step

Predictions using Multi-Layer Perceptron: [1, 1, 1, 0]

```
[[0.55919135]
 [0.52284753]
 [0.5264766 ]
 [0.411234  ]]
```

1/1 **0s** 55ms/step

Predictions using Multi-Layer Perceptron: [1, 1, 1, 0]

```
[[0.55919135]
 [0.52284753]
 [0.5264766 ]
 [0.411234  ]]
```

Single Layer Perceptron:

- The Single Layer Perceptron fails to classify XOR correctly. This happens because XOR is not linearly separable.
- A Single Layer Perceptron can only handle problems where the classes can be separated by a straight line.

Multi-Layer Perceptron (MLP):

- The MLP, on the other hand, can handle non-linear separability. By using at least one hidden layer with non-linear activation functions the model can classify XOR correctly.
- The MLP predictions will closely match the XOR truth table

Question - 2

part B

Load the Dataset and preprocess

```
In [1]: import numpy as np
from tensorflow.keras.datasets import imdb
from tensorflow.keras.preprocessing.sequence import pad_sequences

(X_train, y_train), (X_test, y_test) = imdb.load_data(num_words=10000)

X_train = pad_sequences(X_train, maxlen=200)
X_test = pad_sequences(X_test, maxlen=200)

print(f"Training data shape: {X_train.shape}, Test data shape: {X_test.shape}")
```

Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/imdb.npz

17464789/17464789 ————— 3s 0us/step

Training data shape: (25000, 200), Test data shape: (25000, 200)

understanding the X and y trains values

```
In [2]: print(X_train[0])
print(y_train[0])
```

```
[ 5 25 100 43 838 112 50 670 2 9 35 480 284 5
 150 4 172 112 167 2 336 385 39 4 172 4536 1111 17
 546 38 13 447 4 192 50 16 6 147 2025 19 14 22
 4 1920 4613 469 4 22 71 87 12 16 43 530 38 76
 15 13 1247 4 22 17 515 17 12 16 626 18 2 5
 62 386 12 8 316 8 106 5 4 2223 5244 16 480 66
 3785 33 4 130 12 16 38 619 5 25 124 51 36 135
 48 25 1415 33 6 22 12 215 28 77 52 5 14 407
 16 82 2 8 4 107 117 5952 15 256 4 2 7 3766
 5 723 36 71 43 530 476 26 400 317 46 7 4 2
 1029 13 104 88 4 381 15 297 98 32 2071 56 26 141
 6 194 7486 18 4 226 22 21 134 476 26 480 5 144
 30 5535 18 51 36 28 224 92 25 104 4 226 65 16
 38 1334 88 12 16 283 5 16 4472 113 103 32 15 16
 5345 19 178 32]
```

1

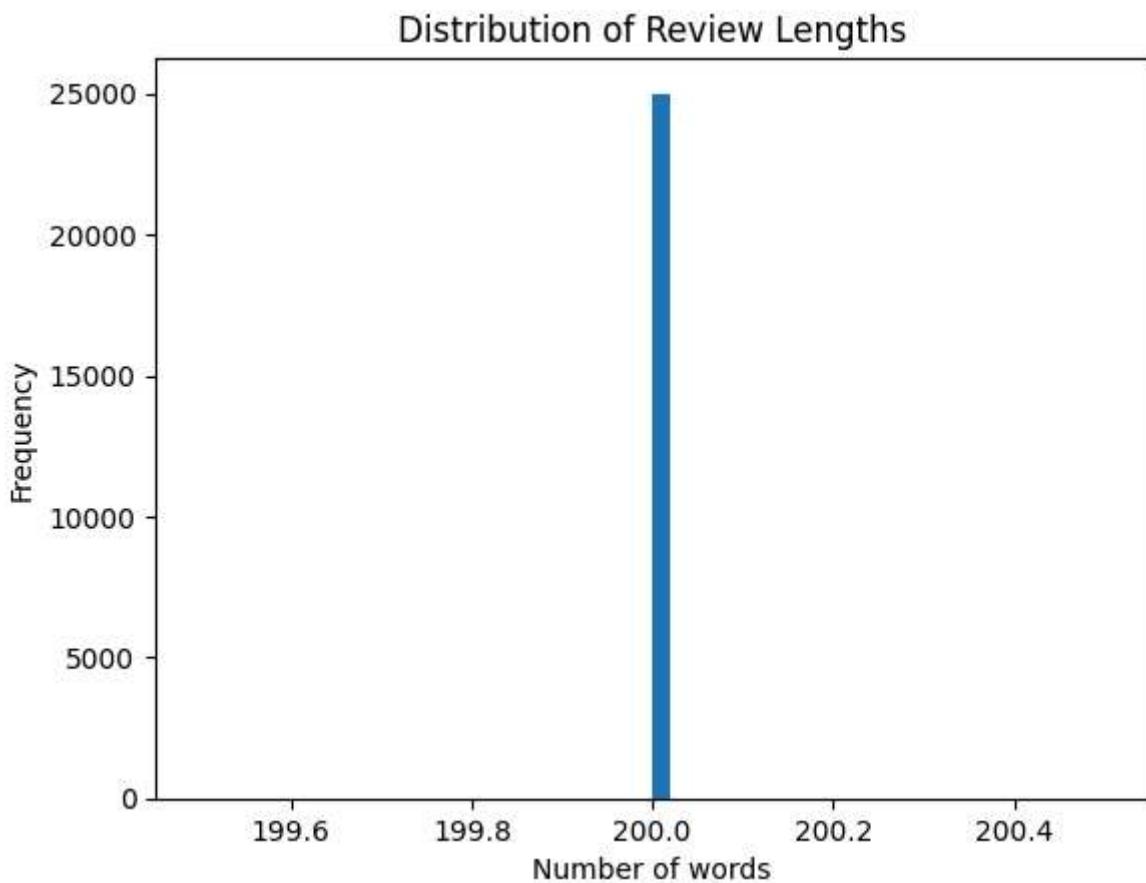
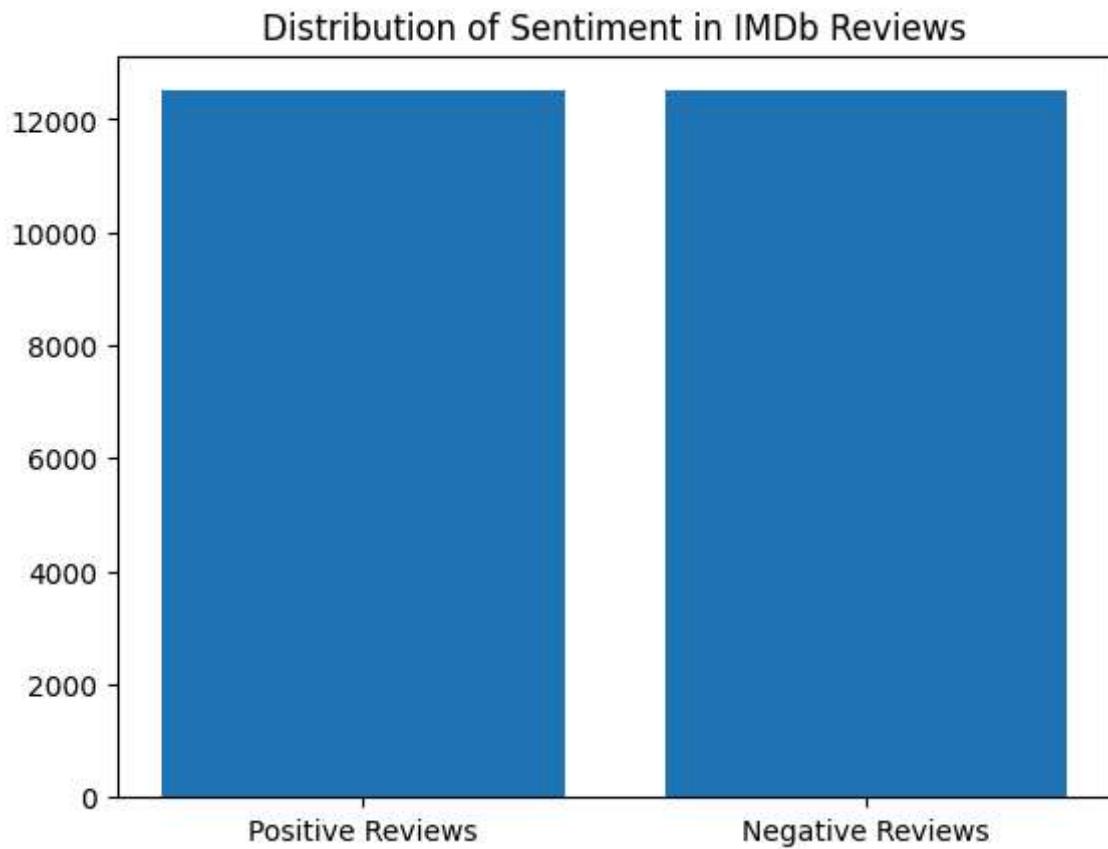
Exploratory Data Analysis

```
In [34]: import matplotlib.pyplot as plt
```

```
positive_reviews = np.sum(y_train == 1)
negative_reviews = np.sum(y_train == 0)

plt.bar(['Positive Reviews', 'Negative Reviews'], [positive_reviews, negative_reviews])
plt.title('Distribution of Sentiment in IMDb Reviews')
plt.show()

review_lengths = [len(review) for review in X_train]
plt.hist(review_lengths, bins=50)
plt.title('Distribution of Review Lengths')
plt.xlabel('Number of words')
plt.ylabel('Frequency')
plt.show()
```



Model Architecture

- first input layer - relu function (units 128)
- second inner input layer - relu function (units 64)
- outer layer - sigmoid function (units 1)

The model consists of two hidden layers (Dense) with ReLU activation:

- The first layer has 128 neurons.
 - The second layer has 64 neurons.
- The output layer has 1 neuron with sigmoid activation, which is appropriate for binary classification.

Compilation:

- Adam optimizer is used for optimization.
- Binary cross-entropy is correctly used as the loss function for binary classification.
- Accuracy is included in the metrics to track during training

```
In [11]: from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense

model = Sequential()

model.add(Dense(units=128, activation='relu', input_shape=(200,)))

model.add(Dense(units=64, activation='relu'))

model.add(Dense(units=1, activation='sigmoid'))

model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])

model.summary()
```

Model: "sequential_7"

Layer (type)	Output Shape	Param #
dense_12 (Dense)	(None, 128)	25,728
dense_13 (Dense)	(None, 64)	8,256
dense_14 (Dense)	(None, 1)	65

Total params: 34,049 (133.00 KB)
 Trainable params: 34,049 (133.00 KB)
 Non-trainable params: 0 (0.00 B)

Training the model with 1000 epoch

```
In [15]: history = model.fit(X_train, y_train, epochs=1000, batch_size=128, validation_da
loss, accuracy = model.evaluate(X_test, y_test)
```

Epoch 1/1000
196/196 0s 2ms/step - accuracy: 0.7061 - loss: 0.4322 - val_accuracy: 0.5041 - val_loss: 3.5795
Epoch 2/1000
196/196 0s 2ms/step - accuracy: 0.7090 - loss: 0.4373 - val_accuracy: 0.5030 - val_loss: 3.6685
Epoch 3/1000
196/196 0s 2ms/step - accuracy: 0.7067 - loss: 0.4297 - val_accuracy: 0.5032 - val_loss: 4.1899
Epoch 4/1000
196/196 0s 2ms/step - accuracy: 0.7064 - loss: 0.4424 - val_accuracy: 0.5024 - val_loss: 3.9583
Epoch 5/1000
196/196 0s 2ms/step - accuracy: 0.7044 - loss: 0.4318 - val_accuracy: 0.5036 - val_loss: 3.3980
Epoch 6/1000
196/196 0s 2ms/step - accuracy: 0.7065 - loss: 0.4277 - val_accuracy: 0.5038 - val_loss: 3.3094
Epoch 7/1000
196/196 0s 2ms/step - accuracy: 0.7000 - loss: 0.4383 - val_accuracy: 0.5007 - val_loss: 3.6908
Epoch 8/1000
196/196 0s 2ms/step - accuracy: 0.7081 - loss: 0.4399 - val_accuracy: 0.5033 - val_loss: 4.2247
Epoch 9/1000
196/196 0s 2ms/step - accuracy: 0.7060 - loss: 0.4293 - val_accuracy: 0.5036 - val_loss: 3.7042
Epoch 10/1000
196/196 0s 2ms/step - accuracy: 0.7117 - loss: 0.4279 - val_accuracy: 0.5024 - val_loss: 3.7620
Epoch 11/1000
196/196 0s 2ms/step - accuracy: 0.7126 - loss: 0.4197 - val_accuracy: 0.5032 - val_loss: 4.2921
Epoch 12/1000
196/196 0s 2ms/step - accuracy: 0.7076 - loss: 0.4245 - val_accuracy: 0.5042 - val_loss: 4.1897
Epoch 13/1000
196/196 0s 2ms/step - accuracy: 0.7126 - loss: 0.4274 - val_accuracy: 0.5023 - val_loss: 4.0086
Epoch 14/1000
196/196 0s 2ms/step - accuracy: 0.7080 - loss: 0.4261 - val_accuracy: 0.5019 - val_loss: 3.6205
Epoch 15/1000
196/196 0s 2ms/step - accuracy: 0.7187 - loss: 0.4181 - val_accuracy: 0.5034 - val_loss: 3.6654
Epoch 16/1000
196/196 0s 2ms/step - accuracy: 0.7136 - loss: 0.4335 - val_accuracy: 0.5043 - val_loss: 3.8963
Epoch 17/1000
196/196 0s 2ms/step - accuracy: 0.7154 - loss: 0.4192 - val_accuracy: 0.5036 - val_loss: 3.7789
Epoch 18/1000
196/196 0s 2ms/step - accuracy: 0.7139 - loss: 0.4195 - val_accuracy: 0.5041 - val_loss: 3.9065
Epoch 19/1000
196/196 0s 2ms/step - accuracy: 0.7196 - loss: 0.4174 - val_accuracy: 0.5048 - val_loss: 4.1812
Epoch 20/1000
196/196 0s 2ms/step - accuracy: 0.7158 - loss: 0.4190 - val_accuracy: 0.5042 - val_loss: 4.5139

Epoch 21/1000
196/196 0s 2ms/step - accuracy: 0.7114 - loss: 0.4268 - val_accuracy: 0.5030 - val_loss: 4.1574
Epoch 22/1000
196/196 0s 2ms/step - accuracy: 0.7147 - loss: 0.4202 - val_accuracy: 0.5055 - val_loss: 3.6580
Epoch 23/1000
196/196 0s 2ms/step - accuracy: 0.7143 - loss: 0.4280 - val_accuracy: 0.5029 - val_loss: 3.9827
Epoch 24/1000
196/196 0s 2ms/step - accuracy: 0.7113 - loss: 0.4291 - val_accuracy: 0.5048 - val_loss: 3.8555
Epoch 25/1000
196/196 0s 2ms/step - accuracy: 0.7188 - loss: 0.4088 - val_accuracy: 0.5029 - val_loss: 4.0098
Epoch 26/1000
196/196 0s 2ms/step - accuracy: 0.7214 - loss: 0.4053 - val_accuracy: 0.5033 - val_loss: 5.0652
Epoch 27/1000
196/196 0s 2ms/step - accuracy: 0.7247 - loss: 0.4122 - val_accuracy: 0.5030 - val_loss: 5.4461
Epoch 28/1000
196/196 0s 2ms/step - accuracy: 0.7142 - loss: 0.4184 - val_accuracy: 0.5014 - val_loss: 4.4545
Epoch 29/1000
196/196 0s 2ms/step - accuracy: 0.7001 - loss: 0.4341 - val_accuracy: 0.5028 - val_loss: 4.9628
Epoch 30/1000
196/196 0s 2ms/step - accuracy: 0.7162 - loss: 0.4219 - val_accuracy: 0.5031 - val_loss: 4.3700
Epoch 31/1000
196/196 0s 2ms/step - accuracy: 0.7226 - loss: 0.4090 - val_accuracy: 0.5051 - val_loss: 4.2065
Epoch 32/1000
196/196 0s 2ms/step - accuracy: 0.7252 - loss: 0.4075 - val_accuracy: 0.5036 - val_loss: 3.7627
Epoch 33/1000
196/196 0s 2ms/step - accuracy: 0.7171 - loss: 0.4083 - val_accuracy: 0.5042 - val_loss: 5.7528
Epoch 34/1000
196/196 0s 2ms/step - accuracy: 0.7205 - loss: 0.4228 - val_accuracy: 0.5037 - val_loss: 4.3326
Epoch 35/1000
196/196 0s 2ms/step - accuracy: 0.7289 - loss: 0.4080 - val_accuracy: 0.5052 - val_loss: 4.6535
Epoch 36/1000
196/196 0s 2ms/step - accuracy: 0.7194 - loss: 0.4126 - val_accuracy: 0.5042 - val_loss: 4.4578
Epoch 37/1000
196/196 0s 2ms/step - accuracy: 0.7223 - loss: 0.4018 - val_accuracy: 0.5044 - val_loss: 4.0704
Epoch 38/1000
196/196 0s 2ms/step - accuracy: 0.7213 - loss: 0.4260 - val_accuracy: 0.5013 - val_loss: 5.6386
Epoch 39/1000
196/196 0s 2ms/step - accuracy: 0.7230 - loss: 0.4207 - val_accuracy: 0.5023 - val_loss: 4.7848
Epoch 40/1000
196/196 0s 2ms/step - accuracy: 0.7147 - loss: 0.4160 - val_accuracy: 0.5005 - val_loss: 4.6735

Epoch 41/1000
196/196 0s 2ms/step - accuracy: 0.7235 - loss: 0.4090 - val_accuracy: 0.5008 - val_loss: 3.8517
Epoch 42/1000
196/196 0s 2ms/step - accuracy: 0.7270 - loss: 0.4036 - val_accuracy: 0.5025 - val_loss: 5.1097
Epoch 43/1000
196/196 0s 2ms/step - accuracy: 0.7261 - loss: 0.4142 - val_accuracy: 0.5022 - val_loss: 5.2070
Epoch 44/1000
196/196 0s 2ms/step - accuracy: 0.7254 - loss: 0.4138 - val_accuracy: 0.5031 - val_loss: 4.9051
Epoch 45/1000
196/196 0s 2ms/step - accuracy: 0.7249 - loss: 0.4050 - val_accuracy: 0.5036 - val_loss: 5.2120
Epoch 46/1000
196/196 0s 2ms/step - accuracy: 0.7267 - loss: 0.4014 - val_accuracy: 0.5044 - val_loss: 5.6001
Epoch 47/1000
196/196 0s 2ms/step - accuracy: 0.7274 - loss: 0.4092 - val_accuracy: 0.5043 - val_loss: 4.7250
Epoch 48/1000
196/196 0s 2ms/step - accuracy: 0.7280 - loss: 0.4042 - val_accuracy: 0.5040 - val_loss: 4.8039
Epoch 49/1000
196/196 0s 2ms/step - accuracy: 0.7304 - loss: 0.4064 - val_accuracy: 0.5046 - val_loss: 4.8009
Epoch 50/1000
196/196 0s 2ms/step - accuracy: 0.7306 - loss: 0.4072 - val_accuracy: 0.5034 - val_loss: 5.2590
Epoch 51/1000
196/196 0s 2ms/step - accuracy: 0.7294 - loss: 0.4073 - val_accuracy: 0.5035 - val_loss: 5.7902
Epoch 52/1000
196/196 0s 2ms/step - accuracy: 0.7297 - loss: 0.4041 - val_accuracy: 0.5024 - val_loss: 5.1698
Epoch 53/1000
196/196 0s 2ms/step - accuracy: 0.7358 - loss: 0.4048 - val_accuracy: 0.5021 - val_loss: 5.1078
Epoch 54/1000
196/196 0s 2ms/step - accuracy: 0.7279 - loss: 0.4108 - val_accuracy: 0.5029 - val_loss: 5.2241
Epoch 55/1000
196/196 0s 2ms/step - accuracy: 0.7261 - loss: 0.4094 - val_accuracy: 0.5036 - val_loss: 5.4072
Epoch 56/1000
196/196 0s 2ms/step - accuracy: 0.7306 - loss: 0.4022 - val_accuracy: 0.5038 - val_loss: 5.4688
Epoch 57/1000
196/196 0s 2ms/step - accuracy: 0.7296 - loss: 0.4035 - val_accuracy: 0.5038 - val_loss: 5.1388
Epoch 58/1000
196/196 0s 2ms/step - accuracy: 0.7331 - loss: 0.3965 - val_accuracy: 0.5033 - val_loss: 5.6457
Epoch 59/1000
196/196 0s 2ms/step - accuracy: 0.7349 - loss: 0.3977 - val_accuracy: 0.5022 - val_loss: 5.7367
Epoch 60/1000
196/196 0s 2ms/step - accuracy: 0.7292 - loss: 0.4040 - val_accuracy: 0.5025 - val_loss: 4.4854

Epoch 61/1000
196/196 0s 2ms/step - accuracy: 0.7360 - loss: 0.3992 - val_accuracy: 0.5040 - val_loss: 5.6952
Epoch 62/1000
196/196 0s 2ms/step - accuracy: 0.7317 - loss: 0.4007 - val_accuracy: 0.5030 - val_loss: 6.2945
Epoch 63/1000
196/196 0s 2ms/step - accuracy: 0.7281 - loss: 0.4042 - val_accuracy: 0.5027 - val_loss: 5.9278
Epoch 64/1000
196/196 0s 2ms/step - accuracy: 0.7302 - loss: 0.4024 - val_accuracy: 0.5025 - val_loss: 5.2273
Epoch 65/1000
196/196 0s 2ms/step - accuracy: 0.7335 - loss: 0.4006 - val_accuracy: 0.5012 - val_loss: 6.1690
Epoch 66/1000
196/196 0s 2ms/step - accuracy: 0.7273 - loss: 0.4002 - val_accuracy: 0.5009 - val_loss: 5.2370
Epoch 67/1000
196/196 0s 2ms/step - accuracy: 0.7316 - loss: 0.3967 - val_accuracy: 0.5024 - val_loss: 5.4522
Epoch 68/1000
196/196 0s 2ms/step - accuracy: 0.7335 - loss: 0.3957 - val_accuracy: 0.5032 - val_loss: 4.9943
Epoch 69/1000
196/196 0s 2ms/step - accuracy: 0.7398 - loss: 0.3918 - val_accuracy: 0.5031 - val_loss: 4.6217
Epoch 70/1000
196/196 0s 2ms/step - accuracy: 0.7351 - loss: 0.3944 - val_accuracy: 0.5018 - val_loss: 5.3794
Epoch 71/1000
196/196 0s 2ms/step - accuracy: 0.7345 - loss: 0.3950 - val_accuracy: 0.5027 - val_loss: 6.2519
Epoch 72/1000
196/196 0s 2ms/step - accuracy: 0.7304 - loss: 0.4096 - val_accuracy: 0.5031 - val_loss: 6.9876
Epoch 73/1000
196/196 0s 2ms/step - accuracy: 0.7363 - loss: 0.4022 - val_accuracy: 0.5024 - val_loss: 4.9657
Epoch 74/1000
196/196 0s 2ms/step - accuracy: 0.7355 - loss: 0.3954 - val_accuracy: 0.5028 - val_loss: 5.8323
Epoch 75/1000
196/196 0s 2ms/step - accuracy: 0.7391 - loss: 0.3933 - val_accuracy: 0.5051 - val_loss: 5.6948
Epoch 76/1000
196/196 0s 2ms/step - accuracy: 0.7393 - loss: 0.3878 - val_accuracy: 0.5015 - val_loss: 4.4024
Epoch 77/1000
196/196 0s 2ms/step - accuracy: 0.7362 - loss: 0.3912 - val_accuracy: 0.5019 - val_loss: 5.5485
Epoch 78/1000
196/196 0s 2ms/step - accuracy: 0.7410 - loss: 0.3872 - val_accuracy: 0.5036 - val_loss: 5.6288
Epoch 79/1000
196/196 0s 2ms/step - accuracy: 0.7381 - loss: 0.3924 - val_accuracy: 0.5009 - val_loss: 6.8016
Epoch 80/1000
196/196 0s 2ms/step - accuracy: 0.7405 - loss: 0.3965 - val_accuracy: 0.5014 - val_loss: 6.3296

Epoch 81/1000
196/196 0s 2ms/step - accuracy: 0.7286 - loss: 0.4047 - val_accuracy: 0.5036 - val_loss: 6.3793
Epoch 82/1000
196/196 0s 2ms/step - accuracy: 0.7361 - loss: 0.3920 - val_accuracy: 0.5019 - val_loss: 5.0180
Epoch 83/1000
196/196 0s 2ms/step - accuracy: 0.7377 - loss: 0.3863 - val_accuracy: 0.5044 - val_loss: 6.0441
Epoch 84/1000
196/196 0s 2ms/step - accuracy: 0.7473 - loss: 0.3832 - val_accuracy: 0.5026 - val_loss: 5.3355
Epoch 85/1000
196/196 0s 2ms/step - accuracy: 0.7418 - loss: 0.3961 - val_accuracy: 0.5032 - val_loss: 5.3045
Epoch 86/1000
196/196 0s 2ms/step - accuracy: 0.7397 - loss: 0.3925 - val_accuracy: 0.5017 - val_loss: 5.7008
Epoch 87/1000
196/196 0s 2ms/step - accuracy: 0.7409 - loss: 0.3874 - val_accuracy: 0.5038 - val_loss: 6.6948
Epoch 88/1000
196/196 0s 2ms/step - accuracy: 0.7410 - loss: 0.3952 - val_accuracy: 0.5024 - val_loss: 6.1951
Epoch 89/1000
196/196 0s 2ms/step - accuracy: 0.7441 - loss: 0.3863 - val_accuracy: 0.5028 - val_loss: 5.4493
Epoch 90/1000
196/196 0s 2ms/step - accuracy: 0.7449 - loss: 0.3838 - val_accuracy: 0.5018 - val_loss: 5.8649
Epoch 91/1000
196/196 0s 2ms/step - accuracy: 0.7465 - loss: 0.3798 - val_accuracy: 0.5000 - val_loss: 5.8711
Epoch 92/1000
196/196 0s 2ms/step - accuracy: 0.7440 - loss: 0.3869 - val_accuracy: 0.5006 - val_loss: 5.3050
Epoch 93/1000
196/196 0s 2ms/step - accuracy: 0.7448 - loss: 0.3875 - val_accuracy: 0.5029 - val_loss: 5.8270
Epoch 94/1000
196/196 0s 2ms/step - accuracy: 0.7453 - loss: 0.3817 - val_accuracy: 0.5026 - val_loss: 5.7560
Epoch 95/1000
196/196 0s 2ms/step - accuracy: 0.7431 - loss: 0.3886 - val_accuracy: 0.5034 - val_loss: 5.9359
Epoch 96/1000
196/196 0s 2ms/step - accuracy: 0.7471 - loss: 0.3752 - val_accuracy: 0.5020 - val_loss: 5.0303
Epoch 97/1000
196/196 0s 2ms/step - accuracy: 0.7486 - loss: 0.3795 - val_accuracy: 0.5028 - val_loss: 6.5173
Epoch 98/1000
196/196 0s 2ms/step - accuracy: 0.7462 - loss: 0.3833 - val_accuracy: 0.5015 - val_loss: 5.5750
Epoch 99/1000
196/196 0s 2ms/step - accuracy: 0.7473 - loss: 0.3834 - val_accuracy: 0.5014 - val_loss: 5.4116
Epoch 100/1000
196/196 0s 2ms/step - accuracy: 0.7471 - loss: 0.3790 - val_accuracy: 0.5026 - val_loss: 6.1823

Epoch 101/1000
196/196 0s 2ms/step - accuracy: 0.7411 - loss: 0.3975 - val_accuracy: 0.5029 - val_loss: 5.5570
Epoch 102/1000
196/196 0s 2ms/step - accuracy: 0.7507 - loss: 0.3768 - val_accuracy: 0.5027 - val_loss: 5.0712
Epoch 103/1000
196/196 0s 2ms/step - accuracy: 0.7468 - loss: 0.3858 - val_accuracy: 0.5009 - val_loss: 7.1700
Epoch 104/1000
196/196 0s 2ms/step - accuracy: 0.7380 - loss: 0.3972 - val_accuracy: 0.5036 - val_loss: 6.0304
Epoch 105/1000
196/196 0s 2ms/step - accuracy: 0.7485 - loss: 0.3861 - val_accuracy: 0.5034 - val_loss: 5.8586
Epoch 106/1000
196/196 0s 2ms/step - accuracy: 0.7423 - loss: 0.3940 - val_accuracy: 0.5038 - val_loss: 7.1291
Epoch 107/1000
196/196 0s 2ms/step - accuracy: 0.7467 - loss: 0.3828 - val_accuracy: 0.5008 - val_loss: 6.2206
Epoch 108/1000
196/196 0s 2ms/step - accuracy: 0.7395 - loss: 0.4182 - val_accuracy: 0.5030 - val_loss: 7.1010
Epoch 109/1000
196/196 0s 2ms/step - accuracy: 0.7491 - loss: 0.3828 - val_accuracy: 0.5019 - val_loss: 4.8968
Epoch 110/1000
196/196 0s 2ms/step - accuracy: 0.7445 - loss: 0.3901 - val_accuracy: 0.5041 - val_loss: 6.9988
Epoch 111/1000
196/196 0s 2ms/step - accuracy: 0.7424 - loss: 0.3771 - val_accuracy: 0.5049 - val_loss: 6.4679
Epoch 112/1000
196/196 0s 2ms/step - accuracy: 0.7526 - loss: 0.3680 - val_accuracy: 0.5051 - val_loss: 6.8759
Epoch 113/1000
196/196 0s 2ms/step - accuracy: 0.7485 - loss: 0.3780 - val_accuracy: 0.5046 - val_loss: 6.9872
Epoch 114/1000
196/196 0s 2ms/step - accuracy: 0.7506 - loss: 0.3694 - val_accuracy: 0.5021 - val_loss: 7.1457
Epoch 115/1000
196/196 0s 2ms/step - accuracy: 0.7539 - loss: 0.3723 - val_accuracy: 0.5029 - val_loss: 6.1213
Epoch 116/1000
196/196 0s 2ms/step - accuracy: 0.7527 - loss: 0.3763 - val_accuracy: 0.5042 - val_loss: 6.9431
Epoch 117/1000
196/196 0s 2ms/step - accuracy: 0.7487 - loss: 0.3875 - val_accuracy: 0.5030 - val_loss: 5.9772
Epoch 118/1000
196/196 0s 2ms/step - accuracy: 0.7442 - loss: 0.3893 - val_accuracy: 0.5035 - val_loss: 5.2581
Epoch 119/1000
196/196 0s 2ms/step - accuracy: 0.7501 - loss: 0.3771 - val_accuracy: 0.5018 - val_loss: 7.6425
Epoch 120/1000
196/196 0s 2ms/step - accuracy: 0.7490 - loss: 0.3860 - val_accuracy: 0.5021 - val_loss: 5.8778

Epoch 121/1000
196/196 0s 2ms/step - accuracy: 0.7544 - loss: 0.3754 - val_accuracy: 0.5021 - val_loss: 5.3233
Epoch 122/1000
196/196 0s 2ms/step - accuracy: 0.7473 - loss: 0.3764 - val_accuracy: 0.5048 - val_loss: 6.3920
Epoch 123/1000
196/196 0s 2ms/step - accuracy: 0.7559 - loss: 0.3699 - val_accuracy: 0.5025 - val_loss: 5.8825
Epoch 124/1000
196/196 0s 2ms/step - accuracy: 0.7566 - loss: 0.3683 - val_accuracy: 0.5035 - val_loss: 5.0227
Epoch 125/1000
196/196 0s 2ms/step - accuracy: 0.7510 - loss: 0.3753 - val_accuracy: 0.5040 - val_loss: 7.0098
Epoch 126/1000
196/196 0s 2ms/step - accuracy: 0.7547 - loss: 0.3756 - val_accuracy: 0.5032 - val_loss: 6.7586
Epoch 127/1000
196/196 0s 2ms/step - accuracy: 0.7500 - loss: 0.3820 - val_accuracy: 0.5027 - val_loss: 7.8269
Epoch 128/1000
196/196 0s 2ms/step - accuracy: 0.7539 - loss: 0.3810 - val_accuracy: 0.5053 - val_loss: 6.8270
Epoch 129/1000
196/196 0s 2ms/step - accuracy: 0.7586 - loss: 0.3749 - val_accuracy: 0.5043 - val_loss: 6.0168
Epoch 130/1000
196/196 0s 2ms/step - accuracy: 0.7524 - loss: 0.3736 - val_accuracy: 0.5072 - val_loss: 6.4813
Epoch 131/1000
196/196 0s 2ms/step - accuracy: 0.7501 - loss: 0.3858 - val_accuracy: 0.5064 - val_loss: 6.1923
Epoch 132/1000
196/196 0s 2ms/step - accuracy: 0.7528 - loss: 0.3741 - val_accuracy: 0.5074 - val_loss: 6.7231
Epoch 133/1000
196/196 0s 2ms/step - accuracy: 0.7528 - loss: 0.3887 - val_accuracy: 0.5067 - val_loss: 6.5205
Epoch 134/1000
196/196 0s 2ms/step - accuracy: 0.7583 - loss: 0.3627 - val_accuracy: 0.5064 - val_loss: 6.4309
Epoch 135/1000
196/196 0s 2ms/step - accuracy: 0.7614 - loss: 0.3608 - val_accuracy: 0.5049 - val_loss: 8.0485
Epoch 136/1000
196/196 0s 2ms/step - accuracy: 0.7604 - loss: 0.3664 - val_accuracy: 0.5044 - val_loss: 8.5268
Epoch 137/1000
196/196 0s 2ms/step - accuracy: 0.7492 - loss: 0.3833 - val_accuracy: 0.5052 - val_loss: 6.3497
Epoch 138/1000
196/196 0s 2ms/step - accuracy: 0.7542 - loss: 0.3755 - val_accuracy: 0.5066 - val_loss: 7.8714
Epoch 139/1000
196/196 0s 2ms/step - accuracy: 0.7538 - loss: 0.3777 - val_accuracy: 0.5057 - val_loss: 6.4590
Epoch 140/1000
196/196 0s 2ms/step - accuracy: 0.7600 - loss: 0.3624 - val_accuracy: 0.5049 - val_loss: 7.1858

Epoch 141/1000
196/196 0s 2ms/step - accuracy: 0.7602 - loss: 0.3654 - val_accuracy: 0.5074 - val_loss: 6.9183
Epoch 142/1000
196/196 0s 2ms/step - accuracy: 0.7578 - loss: 0.3601 - val_accuracy: 0.5074 - val_loss: 6.5837
Epoch 143/1000
196/196 0s 2ms/step - accuracy: 0.7625 - loss: 0.3653 - val_accuracy: 0.5043 - val_loss: 6.6298
Epoch 144/1000
196/196 0s 2ms/step - accuracy: 0.7612 - loss: 0.3651 - val_accuracy: 0.5067 - val_loss: 6.9147
Epoch 145/1000
196/196 0s 2ms/step - accuracy: 0.7593 - loss: 0.3695 - val_accuracy: 0.5066 - val_loss: 8.3057
Epoch 146/1000
196/196 0s 2ms/step - accuracy: 0.7584 - loss: 0.3652 - val_accuracy: 0.5041 - val_loss: 6.3448
Epoch 147/1000
196/196 0s 2ms/step - accuracy: 0.7620 - loss: 0.3580 - val_accuracy: 0.5047 - val_loss: 6.2138
Epoch 148/1000
196/196 0s 2ms/step - accuracy: 0.7602 - loss: 0.3604 - val_accuracy: 0.5048 - val_loss: 6.8518
Epoch 149/1000
196/196 0s 2ms/step - accuracy: 0.7613 - loss: 0.3592 - val_accuracy: 0.5060 - val_loss: 7.4810
Epoch 150/1000
196/196 0s 2ms/step - accuracy: 0.7644 - loss: 0.3550 - val_accuracy: 0.5041 - val_loss: 7.3238
Epoch 151/1000
196/196 0s 2ms/step - accuracy: 0.7596 - loss: 0.3771 - val_accuracy: 0.5056 - val_loss: 6.9190
Epoch 152/1000
196/196 0s 2ms/step - accuracy: 0.7616 - loss: 0.3632 - val_accuracy: 0.5062 - val_loss: 8.5399
Epoch 153/1000
196/196 0s 2ms/step - accuracy: 0.7570 - loss: 0.3742 - val_accuracy: 0.5059 - val_loss: 7.3122
Epoch 154/1000
196/196 0s 2ms/step - accuracy: 0.7615 - loss: 0.3724 - val_accuracy: 0.5043 - val_loss: 5.6618
Epoch 155/1000
196/196 0s 2ms/step - accuracy: 0.7650 - loss: 0.3602 - val_accuracy: 0.5032 - val_loss: 6.0444
Epoch 156/1000
196/196 0s 2ms/step - accuracy: 0.7596 - loss: 0.3534 - val_accuracy: 0.5060 - val_loss: 5.8263
Epoch 157/1000
196/196 0s 2ms/step - accuracy: 0.7668 - loss: 0.3511 - val_accuracy: 0.5044 - val_loss: 7.0610
Epoch 158/1000
196/196 0s 2ms/step - accuracy: 0.7663 - loss: 0.3592 - val_accuracy: 0.5059 - val_loss: 7.1925
Epoch 159/1000
196/196 0s 2ms/step - accuracy: 0.7660 - loss: 0.3496 - val_accuracy: 0.5060 - val_loss: 6.2198
Epoch 160/1000
196/196 0s 2ms/step - accuracy: 0.7658 - loss: 0.3536 - val_accuracy: 0.5048 - val_loss: 7.1817

Epoch 161/1000
196/196 0s 2ms/step - accuracy: 0.7606 - loss: 0.3748 - val_accuracy: 0.5025 - val_loss: 6.9155
Epoch 162/1000
196/196 0s 2ms/step - accuracy: 0.7595 - loss: 0.3626 - val_accuracy: 0.5038 - val_loss: 7.4763
Epoch 163/1000
196/196 0s 2ms/step - accuracy: 0.7657 - loss: 0.3551 - val_accuracy: 0.5041 - val_loss: 6.9802
Epoch 164/1000
196/196 0s 2ms/step - accuracy: 0.7655 - loss: 0.3529 - val_accuracy: 0.5057 - val_loss: 6.8413
Epoch 165/1000
196/196 0s 2ms/step - accuracy: 0.7608 - loss: 0.3565 - val_accuracy: 0.5040 - val_loss: 9.1092
Epoch 166/1000
196/196 0s 2ms/step - accuracy: 0.7646 - loss: 0.3596 - val_accuracy: 0.5035 - val_loss: 8.5871
Epoch 167/1000
196/196 0s 2ms/step - accuracy: 0.7603 - loss: 0.3680 - val_accuracy: 0.5028 - val_loss: 6.4125
Epoch 168/1000
196/196 0s 2ms/step - accuracy: 0.7597 - loss: 0.3574 - val_accuracy: 0.5021 - val_loss: 9.0688
Epoch 169/1000
196/196 0s 2ms/step - accuracy: 0.7613 - loss: 0.3577 - val_accuracy: 0.5025 - val_loss: 5.3077
Epoch 170/1000
196/196 0s 2ms/step - accuracy: 0.7717 - loss: 0.3496 - val_accuracy: 0.5029 - val_loss: 7.6117
Epoch 171/1000
196/196 0s 2ms/step - accuracy: 0.7673 - loss: 0.3523 - val_accuracy: 0.5065 - val_loss: 7.6513
Epoch 172/1000
196/196 0s 2ms/step - accuracy: 0.7689 - loss: 0.3557 - val_accuracy: 0.5039 - val_loss: 8.5213
Epoch 173/1000
196/196 0s 2ms/step - accuracy: 0.7596 - loss: 0.3647 - val_accuracy: 0.5049 - val_loss: 6.9762
Epoch 174/1000
196/196 0s 2ms/step - accuracy: 0.7666 - loss: 0.3559 - val_accuracy: 0.5044 - val_loss: 6.9309
Epoch 175/1000
196/196 0s 2ms/step - accuracy: 0.7714 - loss: 0.3494 - val_accuracy: 0.5048 - val_loss: 9.3663
Epoch 176/1000
196/196 0s 2ms/step - accuracy: 0.7691 - loss: 0.3582 - val_accuracy: 0.5064 - val_loss: 7.7931
Epoch 177/1000
196/196 0s 2ms/step - accuracy: 0.7702 - loss: 0.3465 - val_accuracy: 0.5036 - val_loss: 7.1532
Epoch 178/1000
196/196 0s 2ms/step - accuracy: 0.7690 - loss: 0.3478 - val_accuracy: 0.5047 - val_loss: 6.6984
Epoch 179/1000
196/196 0s 1ms/step - accuracy: 0.7706 - loss: 0.3456 - val_accuracy: 0.5072 - val_loss: 7.9427
Epoch 180/1000
196/196 0s 2ms/step - accuracy: 0.7656 - loss: 0.3523 - val_accuracy: 0.5071 - val_loss: 6.7250

Epoch 181/1000
196/196 0s 2ms/step - accuracy: 0.7761 - loss: 0.3478 - val_accuracy: 0.5066 - val_loss: 8.9287
Epoch 182/1000
196/196 0s 2ms/step - accuracy: 0.7707 - loss: 0.3567 - val_accuracy: 0.5061 - val_loss: 7.6336
Epoch 183/1000
196/196 0s 2ms/step - accuracy: 0.7682 - loss: 0.3710 - val_accuracy: 0.5049 - val_loss: 8.0301
Epoch 184/1000
196/196 0s 2ms/step - accuracy: 0.7686 - loss: 0.3595 - val_accuracy: 0.5032 - val_loss: 7.8223
Epoch 185/1000
196/196 0s 2ms/step - accuracy: 0.7656 - loss: 0.3653 - val_accuracy: 0.5060 - val_loss: 7.8180
Epoch 186/1000
196/196 0s 2ms/step - accuracy: 0.7703 - loss: 0.3533 - val_accuracy: 0.5039 - val_loss: 7.2557
Epoch 187/1000
196/196 0s 2ms/step - accuracy: 0.7696 - loss: 0.3539 - val_accuracy: 0.5059 - val_loss: 8.1016
Epoch 188/1000
196/196 0s 2ms/step - accuracy: 0.7675 - loss: 0.3532 - val_accuracy: 0.5058 - val_loss: 8.2050
Epoch 189/1000
196/196 0s 2ms/step - accuracy: 0.7698 - loss: 0.3507 - val_accuracy: 0.5042 - val_loss: 7.8474
Epoch 190/1000
196/196 0s 2ms/step - accuracy: 0.7742 - loss: 0.3512 - val_accuracy: 0.5035 - val_loss: 10.1394
Epoch 191/1000
196/196 0s 2ms/step - accuracy: 0.7672 - loss: 0.3585 - val_accuracy: 0.5054 - val_loss: 8.3625
Epoch 192/1000
196/196 0s 2ms/step - accuracy: 0.7750 - loss: 0.3451 - val_accuracy: 0.5065 - val_loss: 8.8464
Epoch 193/1000
196/196 0s 2ms/step - accuracy: 0.7737 - loss: 0.3409 - val_accuracy: 0.5051 - val_loss: 10.4977
Epoch 194/1000
196/196 0s 2ms/step - accuracy: 0.7714 - loss: 0.3550 - val_accuracy: 0.5035 - val_loss: 8.9501
Epoch 195/1000
196/196 0s 2ms/step - accuracy: 0.7686 - loss: 0.3510 - val_accuracy: 0.5046 - val_loss: 8.4802
Epoch 196/1000
196/196 0s 2ms/step - accuracy: 0.7674 - loss: 0.3507 - val_accuracy: 0.5062 - val_loss: 7.9011
Epoch 197/1000
196/196 0s 2ms/step - accuracy: 0.7750 - loss: 0.3408 - val_accuracy: 0.5068 - val_loss: 7.8418
Epoch 198/1000
196/196 0s 2ms/step - accuracy: 0.7702 - loss: 0.3454 - val_accuracy: 0.5050 - val_loss: 8.9646
Epoch 199/1000
196/196 0s 2ms/step - accuracy: 0.7791 - loss: 0.3366 - val_accuracy: 0.5058 - val_loss: 7.5507
Epoch 200/1000
196/196 0s 2ms/step - accuracy: 0.7763 - loss: 0.3378 - val_accuracy: 0.5073 - val_loss: 9.3881

Epoch 201/1000
196/196 0s 2ms/step - accuracy: 0.7738 - loss: 0.3417 - val_accuracy: 0.5089 - val_loss: 8.8097
Epoch 202/1000
196/196 0s 2ms/step - accuracy: 0.7710 - loss: 0.3445 - val_accuracy: 0.5069 - val_loss: 9.0667
Epoch 203/1000
196/196 0s 2ms/step - accuracy: 0.7733 - loss: 0.3511 - val_accuracy: 0.5084 - val_loss: 7.5103
Epoch 204/1000
196/196 0s 2ms/step - accuracy: 0.7743 - loss: 0.3404 - val_accuracy: 0.5082 - val_loss: 8.4184
Epoch 205/1000
196/196 0s 2ms/step - accuracy: 0.7724 - loss: 0.3480 - val_accuracy: 0.5078 - val_loss: 8.1312
Epoch 206/1000
196/196 0s 2ms/step - accuracy: 0.7706 - loss: 0.3517 - val_accuracy: 0.5088 - val_loss: 7.3627
Epoch 207/1000
196/196 0s 2ms/step - accuracy: 0.7765 - loss: 0.3493 - val_accuracy: 0.5057 - val_loss: 8.3510
Epoch 208/1000
196/196 0s 2ms/step - accuracy: 0.7704 - loss: 0.3536 - val_accuracy: 0.5048 - val_loss: 7.6737
Epoch 209/1000
196/196 0s 2ms/step - accuracy: 0.7727 - loss: 0.3495 - val_accuracy: 0.5061 - val_loss: 9.2095
Epoch 210/1000
196/196 0s 2ms/step - accuracy: 0.7755 - loss: 0.3447 - val_accuracy: 0.5048 - val_loss: 8.8996
Epoch 211/1000
196/196 0s 2ms/step - accuracy: 0.7673 - loss: 0.3629 - val_accuracy: 0.5070 - val_loss: 9.1615
Epoch 212/1000
196/196 0s 2ms/step - accuracy: 0.7727 - loss: 0.3482 - val_accuracy: 0.5033 - val_loss: 8.1347
Epoch 213/1000
196/196 0s 2ms/step - accuracy: 0.7739 - loss: 0.3540 - val_accuracy: 0.5028 - val_loss: 8.2221
Epoch 214/1000
196/196 0s 2ms/step - accuracy: 0.7740 - loss: 0.3474 - val_accuracy: 0.5030 - val_loss: 7.3850
Epoch 215/1000
196/196 0s 2ms/step - accuracy: 0.7736 - loss: 0.3428 - val_accuracy: 0.5060 - val_loss: 9.2686
Epoch 216/1000
196/196 0s 2ms/step - accuracy: 0.7729 - loss: 0.3469 - val_accuracy: 0.5034 - val_loss: 9.1479
Epoch 217/1000
196/196 1s 3ms/step - accuracy: 0.7702 - loss: 0.3537 - val_accuracy: 0.5041 - val_loss: 8.1247
Epoch 218/1000
196/196 0s 2ms/step - accuracy: 0.7777 - loss: 0.3528 - val_accuracy: 0.5037 - val_loss: 10.5906
Epoch 219/1000
196/196 0s 2ms/step - accuracy: 0.7702 - loss: 0.3566 - val_accuracy: 0.5051 - val_loss: 10.3987
Epoch 220/1000
196/196 0s 2ms/step - accuracy: 0.7724 - loss: 0.3429 - val_accuracy: 0.5032 - val_loss: 9.1764

Epoch 221/1000
196/196 0s 2ms/step - accuracy: 0.7756 - loss: 0.3409 - val_accuracy: 0.5064 - val_loss: 9.4659
Epoch 222/1000
196/196 0s 2ms/step - accuracy: 0.7774 - loss: 0.3380 - val_accuracy: 0.5052 - val_loss: 9.4767
Epoch 223/1000
196/196 0s 2ms/step - accuracy: 0.7789 - loss: 0.3367 - val_accuracy: 0.5052 - val_loss: 11.1530
Epoch 224/1000
196/196 0s 2ms/step - accuracy: 0.7799 - loss: 0.3477 - val_accuracy: 0.5035 - val_loss: 10.0613
Epoch 225/1000
196/196 0s 2ms/step - accuracy: 0.7778 - loss: 0.3369 - val_accuracy: 0.5039 - val_loss: 10.7134
Epoch 226/1000
196/196 0s 2ms/step - accuracy: 0.7724 - loss: 0.3556 - val_accuracy: 0.5041 - val_loss: 10.6856
Epoch 227/1000
196/196 0s 2ms/step - accuracy: 0.7757 - loss: 0.3519 - val_accuracy: 0.5048 - val_loss: 8.9775
Epoch 228/1000
196/196 0s 2ms/step - accuracy: 0.7706 - loss: 0.3593 - val_accuracy: 0.5064 - val_loss: 7.8217
Epoch 229/1000
196/196 0s 2ms/step - accuracy: 0.7759 - loss: 0.3414 - val_accuracy: 0.5062 - val_loss: 8.4476
Epoch 230/1000
196/196 0s 2ms/step - accuracy: 0.7779 - loss: 0.3333 - val_accuracy: 0.5060 - val_loss: 11.1275
Epoch 231/1000
196/196 0s 2ms/step - accuracy: 0.7739 - loss: 0.3505 - val_accuracy: 0.5056 - val_loss: 9.7178
Epoch 232/1000
196/196 0s 2ms/step - accuracy: 0.7769 - loss: 0.3454 - val_accuracy: 0.5048 - val_loss: 9.2597
Epoch 233/1000
196/196 0s 2ms/step - accuracy: 0.7753 - loss: 0.3435 - val_accuracy: 0.5021 - val_loss: 9.4200
Epoch 234/1000
196/196 0s 2ms/step - accuracy: 0.7744 - loss: 0.3417 - val_accuracy: 0.5033 - val_loss: 10.6926
Epoch 235/1000
196/196 0s 2ms/step - accuracy: 0.7781 - loss: 0.3381 - val_accuracy: 0.5057 - val_loss: 10.2501
Epoch 236/1000
196/196 0s 2ms/step - accuracy: 0.7805 - loss: 0.3337 - val_accuracy: 0.5058 - val_loss: 10.9034
Epoch 237/1000
196/196 0s 2ms/step - accuracy: 0.7833 - loss: 0.3426 - val_accuracy: 0.5079 - val_loss: 9.8482
Epoch 238/1000
196/196 0s 2ms/step - accuracy: 0.7712 - loss: 0.3506 - val_accuracy: 0.5046 - val_loss: 9.7262
Epoch 239/1000
196/196 0s 2ms/step - accuracy: 0.7755 - loss: 0.3360 - val_accuracy: 0.5037 - val_loss: 9.9860
Epoch 240/1000
196/196 0s 2ms/step - accuracy: 0.7795 - loss: 0.3403 - val_accuracy: 0.5046 - val_loss: 8.0523

Epoch 241/1000
196/196 0s 2ms/step - accuracy: 0.7777 - loss: 0.3428 - val_accuracy: 0.5045 - val_loss: 8.7878
Epoch 242/1000
196/196 0s 2ms/step - accuracy: 0.7828 - loss: 0.3383 - val_accuracy: 0.5046 - val_loss: 10.2053
Epoch 243/1000
196/196 0s 2ms/step - accuracy: 0.7825 - loss: 0.3384 - val_accuracy: 0.5038 - val_loss: 10.0985
Epoch 244/1000
196/196 0s 2ms/step - accuracy: 0.7764 - loss: 0.3492 - val_accuracy: 0.5060 - val_loss: 8.9635
Epoch 245/1000
196/196 0s 2ms/step - accuracy: 0.7720 - loss: 0.3615 - val_accuracy: 0.5066 - val_loss: 11.5535
Epoch 246/1000
196/196 0s 1ms/step - accuracy: 0.7713 - loss: 0.3525 - val_accuracy: 0.5054 - val_loss: 11.6167
Epoch 247/1000
196/196 0s 2ms/step - accuracy: 0.7787 - loss: 0.3373 - val_accuracy: 0.5066 - val_loss: 10.8580
Epoch 248/1000
196/196 0s 2ms/step - accuracy: 0.7816 - loss: 0.3419 - val_accuracy: 0.5070 - val_loss: 10.5851
Epoch 249/1000
196/196 0s 2ms/step - accuracy: 0.7823 - loss: 0.3270 - val_accuracy: 0.5070 - val_loss: 9.7501
Epoch 250/1000
196/196 0s 2ms/step - accuracy: 0.7791 - loss: 0.3357 - val_accuracy: 0.5064 - val_loss: 10.5165
Epoch 251/1000
196/196 0s 2ms/step - accuracy: 0.7815 - loss: 0.3307 - val_accuracy: 0.5050 - val_loss: 12.1569
Epoch 252/1000
196/196 0s 2ms/step - accuracy: 0.7838 - loss: 0.3287 - val_accuracy: 0.5062 - val_loss: 10.6608
Epoch 253/1000
196/196 0s 2ms/step - accuracy: 0.7748 - loss: 0.3401 - val_accuracy: 0.5053 - val_loss: 12.7764
Epoch 254/1000
196/196 0s 2ms/step - accuracy: 0.7823 - loss: 0.3328 - val_accuracy: 0.5047 - val_loss: 10.5917
Epoch 255/1000
196/196 0s 2ms/step - accuracy: 0.7792 - loss: 0.3411 - val_accuracy: 0.5073 - val_loss: 9.9922
Epoch 256/1000
196/196 0s 2ms/step - accuracy: 0.7805 - loss: 0.3466 - val_accuracy: 0.5074 - val_loss: 10.8499
Epoch 257/1000
196/196 0s 2ms/step - accuracy: 0.7793 - loss: 0.3511 - val_accuracy: 0.5050 - val_loss: 10.5826
Epoch 258/1000
196/196 0s 2ms/step - accuracy: 0.7811 - loss: 0.3433 - val_accuracy: 0.5051 - val_loss: 10.6777
Epoch 259/1000
196/196 0s 2ms/step - accuracy: 0.7843 - loss: 0.3340 - val_accuracy: 0.5040 - val_loss: 9.2329
Epoch 260/1000
196/196 0s 2ms/step - accuracy: 0.7802 - loss: 0.3333 - val_accuracy: 0.5048 - val_loss: 11.6559

Epoch 261/1000
196/196 0s 2ms/step - accuracy: 0.7761 - loss: 0.3522 - val_accuracy: 0.5068 - val_loss: 10.5984
Epoch 262/1000
196/196 0s 2ms/step - accuracy: 0.7802 - loss: 0.3385 - val_accuracy: 0.5050 - val_loss: 9.7415
Epoch 263/1000
196/196 0s 2ms/step - accuracy: 0.7803 - loss: 0.3402 - val_accuracy: 0.5046 - val_loss: 9.9880
Epoch 264/1000
196/196 0s 2ms/step - accuracy: 0.7785 - loss: 0.3326 - val_accuracy: 0.5052 - val_loss: 8.9062
Epoch 265/1000
196/196 0s 2ms/step - accuracy: 0.7859 - loss: 0.3278 - val_accuracy: 0.5063 - val_loss: 12.3343
Epoch 266/1000
196/196 0s 2ms/step - accuracy: 0.7814 - loss: 0.3555 - val_accuracy: 0.5042 - val_loss: 11.0570
Epoch 267/1000
196/196 0s 2ms/step - accuracy: 0.7887 - loss: 0.3262 - val_accuracy: 0.5042 - val_loss: 9.4239
Epoch 268/1000
196/196 0s 2ms/step - accuracy: 0.7818 - loss: 0.3333 - val_accuracy: 0.5055 - val_loss: 8.7271
Epoch 269/1000
196/196 0s 2ms/step - accuracy: 0.7807 - loss: 0.3394 - val_accuracy: 0.5058 - val_loss: 12.7222
Epoch 270/1000
196/196 0s 2ms/step - accuracy: 0.7859 - loss: 0.3292 - val_accuracy: 0.5049 - val_loss: 11.9692
Epoch 271/1000
196/196 0s 2ms/step - accuracy: 0.7899 - loss: 0.3257 - val_accuracy: 0.5027 - val_loss: 10.3720
Epoch 272/1000
196/196 0s 2ms/step - accuracy: 0.7797 - loss: 0.3292 - val_accuracy: 0.5046 - val_loss: 10.2474
Epoch 273/1000
196/196 0s 2ms/step - accuracy: 0.7847 - loss: 0.3261 - val_accuracy: 0.5058 - val_loss: 10.6000
Epoch 274/1000
196/196 0s 2ms/step - accuracy: 0.7883 - loss: 0.3303 - val_accuracy: 0.5028 - val_loss: 10.0347
Epoch 275/1000
196/196 0s 2ms/step - accuracy: 0.7884 - loss: 0.3300 - val_accuracy: 0.5020 - val_loss: 7.6758
Epoch 276/1000
196/196 0s 2ms/step - accuracy: 0.7856 - loss: 0.3277 - val_accuracy: 0.5036 - val_loss: 9.3170
Epoch 277/1000
196/196 0s 2ms/step - accuracy: 0.7934 - loss: 0.3213 - val_accuracy: 0.5036 - val_loss: 10.2525
Epoch 278/1000
196/196 0s 2ms/step - accuracy: 0.7857 - loss: 0.3411 - val_accuracy: 0.5064 - val_loss: 10.7510
Epoch 279/1000
196/196 0s 2ms/step - accuracy: 0.7832 - loss: 0.3488 - val_accuracy: 0.5013 - val_loss: 12.1087
Epoch 280/1000
196/196 0s 2ms/step - accuracy: 0.7757 - loss: 0.3585 - val_accuracy: 0.5034 - val_loss: 9.5727

Epoch 281/1000
196/196 0s 2ms/step - accuracy: 0.7825 - loss: 0.3366 - val_accuracy: 0.5040 - val_loss: 9.0871
Epoch 282/1000
196/196 0s 2ms/step - accuracy: 0.7905 - loss: 0.3194 - val_accuracy: 0.5037 - val_loss: 10.3056
Epoch 283/1000
196/196 0s 2ms/step - accuracy: 0.7889 - loss: 0.3293 - val_accuracy: 0.5039 - val_loss: 10.5434
Epoch 284/1000
196/196 0s 2ms/step - accuracy: 0.7864 - loss: 0.3285 - val_accuracy: 0.5043 - val_loss: 10.4078
Epoch 285/1000
196/196 0s 2ms/step - accuracy: 0.7925 - loss: 0.3175 - val_accuracy: 0.5038 - val_loss: 9.9853
Epoch 286/1000
196/196 0s 2ms/step - accuracy: 0.7883 - loss: 0.3226 - val_accuracy: 0.5034 - val_loss: 9.6672
Epoch 287/1000
196/196 0s 2ms/step - accuracy: 0.7882 - loss: 0.3335 - val_accuracy: 0.5032 - val_loss: 10.5916
Epoch 288/1000
196/196 0s 2ms/step - accuracy: 0.7889 - loss: 0.3247 - val_accuracy: 0.5030 - val_loss: 12.3446
Epoch 289/1000
196/196 0s 2ms/step - accuracy: 0.7891 - loss: 0.3245 - val_accuracy: 0.5032 - val_loss: 11.2157
Epoch 290/1000
196/196 0s 2ms/step - accuracy: 0.7798 - loss: 0.3339 - val_accuracy: 0.5031 - val_loss: 11.7032
Epoch 291/1000
196/196 0s 2ms/step - accuracy: 0.7830 - loss: 0.3331 - val_accuracy: 0.5041 - val_loss: 9.3186
Epoch 292/1000
196/196 0s 2ms/step - accuracy: 0.7864 - loss: 0.3394 - val_accuracy: 0.5040 - val_loss: 9.9170
Epoch 293/1000
196/196 0s 2ms/step - accuracy: 0.7894 - loss: 0.3269 - val_accuracy: 0.5033 - val_loss: 9.5547
Epoch 294/1000
196/196 0s 2ms/step - accuracy: 0.7908 - loss: 0.3206 - val_accuracy: 0.5069 - val_loss: 11.0153
Epoch 295/1000
196/196 0s 2ms/step - accuracy: 0.7910 - loss: 0.3223 - val_accuracy: 0.5052 - val_loss: 10.6406
Epoch 296/1000
196/196 0s 2ms/step - accuracy: 0.7880 - loss: 0.3250 - val_accuracy: 0.5056 - val_loss: 9.6801
Epoch 297/1000
196/196 0s 2ms/step - accuracy: 0.7943 - loss: 0.3202 - val_accuracy: 0.5056 - val_loss: 9.5339
Epoch 298/1000
196/196 0s 2ms/step - accuracy: 0.7902 - loss: 0.3301 - val_accuracy: 0.5047 - val_loss: 10.7433
Epoch 299/1000
196/196 0s 2ms/step - accuracy: 0.7941 - loss: 0.3287 - val_accuracy: 0.5060 - val_loss: 10.8439
Epoch 300/1000
196/196 0s 2ms/step - accuracy: 0.7975 - loss: 0.3200 - val_accuracy: 0.5052 - val_loss: 10.9229

Epoch 301/1000
196/196 0s 2ms/step - accuracy: 0.7920 - loss: 0.3343 - val_accuracy: 0.5062 - val_loss: 11.9865
Epoch 302/1000
196/196 0s 2ms/step - accuracy: 0.7857 - loss: 0.3314 - val_accuracy: 0.5052 - val_loss: 8.7188
Epoch 303/1000
196/196 0s 2ms/step - accuracy: 0.7871 - loss: 0.3234 - val_accuracy: 0.5054 - val_loss: 10.8795
Epoch 304/1000
196/196 0s 2ms/step - accuracy: 0.7902 - loss: 0.3196 - val_accuracy: 0.5059 - val_loss: 10.0692
Epoch 305/1000
196/196 0s 2ms/step - accuracy: 0.7924 - loss: 0.3154 - val_accuracy: 0.5060 - val_loss: 11.4378
Epoch 306/1000
196/196 0s 2ms/step - accuracy: 0.7896 - loss: 0.3176 - val_accuracy: 0.5060 - val_loss: 11.0736
Epoch 307/1000
196/196 0s 2ms/step - accuracy: 0.7815 - loss: 0.3368 - val_accuracy: 0.5065 - val_loss: 11.1260
Epoch 308/1000
196/196 0s 2ms/step - accuracy: 0.7926 - loss: 0.3229 - val_accuracy: 0.5055 - val_loss: 12.2640
Epoch 309/1000
196/196 0s 2ms/step - accuracy: 0.7817 - loss: 0.3332 - val_accuracy: 0.5057 - val_loss: 8.7976
Epoch 310/1000
196/196 0s 2ms/step - accuracy: 0.7900 - loss: 0.3238 - val_accuracy: 0.5065 - val_loss: 9.1975
Epoch 311/1000
196/196 0s 2ms/step - accuracy: 0.7915 - loss: 0.3358 - val_accuracy: 0.5084 - val_loss: 11.1569
Epoch 312/1000
196/196 1s 2ms/step - accuracy: 0.7936 - loss: 0.3184 - val_accuracy: 0.5057 - val_loss: 11.6869
Epoch 313/1000
196/196 1s 4ms/step - accuracy: 0.7899 - loss: 0.3305 - val_accuracy: 0.5072 - val_loss: 10.9044
Epoch 314/1000
196/196 0s 2ms/step - accuracy: 0.7922 - loss: 0.3240 - val_accuracy: 0.5055 - val_loss: 12.8619
Epoch 315/1000
196/196 0s 2ms/step - accuracy: 0.7889 - loss: 0.3285 - val_accuracy: 0.5051 - val_loss: 9.7146
Epoch 316/1000
196/196 0s 2ms/step - accuracy: 0.7929 - loss: 0.3216 - val_accuracy: 0.5066 - val_loss: 9.9520
Epoch 317/1000
196/196 0s 2ms/step - accuracy: 0.7886 - loss: 0.3178 - val_accuracy: 0.5049 - val_loss: 10.3431
Epoch 318/1000
196/196 0s 2ms/step - accuracy: 0.7913 - loss: 0.3174 - val_accuracy: 0.5090 - val_loss: 13.0184
Epoch 319/1000
196/196 0s 2ms/step - accuracy: 0.7911 - loss: 0.3346 - val_accuracy: 0.5066 - val_loss: 13.1308
Epoch 320/1000
196/196 0s 2ms/step - accuracy: 0.7910 - loss: 0.3259 - val_accuracy: 0.5065 - val_loss: 10.5966

Epoch 321/1000
196/196 0s 2ms/step - accuracy: 0.7905 - loss: 0.3276 - val_accuracy: 0.5057 - val_loss: 10.0729
Epoch 322/1000
196/196 0s 2ms/step - accuracy: 0.7979 - loss: 0.3258 - val_accuracy: 0.5065 - val_loss: 10.0323
Epoch 323/1000
196/196 0s 2ms/step - accuracy: 0.7961 - loss: 0.3190 - val_accuracy: 0.5057 - val_loss: 10.0213
Epoch 324/1000
196/196 0s 2ms/step - accuracy: 0.7928 - loss: 0.3211 - val_accuracy: 0.5061 - val_loss: 10.9090
Epoch 325/1000
196/196 0s 2ms/step - accuracy: 0.7981 - loss: 0.3094 - val_accuracy: 0.5049 - val_loss: 11.5501
Epoch 326/1000
196/196 0s 2ms/step - accuracy: 0.7986 - loss: 0.3116 - val_accuracy: 0.5062 - val_loss: 12.7674
Epoch 327/1000
196/196 0s 2ms/step - accuracy: 0.7929 - loss: 0.3195 - val_accuracy: 0.5054 - val_loss: 11.9147
Epoch 328/1000
196/196 1s 3ms/step - accuracy: 0.7913 - loss: 0.3275 - val_accuracy: 0.5038 - val_loss: 12.7440
Epoch 329/1000
196/196 1s 3ms/step - accuracy: 0.7879 - loss: 0.3299 - val_accuracy: 0.5047 - val_loss: 10.4621
Epoch 330/1000
196/196 0s 2ms/step - accuracy: 0.7932 - loss: 0.3148 - val_accuracy: 0.5040 - val_loss: 12.0433
Epoch 331/1000
196/196 0s 2ms/step - accuracy: 0.7943 - loss: 0.3239 - val_accuracy: 0.5054 - val_loss: 12.0856
Epoch 332/1000
196/196 0s 2ms/step - accuracy: 0.7938 - loss: 0.3297 - val_accuracy: 0.5060 - val_loss: 11.7226
Epoch 333/1000
196/196 0s 2ms/step - accuracy: 0.7898 - loss: 0.3226 - val_accuracy: 0.5050 - val_loss: 13.1814
Epoch 334/1000
196/196 1s 3ms/step - accuracy: 0.7968 - loss: 0.3322 - val_accuracy: 0.5046 - val_loss: 11.2988
Epoch 335/1000
196/196 1s 3ms/step - accuracy: 0.7932 - loss: 0.3211 - val_accuracy: 0.5048 - val_loss: 10.3285
Epoch 336/1000
196/196 0s 2ms/step - accuracy: 0.7901 - loss: 0.3233 - val_accuracy: 0.5034 - val_loss: 11.7588
Epoch 337/1000
196/196 0s 2ms/step - accuracy: 0.7932 - loss: 0.3154 - val_accuracy: 0.5058 - val_loss: 12.4164
Epoch 338/1000
196/196 0s 2ms/step - accuracy: 0.7981 - loss: 0.3056 - val_accuracy: 0.5052 - val_loss: 12.9939
Epoch 339/1000
196/196 0s 2ms/step - accuracy: 0.7999 - loss: 0.3121 - val_accuracy: 0.5034 - val_loss: 12.8977
Epoch 340/1000
196/196 0s 2ms/step - accuracy: 0.7938 - loss: 0.3312 - val_accuracy: 0.5035 - val_loss: 13.4418

Epoch 341/1000
196/196 0s 2ms/step - accuracy: 0.7897 - loss: 0.3195 - val_accuracy: 0.5057 - val_loss: 13.7509
Epoch 342/1000
196/196 0s 2ms/step - accuracy: 0.7928 - loss: 0.3219 - val_accuracy: 0.5054 - val_loss: 12.7368
Epoch 343/1000
196/196 0s 2ms/step - accuracy: 0.7875 - loss: 0.3305 - val_accuracy: 0.5044 - val_loss: 13.9112
Epoch 344/1000
196/196 0s 2ms/step - accuracy: 0.7922 - loss: 0.3140 - val_accuracy: 0.5044 - val_loss: 12.2533
Epoch 345/1000
196/196 0s 2ms/step - accuracy: 0.7974 - loss: 0.3217 - val_accuracy: 0.5038 - val_loss: 11.2018
Epoch 346/1000
196/196 0s 2ms/step - accuracy: 0.8016 - loss: 0.3081 - val_accuracy: 0.5038 - val_loss: 12.3555
Epoch 347/1000
196/196 0s 2ms/step - accuracy: 0.7949 - loss: 0.3309 - val_accuracy: 0.5043 - val_loss: 12.5545
Epoch 348/1000
196/196 0s 2ms/step - accuracy: 0.7966 - loss: 0.3219 - val_accuracy: 0.5058 - val_loss: 12.8090
Epoch 349/1000
196/196 1s 3ms/step - accuracy: 0.7963 - loss: 0.3184 - val_accuracy: 0.5066 - val_loss: 12.1808
Epoch 350/1000
196/196 0s 2ms/step - accuracy: 0.7936 - loss: 0.3225 - val_accuracy: 0.5051 - val_loss: 12.4066
Epoch 351/1000
196/196 0s 2ms/step - accuracy: 0.8021 - loss: 0.3090 - val_accuracy: 0.5051 - val_loss: 12.3587
Epoch 352/1000
196/196 0s 2ms/step - accuracy: 0.7984 - loss: 0.3074 - val_accuracy: 0.5051 - val_loss: 13.9572
Epoch 353/1000
196/196 0s 2ms/step - accuracy: 0.8030 - loss: 0.3074 - val_accuracy: 0.5052 - val_loss: 15.1496
Epoch 354/1000
196/196 0s 2ms/step - accuracy: 0.8014 - loss: 0.3056 - val_accuracy: 0.5058 - val_loss: 13.6258
Epoch 355/1000
196/196 0s 2ms/step - accuracy: 0.7882 - loss: 0.3287 - val_accuracy: 0.5050 - val_loss: 11.9108
Epoch 356/1000
196/196 1s 3ms/step - accuracy: 0.7917 - loss: 0.3409 - val_accuracy: 0.5056 - val_loss: 13.5581
Epoch 357/1000
196/196 0s 2ms/step - accuracy: 0.7943 - loss: 0.3245 - val_accuracy: 0.5037 - val_loss: 11.3865
Epoch 358/1000
196/196 1s 3ms/step - accuracy: 0.7919 - loss: 0.3133 - val_accuracy: 0.5051 - val_loss: 12.2529
Epoch 359/1000
196/196 1s 2ms/step - accuracy: 0.7967 - loss: 0.3099 - val_accuracy: 0.5046 - val_loss: 14.1349
Epoch 360/1000
196/196 1s 3ms/step - accuracy: 0.7960 - loss: 0.3130 - val_accuracy: 0.5036 - val_loss: 14.8106

Epoch 361/1000
196/196 1s 3ms/step - accuracy: 0.7996 - loss: 0.3085 - val_accuracy: 0.5054 - val_loss: 15.4550
Epoch 362/1000
196/196 1s 3ms/step - accuracy: 0.7985 - loss: 0.3116 - val_accuracy: 0.5068 - val_loss: 13.0885
Epoch 363/1000
196/196 1s 3ms/step - accuracy: 0.8018 - loss: 0.3074 - val_accuracy: 0.5065 - val_loss: 11.5820
Epoch 364/1000
196/196 0s 2ms/step - accuracy: 0.7980 - loss: 0.3129 - val_accuracy: 0.5053 - val_loss: 13.9186
Epoch 365/1000
196/196 0s 2ms/step - accuracy: 0.7965 - loss: 0.3132 - val_accuracy: 0.5060 - val_loss: 13.2056
Epoch 366/1000
196/196 0s 2ms/step - accuracy: 0.7914 - loss: 0.3130 - val_accuracy: 0.5063 - val_loss: 11.8951
Epoch 367/1000
196/196 0s 2ms/step - accuracy: 0.7946 - loss: 0.3145 - val_accuracy: 0.5049 - val_loss: 14.1695
Epoch 368/1000
196/196 0s 2ms/step - accuracy: 0.7989 - loss: 0.3049 - val_accuracy: 0.5050 - val_loss: 11.7807
Epoch 369/1000
196/196 0s 2ms/step - accuracy: 0.7970 - loss: 0.3150 - val_accuracy: 0.5055 - val_loss: 15.1172
Epoch 370/1000
196/196 0s 2ms/step - accuracy: 0.7982 - loss: 0.3214 - val_accuracy: 0.5063 - val_loss: 12.7711
Epoch 371/1000
196/196 0s 2ms/step - accuracy: 0.7991 - loss: 0.3204 - val_accuracy: 0.5048 - val_loss: 13.1626
Epoch 372/1000
196/196 0s 2ms/step - accuracy: 0.7979 - loss: 0.3059 - val_accuracy: 0.5060 - val_loss: 14.5943
Epoch 373/1000
196/196 0s 2ms/step - accuracy: 0.8009 - loss: 0.3171 - val_accuracy: 0.5068 - val_loss: 13.6190
Epoch 374/1000
196/196 0s 2ms/step - accuracy: 0.8038 - loss: 0.3087 - val_accuracy: 0.5046 - val_loss: 12.7941
Epoch 375/1000
196/196 0s 2ms/step - accuracy: 0.7968 - loss: 0.3136 - val_accuracy: 0.5050 - val_loss: 12.0605
Epoch 376/1000
196/196 0s 2ms/step - accuracy: 0.7948 - loss: 0.3137 - val_accuracy: 0.5048 - val_loss: 11.0661
Epoch 377/1000
196/196 0s 2ms/step - accuracy: 0.8015 - loss: 0.3021 - val_accuracy: 0.5048 - val_loss: 14.2531
Epoch 378/1000
196/196 1s 3ms/step - accuracy: 0.8028 - loss: 0.3093 - val_accuracy: 0.5052 - val_loss: 13.0547
Epoch 379/1000
196/196 0s 2ms/step - accuracy: 0.8055 - loss: 0.3023 - val_accuracy: 0.5051 - val_loss: 12.7486
Epoch 380/1000
196/196 0s 2ms/step - accuracy: 0.8019 - loss: 0.3014 - val_accuracy: 0.5066 - val_loss: 12.1667

Epoch 381/1000
196/196 0s 2ms/step - accuracy: 0.8009 - loss: 0.3061 - val_accuracy: 0.5077 - val_loss: 12.7172
Epoch 382/1000
196/196 0s 2ms/step - accuracy: 0.8051 - loss: 0.3030 - val_accuracy: 0.5045 - val_loss: 13.7444
Epoch 383/1000
196/196 0s 2ms/step - accuracy: 0.7968 - loss: 0.3144 - val_accuracy: 0.5055 - val_loss: 10.7734
Epoch 384/1000
196/196 0s 2ms/step - accuracy: 0.7987 - loss: 0.3185 - val_accuracy: 0.5061 - val_loss: 12.0249
Epoch 385/1000
196/196 0s 2ms/step - accuracy: 0.8028 - loss: 0.3074 - val_accuracy: 0.5043 - val_loss: 12.3614
Epoch 386/1000
196/196 0s 2ms/step - accuracy: 0.8038 - loss: 0.3036 - val_accuracy: 0.5056 - val_loss: 12.5727
Epoch 387/1000
196/196 0s 2ms/step - accuracy: 0.8025 - loss: 0.3152 - val_accuracy: 0.5048 - val_loss: 15.9009
Epoch 388/1000
196/196 0s 2ms/step - accuracy: 0.7916 - loss: 0.3287 - val_accuracy: 0.5047 - val_loss: 12.6721
Epoch 389/1000
196/196 0s 2ms/step - accuracy: 0.7947 - loss: 0.3181 - val_accuracy: 0.5060 - val_loss: 13.5575
Epoch 390/1000
196/196 0s 2ms/step - accuracy: 0.8000 - loss: 0.3116 - val_accuracy: 0.5033 - val_loss: 13.0951
Epoch 391/1000
196/196 0s 2ms/step - accuracy: 0.7970 - loss: 0.3127 - val_accuracy: 0.5043 - val_loss: 13.2871
Epoch 392/1000
196/196 0s 2ms/step - accuracy: 0.8006 - loss: 0.3116 - val_accuracy: 0.5031 - val_loss: 14.3364
Epoch 393/1000
196/196 0s 2ms/step - accuracy: 0.8058 - loss: 0.3030 - val_accuracy: 0.5053 - val_loss: 12.8123
Epoch 394/1000
196/196 0s 2ms/step - accuracy: 0.8073 - loss: 0.3153 - val_accuracy: 0.5028 - val_loss: 12.9220
Epoch 395/1000
196/196 0s 2ms/step - accuracy: 0.8040 - loss: 0.3043 - val_accuracy: 0.5018 - val_loss: 16.5176
Epoch 396/1000
196/196 0s 2ms/step - accuracy: 0.7981 - loss: 0.3251 - val_accuracy: 0.5030 - val_loss: 13.7576
Epoch 397/1000
196/196 0s 2ms/step - accuracy: 0.7975 - loss: 0.3147 - val_accuracy: 0.5052 - val_loss: 16.1885
Epoch 398/1000
196/196 0s 2ms/step - accuracy: 0.8048 - loss: 0.3227 - val_accuracy: 0.5052 - val_loss: 14.0204
Epoch 399/1000
196/196 0s 2ms/step - accuracy: 0.8075 - loss: 0.3058 - val_accuracy: 0.5041 - val_loss: 14.6259
Epoch 400/1000
196/196 0s 2ms/step - accuracy: 0.7994 - loss: 0.3058 - val_accuracy: 0.5035 - val_loss: 15.1581

Epoch 401/1000
196/196 0s 2ms/step - accuracy: 0.8048 - loss: 0.3066 - val_accuracy: 0.5048 - val_loss: 14.2908
Epoch 402/1000
196/196 0s 2ms/step - accuracy: 0.7997 - loss: 0.3086 - val_accuracy: 0.5054 - val_loss: 16.4395
Epoch 403/1000
196/196 0s 2ms/step - accuracy: 0.8007 - loss: 0.3086 - val_accuracy: 0.5053 - val_loss: 14.5136
Epoch 404/1000
196/196 0s 2ms/step - accuracy: 0.8042 - loss: 0.3134 - val_accuracy: 0.5035 - val_loss: 16.1426
Epoch 405/1000
196/196 0s 2ms/step - accuracy: 0.7996 - loss: 0.3128 - val_accuracy: 0.5048 - val_loss: 13.4743
Epoch 406/1000
196/196 0s 2ms/step - accuracy: 0.8044 - loss: 0.3190 - val_accuracy: 0.5064 - val_loss: 11.6477
Epoch 407/1000
196/196 0s 2ms/step - accuracy: 0.8015 - loss: 0.3037 - val_accuracy: 0.5049 - val_loss: 11.4697
Epoch 408/1000
196/196 0s 2ms/step - accuracy: 0.8045 - loss: 0.3059 - val_accuracy: 0.5045 - val_loss: 11.7316
Epoch 409/1000
196/196 0s 2ms/step - accuracy: 0.8050 - loss: 0.3068 - val_accuracy: 0.5054 - val_loss: 13.9505
Epoch 410/1000
196/196 0s 2ms/step - accuracy: 0.8063 - loss: 0.3069 - val_accuracy: 0.5032 - val_loss: 13.6195
Epoch 411/1000
196/196 0s 2ms/step - accuracy: 0.8036 - loss: 0.3057 - val_accuracy: 0.5053 - val_loss: 13.7532
Epoch 412/1000
196/196 0s 2ms/step - accuracy: 0.8058 - loss: 0.2990 - val_accuracy: 0.5026 - val_loss: 12.2477
Epoch 413/1000
196/196 0s 2ms/step - accuracy: 0.8039 - loss: 0.3137 - val_accuracy: 0.5054 - val_loss: 14.7689
Epoch 414/1000
196/196 0s 2ms/step - accuracy: 0.8033 - loss: 0.3034 - val_accuracy: 0.5048 - val_loss: 16.8188
Epoch 415/1000
196/196 0s 2ms/step - accuracy: 0.8031 - loss: 0.3105 - val_accuracy: 0.5043 - val_loss: 13.9969
Epoch 416/1000
196/196 0s 2ms/step - accuracy: 0.8073 - loss: 0.3087 - val_accuracy: 0.5044 - val_loss: 12.7078
Epoch 417/1000
196/196 0s 2ms/step - accuracy: 0.8031 - loss: 0.2977 - val_accuracy: 0.5034 - val_loss: 13.9477
Epoch 418/1000
196/196 0s 2ms/step - accuracy: 0.8048 - loss: 0.3034 - val_accuracy: 0.5043 - val_loss: 14.5253
Epoch 419/1000
196/196 0s 2ms/step - accuracy: 0.8052 - loss: 0.3036 - val_accuracy: 0.5026 - val_loss: 13.9688
Epoch 420/1000
196/196 0s 2ms/step - accuracy: 0.8018 - loss: 0.3215 - val_accuracy: 0.5058 - val_loss: 17.8524

Epoch 421/1000
196/196 0s 2ms/step - accuracy: 0.8057 - loss: 0.3089 - val_accuracy: 0.5032 - val_loss: 17.0389
Epoch 422/1000
196/196 0s 2ms/step - accuracy: 0.8040 - loss: 0.3137 - val_accuracy: 0.5019 - val_loss: 15.8802
Epoch 423/1000
196/196 0s 2ms/step - accuracy: 0.8049 - loss: 0.3151 - val_accuracy: 0.5003 - val_loss: 15.7644
Epoch 424/1000
196/196 0s 2ms/step - accuracy: 0.8057 - loss: 0.3095 - val_accuracy: 0.5012 - val_loss: 13.9408
Epoch 425/1000
196/196 0s 2ms/step - accuracy: 0.8017 - loss: 0.3074 - val_accuracy: 0.5036 - val_loss: 14.1924
Epoch 426/1000
196/196 0s 2ms/step - accuracy: 0.8036 - loss: 0.3027 - val_accuracy: 0.5016 - val_loss: 15.9764
Epoch 427/1000
196/196 0s 2ms/step - accuracy: 0.8043 - loss: 0.3049 - val_accuracy: 0.5026 - val_loss: 14.4580
Epoch 428/1000
196/196 0s 2ms/step - accuracy: 0.8032 - loss: 0.3025 - val_accuracy: 0.5023 - val_loss: 15.7222
Epoch 429/1000
196/196 0s 2ms/step - accuracy: 0.8070 - loss: 0.2982 - val_accuracy: 0.5027 - val_loss: 14.7193
Epoch 430/1000
196/196 0s 2ms/step - accuracy: 0.8149 - loss: 0.2919 - val_accuracy: 0.5008 - val_loss: 14.6548
Epoch 431/1000
196/196 0s 2ms/step - accuracy: 0.8013 - loss: 0.3044 - val_accuracy: 0.5029 - val_loss: 15.3570
Epoch 432/1000
196/196 0s 2ms/step - accuracy: 0.7973 - loss: 0.3323 - val_accuracy: 0.5025 - val_loss: 14.7590
Epoch 433/1000
196/196 0s 2ms/step - accuracy: 0.8023 - loss: 0.3149 - val_accuracy: 0.5020 - val_loss: 15.2388
Epoch 434/1000
196/196 0s 2ms/step - accuracy: 0.8021 - loss: 0.3040 - val_accuracy: 0.5047 - val_loss: 15.1391
Epoch 435/1000
196/196 0s 2ms/step - accuracy: 0.8076 - loss: 0.2984 - val_accuracy: 0.5047 - val_loss: 14.8627
Epoch 436/1000
196/196 0s 2ms/step - accuracy: 0.8026 - loss: 0.3022 - val_accuracy: 0.5055 - val_loss: 16.0052
Epoch 437/1000
196/196 1s 2ms/step - accuracy: 0.8063 - loss: 0.2977 - val_accuracy: 0.5029 - val_loss: 16.3339
Epoch 438/1000
196/196 0s 2ms/step - accuracy: 0.8062 - loss: 0.3110 - val_accuracy: 0.5046 - val_loss: 14.9610
Epoch 439/1000
196/196 0s 2ms/step - accuracy: 0.8020 - loss: 0.3204 - val_accuracy: 0.5052 - val_loss: 13.6906
Epoch 440/1000
196/196 0s 2ms/step - accuracy: 0.8054 - loss: 0.3151 - val_accuracy: 0.5041 - val_loss: 16.4080

Epoch 441/1000
196/196 0s 2ms/step - accuracy: 0.8036 - loss: 0.3144 - val_accuracy: 0.5020 - val_loss: 16.0013
Epoch 442/1000
196/196 0s 2ms/step - accuracy: 0.8052 - loss: 0.3068 - val_accuracy: 0.5040 - val_loss: 14.9600
Epoch 443/1000
196/196 0s 2ms/step - accuracy: 0.8055 - loss: 0.3078 - val_accuracy: 0.5043 - val_loss: 14.2978
Epoch 444/1000
196/196 0s 2ms/step - accuracy: 0.8019 - loss: 0.3027 - val_accuracy: 0.5048 - val_loss: 13.3361
Epoch 445/1000
196/196 0s 2ms/step - accuracy: 0.8115 - loss: 0.2979 - val_accuracy: 0.5048 - val_loss: 13.2044
Epoch 446/1000
196/196 1s 3ms/step - accuracy: 0.8087 - loss: 0.2970 - val_accuracy: 0.5058 - val_loss: 13.7133
Epoch 447/1000
196/196 0s 2ms/step - accuracy: 0.8096 - loss: 0.2962 - val_accuracy: 0.5045 - val_loss: 15.4528
Epoch 448/1000
196/196 0s 2ms/step - accuracy: 0.8107 - loss: 0.2987 - val_accuracy: 0.5024 - val_loss: 20.6179
Epoch 449/1000
196/196 0s 2ms/step - accuracy: 0.7992 - loss: 0.3246 - val_accuracy: 0.5019 - val_loss: 18.5858
Epoch 450/1000
196/196 0s 2ms/step - accuracy: 0.8077 - loss: 0.3107 - val_accuracy: 0.5053 - val_loss: 15.3019
Epoch 451/1000
196/196 1s 3ms/step - accuracy: 0.8029 - loss: 0.3018 - val_accuracy: 0.5056 - val_loss: 15.6196
Epoch 452/1000
196/196 0s 2ms/step - accuracy: 0.8076 - loss: 0.2978 - val_accuracy: 0.5041 - val_loss: 15.5002
Epoch 453/1000
196/196 0s 2ms/step - accuracy: 0.8112 - loss: 0.2986 - val_accuracy: 0.5038 - val_loss: 15.5284
Epoch 454/1000
196/196 0s 2ms/step - accuracy: 0.8061 - loss: 0.2977 - val_accuracy: 0.5021 - val_loss: 19.0606
Epoch 455/1000
196/196 0s 2ms/step - accuracy: 0.8085 - loss: 0.2966 - val_accuracy: 0.5011 - val_loss: 17.1554
Epoch 456/1000
196/196 0s 2ms/step - accuracy: 0.8023 - loss: 0.3039 - val_accuracy: 0.5015 - val_loss: 17.2354
Epoch 457/1000
196/196 0s 2ms/step - accuracy: 0.8041 - loss: 0.3058 - val_accuracy: 0.5029 - val_loss: 15.9273
Epoch 458/1000
196/196 0s 2ms/step - accuracy: 0.8049 - loss: 0.3026 - val_accuracy: 0.5034 - val_loss: 15.3944
Epoch 459/1000
196/196 0s 2ms/step - accuracy: 0.8074 - loss: 0.3179 - val_accuracy: 0.5036 - val_loss: 17.0848
Epoch 460/1000
196/196 0s 2ms/step - accuracy: 0.8057 - loss: 0.3096 - val_accuracy: 0.5035 - val_loss: 17.2646

Epoch 461/1000
196/196 0s 2ms/step - accuracy: 0.8096 - loss: 0.3027 - val_accuracy: 0.5045 - val_loss: 16.7415
Epoch 462/1000
196/196 0s 2ms/step - accuracy: 0.8092 - loss: 0.2972 - val_accuracy: 0.5030 - val_loss: 13.9889
Epoch 463/1000
196/196 0s 2ms/step - accuracy: 0.8111 - loss: 0.2908 - val_accuracy: 0.5044 - val_loss: 15.9208
Epoch 464/1000
196/196 0s 2ms/step - accuracy: 0.8120 - loss: 0.2948 - val_accuracy: 0.5033 - val_loss: 17.4590
Epoch 465/1000
196/196 0s 2ms/step - accuracy: 0.8089 - loss: 0.2982 - val_accuracy: 0.5050 - val_loss: 16.4175
Epoch 466/1000
196/196 0s 2ms/step - accuracy: 0.8054 - loss: 0.3016 - val_accuracy: 0.5033 - val_loss: 17.0383
Epoch 467/1000
196/196 0s 2ms/step - accuracy: 0.8044 - loss: 0.2987 - val_accuracy: 0.5024 - val_loss: 17.3002
Epoch 468/1000
196/196 0s 2ms/step - accuracy: 0.8110 - loss: 0.2918 - val_accuracy: 0.5044 - val_loss: 15.7616
Epoch 469/1000
196/196 0s 2ms/step - accuracy: 0.8134 - loss: 0.2888 - val_accuracy: 0.5041 - val_loss: 18.1308
Epoch 470/1000
196/196 0s 2ms/step - accuracy: 0.8118 - loss: 0.2933 - val_accuracy: 0.5053 - val_loss: 17.3463
Epoch 471/1000
196/196 1s 3ms/step - accuracy: 0.8103 - loss: 0.2970 - val_accuracy: 0.5040 - val_loss: 14.2508
Epoch 472/1000
196/196 1s 3ms/step - accuracy: 0.8044 - loss: 0.3129 - val_accuracy: 0.5028 - val_loss: 18.3314
Epoch 473/1000
196/196 1s 3ms/step - accuracy: 0.8008 - loss: 0.3103 - val_accuracy: 0.5037 - val_loss: 14.6809
Epoch 474/1000
196/196 0s 2ms/step - accuracy: 0.8071 - loss: 0.2972 - val_accuracy: 0.5056 - val_loss: 17.1689
Epoch 475/1000
196/196 0s 2ms/step - accuracy: 0.8037 - loss: 0.3042 - val_accuracy: 0.5045 - val_loss: 16.1572
Epoch 476/1000
196/196 0s 2ms/step - accuracy: 0.8127 - loss: 0.2928 - val_accuracy: 0.5049 - val_loss: 14.9666
Epoch 477/1000
196/196 0s 2ms/step - accuracy: 0.8088 - loss: 0.2889 - val_accuracy: 0.5038 - val_loss: 16.4715
Epoch 478/1000
196/196 0s 2ms/step - accuracy: 0.8050 - loss: 0.3054 - val_accuracy: 0.5032 - val_loss: 21.9120
Epoch 479/1000
196/196 0s 2ms/step - accuracy: 0.8085 - loss: 0.3116 - val_accuracy: 0.5051 - val_loss: 17.7293
Epoch 480/1000
196/196 0s 2ms/step - accuracy: 0.8087 - loss: 0.2994 - val_accuracy: 0.5034 - val_loss: 17.2956

Epoch 481/1000
196/196 0s 2ms/step - accuracy: 0.8076 - loss: 0.2902 - val_accuracy: 0.5057 - val_loss: 18.4438
Epoch 482/1000
196/196 0s 2ms/step - accuracy: 0.8120 - loss: 0.2979 - val_accuracy: 0.5043 - val_loss: 15.4910
Epoch 483/1000
196/196 0s 2ms/step - accuracy: 0.8069 - loss: 0.3019 - val_accuracy: 0.5031 - val_loss: 15.0088
Epoch 484/1000
196/196 0s 2ms/step - accuracy: 0.8156 - loss: 0.2937 - val_accuracy: 0.5026 - val_loss: 18.4257
Epoch 485/1000
196/196 0s 2ms/step - accuracy: 0.8145 - loss: 0.2940 - val_accuracy: 0.5014 - val_loss: 16.8475
Epoch 486/1000
196/196 0s 2ms/step - accuracy: 0.8079 - loss: 0.3025 - val_accuracy: 0.5033 - val_loss: 22.8042
Epoch 487/1000
196/196 0s 2ms/step - accuracy: 0.8046 - loss: 0.3233 - val_accuracy: 0.5042 - val_loss: 21.0922
Epoch 488/1000
196/196 0s 2ms/step - accuracy: 0.8051 - loss: 0.3244 - val_accuracy: 0.5046 - val_loss: 19.6757
Epoch 489/1000
196/196 0s 2ms/step - accuracy: 0.8098 - loss: 0.3002 - val_accuracy: 0.5032 - val_loss: 18.3895
Epoch 490/1000
196/196 0s 2ms/step - accuracy: 0.8106 - loss: 0.2913 - val_accuracy: 0.5035 - val_loss: 16.9930
Epoch 491/1000
196/196 0s 2ms/step - accuracy: 0.8108 - loss: 0.2903 - val_accuracy: 0.5056 - val_loss: 17.7928
Epoch 492/1000
196/196 0s 2ms/step - accuracy: 0.8104 - loss: 0.2929 - val_accuracy: 0.5052 - val_loss: 17.0904
Epoch 493/1000
196/196 0s 2ms/step - accuracy: 0.8071 - loss: 0.2969 - val_accuracy: 0.5048 - val_loss: 16.3303
Epoch 494/1000
196/196 0s 2ms/step - accuracy: 0.8144 - loss: 0.2812 - val_accuracy: 0.5034 - val_loss: 16.2402
Epoch 495/1000
196/196 1s 2ms/step - accuracy: 0.8072 - loss: 0.2974 - val_accuracy: 0.5032 - val_loss: 15.5591
Epoch 496/1000
196/196 1s 3ms/step - accuracy: 0.8119 - loss: 0.3125 - val_accuracy: 0.5026 - val_loss: 21.0512
Epoch 497/1000
196/196 1s 3ms/step - accuracy: 0.8095 - loss: 0.3035 - val_accuracy: 0.5033 - val_loss: 16.8753
Epoch 498/1000
196/196 1s 3ms/step - accuracy: 0.8119 - loss: 0.2961 - val_accuracy: 0.5048 - val_loss: 17.8905
Epoch 499/1000
196/196 0s 2ms/step - accuracy: 0.8150 - loss: 0.2928 - val_accuracy: 0.5042 - val_loss: 21.7956
Epoch 500/1000
196/196 0s 2ms/step - accuracy: 0.8109 - loss: 0.2949 - val_accuracy: 0.5055 - val_loss: 19.2871

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Epoch 501/1000
196/196 0s 2ms/step - accuracy: 0.8057 - loss: 0.3034 - val_
accuracy: 0.5034 - val_loss: 18.1895
Epoch 502/1000
196/196 0s 2ms/step - accuracy: 0.8060 - loss: 0.3044 - val_
accuracy: 0.5034 - val_loss: 14.6368
Epoch 503/1000
196/196 0s 2ms/step - accuracy: 0.8090 - loss: 0.2944 - val_
accuracy: 0.5043 - val_loss: 18.9089
Epoch 504/1000
196/196 0s 2ms/step - accuracy: 0.8117 - loss: 0.3016 - val_
accuracy: 0.5022 - val_loss: 16.9127
Epoch 505/1000
196/196 0s 2ms/step - accuracy: 0.8137 - loss: 0.2926 - val_
accuracy: 0.5040 - val_loss: 17.7721
Epoch 506/1000
196/196 0s 2ms/step - accuracy: 0.8208 - loss: 0.2866 - val_
accuracy: 0.5032 - val_loss: 17.4256
Epoch 507/1000
196/196 0s 2ms/step - accuracy: 0.8056 - loss: 0.2979 - val_
accuracy: 0.5034 - val_loss: 18.9381
Epoch 508/1000
196/196 0s 2ms/step - accuracy: 0.8076 - loss: 0.3054 - val_
accuracy: 0.5040 - val_loss: 16.7853
Epoch 509/1000
196/196 0s 2ms/step - accuracy: 0.8102 - loss: 0.3105 - val_
accuracy: 0.5032 - val_loss: 20.6012
Epoch 510/1000
196/196 1s 4ms/step - accuracy: 0.8103 - loss: 0.2955 - val_
accuracy: 0.5011 - val_loss: 19.1079
Epoch 511/1000
196/196 1s 3ms/step - accuracy: 0.8161 - loss: 0.2917 - val_
accuracy: 0.5013 - val_loss: 19.3366
Epoch 512/1000
196/196 0s 2ms/step - accuracy: 0.8096 - loss: 0.3023 - val_
accuracy: 0.5037 - val_loss: 16.4275
Epoch 513/1000
196/196 1s 2ms/step - accuracy: 0.8141 - loss: 0.2995 - val_
accuracy: 0.5032 - val_loss: 17.8666
Epoch 514/1000
196/196 0s 2ms/step - accuracy: 0.8129 - loss: 0.3021 - val_
accuracy: 0.5032 - val_loss: 15.9870
Epoch 515/1000
196/196 0s 2ms/step - accuracy: 0.8125 - loss: 0.2906 - val_
accuracy: 0.5025 - val_loss: 18.2265
Epoch 516/1000
196/196 0s 2ms/step - accuracy: 0.8062 - loss: 0.3017 - val_
accuracy: 0.5033 - val_loss: 21.2046
Epoch 517/1000
196/196 0s 2ms/step - accuracy: 0.8151 - loss: 0.2980 - val_
accuracy: 0.5032 - val_loss: 17.9049
Epoch 518/1000
196/196 1s 3ms/step - accuracy: 0.8051 - loss: 0.3098 - val_
accuracy: 0.5031 - val_loss: 19.2235
Epoch 519/1000
196/196 0s 2ms/step - accuracy: 0.8119 - loss: 0.2963 - val_
accuracy: 0.5040 - val_loss: 18.0677
Epoch 520/1000
196/196 0s 2ms/step - accuracy: 0.8110 - loss: 0.2939 - val_
accuracy: 0.5027 - val_loss: 20.9619
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Epoch 521/1000
196/196 0s 2ms/step - accuracy: 0.8112 - loss: 0.2879 - val_accuracy: 0.5006 - val_loss: 19.6552
Epoch 522/1000
196/196 0s 2ms/step - accuracy: 0.8135 - loss: 0.2898 - val_accuracy: 0.5016 - val_loss: 19.4755
Epoch 523/1000
196/196 0s 2ms/step - accuracy: 0.8099 - loss: 0.2983 - val_accuracy: 0.5028 - val_loss: 19.4251
Epoch 524/1000
196/196 1s 2ms/step - accuracy: 0.8125 - loss: 0.2895 - val_accuracy: 0.5034 - val_loss: 19.8301
Epoch 525/1000
196/196 0s 2ms/step - accuracy: 0.8111 - loss: 0.2927 - val_accuracy: 0.5008 - val_loss: 20.8153
Epoch 526/1000
196/196 0s 2ms/step - accuracy: 0.8163 - loss: 0.2901 - val_accuracy: 0.5016 - val_loss: 17.9140
Epoch 527/1000
196/196 0s 2ms/step - accuracy: 0.8119 - loss: 0.2857 - val_accuracy: 0.5028 - val_loss: 14.1045
Epoch 528/1000
196/196 0s 2ms/step - accuracy: 0.8088 - loss: 0.2908 - val_accuracy: 0.5028 - val_loss: 20.1167
Epoch 529/1000
196/196 0s 2ms/step - accuracy: 0.8110 - loss: 0.3001 - val_accuracy: 0.5038 - val_loss: 19.6256
Epoch 530/1000
196/196 0s 2ms/step - accuracy: 0.8148 - loss: 0.2918 - val_accuracy: 0.5013 - val_loss: 16.7406
Epoch 531/1000
196/196 0s 2ms/step - accuracy: 0.8175 - loss: 0.2851 - val_accuracy: 0.5022 - val_loss: 16.3577
Epoch 532/1000
196/196 0s 2ms/step - accuracy: 0.8164 - loss: 0.2895 - val_accuracy: 0.5031 - val_loss: 16.0729
Epoch 533/1000
196/196 0s 2ms/step - accuracy: 0.8175 - loss: 0.3009 - val_accuracy: 0.5028 - val_loss: 20.0292
Epoch 534/1000
196/196 0s 2ms/step - accuracy: 0.8121 - loss: 0.2935 - val_accuracy: 0.5034 - val_loss: 19.4610
Epoch 535/1000
196/196 0s 2ms/step - accuracy: 0.8127 - loss: 0.2941 - val_accuracy: 0.5042 - val_loss: 16.2931
Epoch 536/1000
196/196 0s 2ms/step - accuracy: 0.8074 - loss: 0.3061 - val_accuracy: 0.5038 - val_loss: 18.1931
Epoch 537/1000
196/196 0s 2ms/step - accuracy: 0.8110 - loss: 0.3125 - val_accuracy: 0.5030 - val_loss: 16.7899
Epoch 538/1000
196/196 0s 2ms/step - accuracy: 0.8142 - loss: 0.2984 - val_accuracy: 0.5016 - val_loss: 19.4496
Epoch 539/1000
196/196 0s 2ms/step - accuracy: 0.8148 - loss: 0.2892 - val_accuracy: 0.5040 - val_loss: 19.7890
Epoch 540/1000
196/196 0s 2ms/step - accuracy: 0.8177 - loss: 0.2800 - val_accuracy: 0.5046 - val_loss: 19.4881

Epoch 541/1000
196/196 0s 2ms/step - accuracy: 0.8144 - loss: 0.2985 - val_accuracy: 0.5023 - val_loss: 18.7636
Epoch 542/1000
196/196 0s 2ms/step - accuracy: 0.8147 - loss: 0.2942 - val_accuracy: 0.5020 - val_loss: 20.6173
Epoch 543/1000
196/196 0s 2ms/step - accuracy: 0.8146 - loss: 0.3037 - val_accuracy: 0.5019 - val_loss: 16.5340
Epoch 544/1000
196/196 0s 2ms/step - accuracy: 0.8078 - loss: 0.2919 - val_accuracy: 0.5037 - val_loss: 17.5999
Epoch 545/1000
196/196 0s 2ms/step - accuracy: 0.8122 - loss: 0.2941 - val_accuracy: 0.5010 - val_loss: 14.9051
Epoch 546/1000
196/196 0s 2ms/step - accuracy: 0.8186 - loss: 0.2892 - val_accuracy: 0.5012 - val_loss: 17.3634
Epoch 547/1000
196/196 0s 2ms/step - accuracy: 0.8045 - loss: 0.2980 - val_accuracy: 0.5025 - val_loss: 22.7587
Epoch 548/1000
196/196 0s 2ms/step - accuracy: 0.8149 - loss: 0.2884 - val_accuracy: 0.5000 - val_loss: 20.0861
Epoch 549/1000
196/196 0s 2ms/step - accuracy: 0.8147 - loss: 0.2951 - val_accuracy: 0.5010 - val_loss: 16.6854
Epoch 550/1000
196/196 1s 2ms/step - accuracy: 0.8165 - loss: 0.3234 - val_accuracy: 0.5012 - val_loss: 17.6193
Epoch 551/1000
196/196 0s 2ms/step - accuracy: 0.8091 - loss: 0.2883 - val_accuracy: 0.5017 - val_loss: 20.5004
Epoch 552/1000
196/196 1s 3ms/step - accuracy: 0.8134 - loss: 0.2838 - val_accuracy: 0.5030 - val_loss: 21.5221
Epoch 553/1000
196/196 0s 2ms/step - accuracy: 0.8119 - loss: 0.2945 - val_accuracy: 0.5016 - val_loss: 22.6361
Epoch 554/1000
196/196 0s 2ms/step - accuracy: 0.8155 - loss: 0.2914 - val_accuracy: 0.5030 - val_loss: 19.4539
Epoch 555/1000
196/196 0s 2ms/step - accuracy: 0.8116 - loss: 0.3007 - val_accuracy: 0.5028 - val_loss: 20.5265
Epoch 556/1000
196/196 0s 2ms/step - accuracy: 0.8129 - loss: 0.2979 - val_accuracy: 0.5045 - val_loss: 20.4787
Epoch 557/1000
196/196 0s 2ms/step - accuracy: 0.8125 - loss: 0.2958 - val_accuracy: 0.5025 - val_loss: 19.4406
Epoch 558/1000
196/196 0s 2ms/step - accuracy: 0.8127 - loss: 0.2972 - val_accuracy: 0.5042 - val_loss: 21.1615
Epoch 559/1000
196/196 0s 2ms/step - accuracy: 0.8167 - loss: 0.2919 - val_accuracy: 0.5025 - val_loss: 19.3499
Epoch 560/1000
196/196 0s 2ms/step - accuracy: 0.8153 - loss: 0.2864 - val_accuracy: 0.5049 - val_loss: 19.0299

Epoch 561/1000
196/196 0s 2ms/step - accuracy: 0.8135 - loss: 0.2855 - val_accuracy: 0.5015 - val_loss: 17.2316
Epoch 562/1000
196/196 0s 2ms/step - accuracy: 0.8184 - loss: 0.2859 - val_accuracy: 0.5047 - val_loss: 20.5832
Epoch 563/1000
196/196 0s 2ms/step - accuracy: 0.8173 - loss: 0.2796 - val_accuracy: 0.5038 - val_loss: 20.3787
Epoch 564/1000
196/196 0s 2ms/step - accuracy: 0.8181 - loss: 0.2858 - val_accuracy: 0.5026 - val_loss: 18.6950
Epoch 565/1000
196/196 0s 2ms/step - accuracy: 0.8153 - loss: 0.2917 - val_accuracy: 0.5034 - val_loss: 17.1337
Epoch 566/1000
196/196 0s 2ms/step - accuracy: 0.8057 - loss: 0.3020 - val_accuracy: 0.5042 - val_loss: 16.9634
Epoch 567/1000
196/196 0s 2ms/step - accuracy: 0.8190 - loss: 0.2827 - val_accuracy: 0.5019 - val_loss: 16.7628
Epoch 568/1000
196/196 0s 2ms/step - accuracy: 0.8160 - loss: 0.2788 - val_accuracy: 0.5038 - val_loss: 19.2003
Epoch 569/1000
196/196 0s 2ms/step - accuracy: 0.8172 - loss: 0.2842 - val_accuracy: 0.5039 - val_loss: 17.8125
Epoch 570/1000
196/196 0s 2ms/step - accuracy: 0.8133 - loss: 0.2907 - val_accuracy: 0.5045 - val_loss: 21.3338
Epoch 571/1000
196/196 0s 2ms/step - accuracy: 0.8120 - loss: 0.2967 - val_accuracy: 0.5036 - val_loss: 18.3344
Epoch 572/1000
196/196 0s 2ms/step - accuracy: 0.8188 - loss: 0.2835 - val_accuracy: 0.5035 - val_loss: 20.0165
Epoch 573/1000
196/196 0s 2ms/step - accuracy: 0.8153 - loss: 0.2965 - val_accuracy: 0.5034 - val_loss: 15.8495
Epoch 574/1000
196/196 0s 2ms/step - accuracy: 0.8132 - loss: 0.2987 - val_accuracy: 0.5030 - val_loss: 17.2788
Epoch 575/1000
196/196 0s 2ms/step - accuracy: 0.8158 - loss: 0.2905 - val_accuracy: 0.5014 - val_loss: 19.2398
Epoch 576/1000
196/196 0s 2ms/step - accuracy: 0.8150 - loss: 0.2897 - val_accuracy: 0.5015 - val_loss: 19.3086
Epoch 577/1000
196/196 0s 2ms/step - accuracy: 0.8150 - loss: 0.2799 - val_accuracy: 0.5019 - val_loss: 19.1820
Epoch 578/1000
196/196 0s 2ms/step - accuracy: 0.8168 - loss: 0.2796 - val_accuracy: 0.5031 - val_loss: 20.6877
Epoch 579/1000
196/196 0s 2ms/step - accuracy: 0.8221 - loss: 0.2809 - val_accuracy: 0.5008 - val_loss: 20.5499
Epoch 580/1000
196/196 0s 2ms/step - accuracy: 0.8212 - loss: 0.2817 - val_accuracy: 0.5002 - val_loss: 19.8378

Epoch 581/1000
196/196 0s 2ms/step - accuracy: 0.8143 - loss: 0.2873 - val_accuracy: 0.5005 - val_loss: 18.8319
Epoch 582/1000
196/196 0s 2ms/step - accuracy: 0.8146 - loss: 0.2878 - val_accuracy: 0.5032 - val_loss: 20.8229
Epoch 583/1000
196/196 0s 2ms/step - accuracy: 0.8155 - loss: 0.2871 - val_accuracy: 0.5020 - val_loss: 23.8643
Epoch 584/1000
196/196 0s 2ms/step - accuracy: 0.8127 - loss: 0.2982 - val_accuracy: 0.5031 - val_loss: 21.1752
Epoch 585/1000
196/196 0s 2ms/step - accuracy: 0.8150 - loss: 0.2863 - val_accuracy: 0.5002 - val_loss: 19.3151
Epoch 586/1000
196/196 0s 2ms/step - accuracy: 0.8179 - loss: 0.2813 - val_accuracy: 0.5016 - val_loss: 18.8981
Epoch 587/1000
196/196 0s 2ms/step - accuracy: 0.8147 - loss: 0.2932 - val_accuracy: 0.5033 - val_loss: 21.2993
Epoch 588/1000
196/196 0s 2ms/step - accuracy: 0.8125 - loss: 0.3028 - val_accuracy: 0.5025 - val_loss: 22.7325
Epoch 589/1000
196/196 0s 2ms/step - accuracy: 0.8141 - loss: 0.2984 - val_accuracy: 0.5014 - val_loss: 20.0158
Epoch 590/1000
196/196 0s 2ms/step - accuracy: 0.8126 - loss: 0.3031 - val_accuracy: 0.5001 - val_loss: 20.0492
Epoch 591/1000
196/196 0s 2ms/step - accuracy: 0.8092 - loss: 0.2960 - val_accuracy: 0.5018 - val_loss: 21.4561
Epoch 592/1000
196/196 0s 2ms/step - accuracy: 0.8211 - loss: 0.2825 - val_accuracy: 0.5015 - val_loss: 19.3794
Epoch 593/1000
196/196 0s 2ms/step - accuracy: 0.8206 - loss: 0.2787 - val_accuracy: 0.4997 - val_loss: 19.5075
Epoch 594/1000
196/196 0s 2ms/step - accuracy: 0.8208 - loss: 0.2798 - val_accuracy: 0.5025 - val_loss: 23.5828
Epoch 595/1000
196/196 0s 2ms/step - accuracy: 0.8124 - loss: 0.2856 - val_accuracy: 0.5014 - val_loss: 22.6998
Epoch 596/1000
196/196 0s 2ms/step - accuracy: 0.8102 - loss: 0.3198 - val_accuracy: 0.5013 - val_loss: 21.6340
Epoch 597/1000
196/196 0s 2ms/step - accuracy: 0.8065 - loss: 0.2971 - val_accuracy: 0.5012 - val_loss: 19.2888
Epoch 598/1000
196/196 0s 2ms/step - accuracy: 0.8203 - loss: 0.2830 - val_accuracy: 0.5014 - val_loss: 20.6282
Epoch 599/1000
196/196 0s 2ms/step - accuracy: 0.8151 - loss: 0.2805 - val_accuracy: 0.5030 - val_loss: 23.1751
Epoch 600/1000
196/196 0s 2ms/step - accuracy: 0.8207 - loss: 0.2841 - val_accuracy: 0.5020 - val_loss: 19.9824

Epoch 601/1000
196/196 0s 2ms/step - accuracy: 0.8105 - loss: 0.2903 - val_accuracy: 0.5045 - val_loss: 25.5450
Epoch 602/1000
196/196 0s 2ms/step - accuracy: 0.8150 - loss: 0.2823 - val_accuracy: 0.5025 - val_loss: 23.6917
Epoch 603/1000
196/196 0s 2ms/step - accuracy: 0.8186 - loss: 0.2863 - val_accuracy: 0.5023 - val_loss: 21.2355
Epoch 604/1000
196/196 0s 2ms/step - accuracy: 0.8181 - loss: 0.2897 - val_accuracy: 0.5028 - val_loss: 19.9957
Epoch 605/1000
196/196 0s 2ms/step - accuracy: 0.8150 - loss: 0.2910 - val_accuracy: 0.4999 - val_loss: 23.3989
Epoch 606/1000
196/196 0s 2ms/step - accuracy: 0.8162 - loss: 0.2845 - val_accuracy: 0.5026 - val_loss: 24.1530
Epoch 607/1000
196/196 0s 2ms/step - accuracy: 0.8225 - loss: 0.2775 - val_accuracy: 0.5037 - val_loss: 23.8925
Epoch 608/1000
196/196 0s 2ms/step - accuracy: 0.8177 - loss: 0.2803 - val_accuracy: 0.5042 - val_loss: 20.5727
Epoch 609/1000
196/196 0s 2ms/step - accuracy: 0.8178 - loss: 0.2858 - val_accuracy: 0.5027 - val_loss: 22.0394
Epoch 610/1000
196/196 0s 2ms/step - accuracy: 0.8243 - loss: 0.2836 - val_accuracy: 0.5035 - val_loss: 23.4622
Epoch 611/1000
196/196 0s 2ms/step - accuracy: 0.8171 - loss: 0.2795 - val_accuracy: 0.5022 - val_loss: 23.8982
Epoch 612/1000
196/196 0s 2ms/step - accuracy: 0.8196 - loss: 0.2824 - val_accuracy: 0.5021 - val_loss: 20.1482
Epoch 613/1000
196/196 0s 2ms/step - accuracy: 0.8154 - loss: 0.3035 - val_accuracy: 0.5004 - val_loss: 21.7917
Epoch 614/1000
196/196 0s 2ms/step - accuracy: 0.7991 - loss: 0.3456 - val_accuracy: 0.5016 - val_loss: 28.9662
Epoch 615/1000
196/196 0s 2ms/step - accuracy: 0.8096 - loss: 0.3134 - val_accuracy: 0.5026 - val_loss: 23.1958
Epoch 616/1000
196/196 0s 2ms/step - accuracy: 0.8038 - loss: 0.2964 - val_accuracy: 0.5031 - val_loss: 22.6100
Epoch 617/1000
196/196 0s 2ms/step - accuracy: 0.8146 - loss: 0.2969 - val_accuracy: 0.5038 - val_loss: 18.0709
Epoch 618/1000
196/196 0s 2ms/step - accuracy: 0.8113 - loss: 0.2891 - val_accuracy: 0.5030 - val_loss: 21.5579
Epoch 619/1000
196/196 0s 2ms/step - accuracy: 0.8143 - loss: 0.2972 - val_accuracy: 0.5024 - val_loss: 18.8697
Epoch 620/1000
196/196 0s 2ms/step - accuracy: 0.8180 - loss: 0.2811 - val_accuracy: 0.5034 - val_loss: 22.5048

Epoch 621/1000
196/196 0s 2ms/step - accuracy: 0.8193 - loss: 0.2868 - val_accuracy: 0.5039 - val_loss: 20.9864
Epoch 622/1000
196/196 0s 2ms/step - accuracy: 0.8236 - loss: 0.2764 - val_accuracy: 0.5038 - val_loss: 23.7514
Epoch 623/1000
196/196 0s 2ms/step - accuracy: 0.8167 - loss: 0.2831 - val_accuracy: 0.5036 - val_loss: 19.5471
Epoch 624/1000
196/196 0s 2ms/step - accuracy: 0.8186 - loss: 0.2781 - val_accuracy: 0.5037 - val_loss: 18.9720
Epoch 625/1000
196/196 0s 2ms/step - accuracy: 0.8207 - loss: 0.2811 - val_accuracy: 0.5039 - val_loss: 19.3709
Epoch 626/1000
196/196 0s 2ms/step - accuracy: 0.8184 - loss: 0.2802 - val_accuracy: 0.5040 - val_loss: 19.2028
Epoch 627/1000
196/196 0s 2ms/step - accuracy: 0.8232 - loss: 0.2730 - val_accuracy: 0.5026 - val_loss: 20.6748
Epoch 628/1000
196/196 0s 2ms/step - accuracy: 0.8191 - loss: 0.2854 - val_accuracy: 0.5052 - val_loss: 20.9570
Epoch 629/1000
196/196 0s 2ms/step - accuracy: 0.8216 - loss: 0.2764 - val_accuracy: 0.5052 - val_loss: 19.9956
Epoch 630/1000
196/196 0s 2ms/step - accuracy: 0.8265 - loss: 0.2724 - val_accuracy: 0.5043 - val_loss: 22.8941
Epoch 631/1000
196/196 0s 2ms/step - accuracy: 0.8152 - loss: 0.2966 - val_accuracy: 0.5013 - val_loss: 22.1397
Epoch 632/1000
196/196 0s 2ms/step - accuracy: 0.8154 - loss: 0.3004 - val_accuracy: 0.5044 - val_loss: 23.6938
Epoch 633/1000
196/196 0s 2ms/step - accuracy: 0.8177 - loss: 0.2929 - val_accuracy: 0.5012 - val_loss: 24.2812
Epoch 634/1000
196/196 0s 2ms/step - accuracy: 0.8191 - loss: 0.2907 - val_accuracy: 0.5027 - val_loss: 21.0015
Epoch 635/1000
196/196 0s 2ms/step - accuracy: 0.8091 - loss: 0.3039 - val_accuracy: 0.5032 - val_loss: 22.8944
Epoch 636/1000
196/196 0s 2ms/step - accuracy: 0.8190 - loss: 0.2807 - val_accuracy: 0.5044 - val_loss: 22.0348
Epoch 637/1000
196/196 0s 2ms/step - accuracy: 0.8189 - loss: 0.2884 - val_accuracy: 0.5053 - val_loss: 20.9449
Epoch 638/1000
196/196 0s 2ms/step - accuracy: 0.8112 - loss: 0.2940 - val_accuracy: 0.5029 - val_loss: 19.6139
Epoch 639/1000
196/196 0s 2ms/step - accuracy: 0.8183 - loss: 0.3103 - val_accuracy: 0.5022 - val_loss: 22.1379
Epoch 640/1000
196/196 0s 2ms/step - accuracy: 0.8159 - loss: 0.2799 - val_accuracy: 0.5020 - val_loss: 22.9540

Epoch 641/1000
196/196 0s 2ms/step - accuracy: 0.8138 - loss: 0.2819 - val_accuracy: 0.5032 - val_loss: 21.9737
Epoch 642/1000
196/196 0s 2ms/step - accuracy: 0.8159 - loss: 0.2918 - val_accuracy: 0.5044 - val_loss: 26.0996
Epoch 643/1000
196/196 0s 2ms/step - accuracy: 0.8162 - loss: 0.3205 - val_accuracy: 0.5028 - val_loss: 22.0468
Epoch 644/1000
196/196 0s 2ms/step - accuracy: 0.8150 - loss: 0.2849 - val_accuracy: 0.5020 - val_loss: 21.6627
Epoch 645/1000
196/196 0s 2ms/step - accuracy: 0.8135 - loss: 0.2844 - val_accuracy: 0.5037 - val_loss: 19.1276
Epoch 646/1000
196/196 0s 2ms/step - accuracy: 0.8158 - loss: 0.2787 - val_accuracy: 0.5036 - val_loss: 19.7354
Epoch 647/1000
196/196 0s 2ms/step - accuracy: 0.8187 - loss: 0.2857 - val_accuracy: 0.5027 - val_loss: 23.9276
Epoch 648/1000
196/196 0s 2ms/step - accuracy: 0.8178 - loss: 0.2816 - val_accuracy: 0.5005 - val_loss: 19.5652
Epoch 649/1000
196/196 0s 2ms/step - accuracy: 0.8205 - loss: 0.2831 - val_accuracy: 0.5033 - val_loss: 17.4550
Epoch 650/1000
196/196 0s 2ms/step - accuracy: 0.8205 - loss: 0.2864 - val_accuracy: 0.5028 - val_loss: 19.5553
Epoch 651/1000
196/196 0s 2ms/step - accuracy: 0.8226 - loss: 0.2712 - val_accuracy: 0.5043 - val_loss: 23.9918
Epoch 652/1000
196/196 0s 2ms/step - accuracy: 0.8275 - loss: 0.2721 - val_accuracy: 0.5035 - val_loss: 22.3483
Epoch 653/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2712 - val_accuracy: 0.5033 - val_loss: 21.6892
Epoch 654/1000
196/196 0s 2ms/step - accuracy: 0.8236 - loss: 0.2679 - val_accuracy: 0.5014 - val_loss: 21.6689
Epoch 655/1000
196/196 0s 2ms/step - accuracy: 0.8219 - loss: 0.2823 - val_accuracy: 0.5033 - val_loss: 25.1344
Epoch 656/1000
196/196 0s 2ms/step - accuracy: 0.8166 - loss: 0.2810 - val_accuracy: 0.5042 - val_loss: 24.1760
Epoch 657/1000
196/196 0s 2ms/step - accuracy: 0.8178 - loss: 0.2892 - val_accuracy: 0.5018 - val_loss: 25.5158
Epoch 658/1000
196/196 0s 2ms/step - accuracy: 0.8157 - loss: 0.3104 - val_accuracy: 0.5051 - val_loss: 25.5884
Epoch 659/1000
196/196 0s 2ms/step - accuracy: 0.8245 - loss: 0.3109 - val_accuracy: 0.5054 - val_loss: 23.5292
Epoch 660/1000
196/196 0s 2ms/step - accuracy: 0.8153 - loss: 0.2859 - val_accuracy: 0.5026 - val_loss: 20.4418

Epoch 661/1000
196/196 0s 2ms/step - accuracy: 0.8171 - loss: 0.2810 - val_accuracy: 0.5046 - val_loss: 26.7743
Epoch 662/1000
196/196 0s 2ms/step - accuracy: 0.8181 - loss: 0.2797 - val_accuracy: 0.5054 - val_loss: 25.0031
Epoch 663/1000
196/196 0s 2ms/step - accuracy: 0.8217 - loss: 0.2818 - val_accuracy: 0.5048 - val_loss: 21.0038
Epoch 664/1000
196/196 0s 2ms/step - accuracy: 0.8210 - loss: 0.2772 - val_accuracy: 0.5028 - val_loss: 21.9228
Epoch 665/1000
196/196 0s 2ms/step - accuracy: 0.8205 - loss: 0.2881 - val_accuracy: 0.5037 - val_loss: 23.1183
Epoch 666/1000
196/196 0s 2ms/step - accuracy: 0.8166 - loss: 0.2839 - val_accuracy: 0.5039 - val_loss: 20.7865
Epoch 667/1000
196/196 0s 2ms/step - accuracy: 0.8193 - loss: 0.2810 - val_accuracy: 0.5040 - val_loss: 23.5664
Epoch 668/1000
196/196 0s 2ms/step - accuracy: 0.8181 - loss: 0.2788 - val_accuracy: 0.5047 - val_loss: 23.6515
Epoch 669/1000
196/196 0s 2ms/step - accuracy: 0.8196 - loss: 0.2916 - val_accuracy: 0.5021 - val_loss: 26.2618
Epoch 670/1000
196/196 0s 2ms/step - accuracy: 0.8147 - loss: 0.3140 - val_accuracy: 0.5029 - val_loss: 21.9577
Epoch 671/1000
196/196 0s 2ms/step - accuracy: 0.8195 - loss: 0.2856 - val_accuracy: 0.5041 - val_loss: 21.7233
Epoch 672/1000
196/196 0s 2ms/step - accuracy: 0.8170 - loss: 0.2844 - val_accuracy: 0.5017 - val_loss: 22.7462
Epoch 673/1000
196/196 0s 2ms/step - accuracy: 0.8221 - loss: 0.2790 - val_accuracy: 0.5008 - val_loss: 19.3394
Epoch 674/1000
196/196 0s 2ms/step - accuracy: 0.8123 - loss: 0.2886 - val_accuracy: 0.5022 - val_loss: 20.3367
Epoch 675/1000
196/196 0s 2ms/step - accuracy: 0.8182 - loss: 0.2752 - val_accuracy: 0.5037 - val_loss: 22.2470
Epoch 676/1000
196/196 0s 2ms/step - accuracy: 0.8229 - loss: 0.2751 - val_accuracy: 0.5047 - val_loss: 30.0512
Epoch 677/1000
196/196 0s 2ms/step - accuracy: 0.8193 - loss: 0.2829 - val_accuracy: 0.5062 - val_loss: 29.7612
Epoch 678/1000
196/196 0s 2ms/step - accuracy: 0.8182 - loss: 0.2847 - val_accuracy: 0.5046 - val_loss: 25.6356
Epoch 679/1000
196/196 0s 2ms/step - accuracy: 0.8168 - loss: 0.2986 - val_accuracy: 0.5040 - val_loss: 24.3761
Epoch 680/1000
196/196 0s 2ms/step - accuracy: 0.8185 - loss: 0.2882 - val_accuracy: 0.5054 - val_loss: 20.5936

Epoch 681/1000
196/196 0s 2ms/step - accuracy: 0.8197 - loss: 0.2830 - val_accuracy: 0.5034 - val_loss: 23.3862
Epoch 682/1000
196/196 0s 2ms/step - accuracy: 0.8171 - loss: 0.2829 - val_accuracy: 0.5030 - val_loss: 18.9886
Epoch 683/1000
196/196 0s 2ms/step - accuracy: 0.8143 - loss: 0.3056 - val_accuracy: 0.5025 - val_loss: 26.3690
Epoch 684/1000
196/196 0s 2ms/step - accuracy: 0.8161 - loss: 0.2908 - val_accuracy: 0.5012 - val_loss: 25.1704
Epoch 685/1000
196/196 0s 2ms/step - accuracy: 0.8132 - loss: 0.2880 - val_accuracy: 0.5036 - val_loss: 24.5616
Epoch 686/1000
196/196 0s 2ms/step - accuracy: 0.8171 - loss: 0.2860 - val_accuracy: 0.5044 - val_loss: 22.6160
Epoch 687/1000
196/196 0s 2ms/step - accuracy: 0.8194 - loss: 0.2778 - val_accuracy: 0.5034 - val_loss: 26.3552
Epoch 688/1000
196/196 0s 2ms/step - accuracy: 0.8204 - loss: 0.2751 - val_accuracy: 0.5032 - val_loss: 26.0580
Epoch 689/1000
196/196 0s 2ms/step - accuracy: 0.8287 - loss: 0.2649 - val_accuracy: 0.5031 - val_loss: 26.2554
Epoch 690/1000
196/196 0s 2ms/step - accuracy: 0.8234 - loss: 0.2717 - val_accuracy: 0.5048 - val_loss: 25.1832
Epoch 691/1000
196/196 0s 2ms/step - accuracy: 0.8165 - loss: 0.2843 - val_accuracy: 0.5010 - val_loss: 25.6185
Epoch 692/1000
196/196 0s 2ms/step - accuracy: 0.8140 - loss: 0.2887 - val_accuracy: 0.5052 - val_loss: 27.4649
Epoch 693/1000
196/196 0s 2ms/step - accuracy: 0.8209 - loss: 0.2907 - val_accuracy: 0.5038 - val_loss: 22.6752
Epoch 694/1000
196/196 0s 2ms/step - accuracy: 0.8142 - loss: 0.2980 - val_accuracy: 0.5052 - val_loss: 22.5332
Epoch 695/1000
196/196 0s 2ms/step - accuracy: 0.8230 - loss: 0.2751 - val_accuracy: 0.5039 - val_loss: 21.0366
Epoch 696/1000
196/196 0s 2ms/step - accuracy: 0.8229 - loss: 0.2741 - val_accuracy: 0.5067 - val_loss: 20.7964
Epoch 697/1000
196/196 0s 2ms/step - accuracy: 0.8244 - loss: 0.2679 - val_accuracy: 0.5055 - val_loss: 23.2929
Epoch 698/1000
196/196 0s 2ms/step - accuracy: 0.8247 - loss: 0.2756 - val_accuracy: 0.5046 - val_loss: 21.9615
Epoch 699/1000
196/196 0s 2ms/step - accuracy: 0.8229 - loss: 0.2804 - val_accuracy: 0.5036 - val_loss: 22.3668
Epoch 700/1000
196/196 0s 2ms/step - accuracy: 0.8254 - loss: 0.2701 - val_accuracy: 0.5065 - val_loss: 22.8354

Epoch 701/1000
196/196 0s 2ms/step - accuracy: 0.8222 - loss: 0.2733 - val_accuracy: 0.5050 - val_loss: 22.7884
Epoch 702/1000
196/196 0s 2ms/step - accuracy: 0.8255 - loss: 0.2723 - val_accuracy: 0.5044 - val_loss: 22.3621
Epoch 703/1000
196/196 0s 2ms/step - accuracy: 0.8213 - loss: 0.2934 - val_accuracy: 0.5016 - val_loss: 23.7437
Epoch 704/1000
196/196 0s 2ms/step - accuracy: 0.8162 - loss: 0.2831 - val_accuracy: 0.5021 - val_loss: 25.7064
Epoch 705/1000
196/196 0s 2ms/step - accuracy: 0.8192 - loss: 0.2858 - val_accuracy: 0.5038 - val_loss: 23.8015
Epoch 706/1000
196/196 0s 2ms/step - accuracy: 0.8169 - loss: 0.2852 - val_accuracy: 0.5042 - val_loss: 24.1588
Epoch 707/1000
196/196 0s 2ms/step - accuracy: 0.8138 - loss: 0.2921 - val_accuracy: 0.5041 - val_loss: 24.1209
Epoch 708/1000
196/196 0s 2ms/step - accuracy: 0.8181 - loss: 0.2738 - val_accuracy: 0.5054 - val_loss: 26.5053
Epoch 709/1000
196/196 0s 2ms/step - accuracy: 0.8226 - loss: 0.2925 - val_accuracy: 0.5030 - val_loss: 22.2121
Epoch 710/1000
196/196 0s 2ms/step - accuracy: 0.8173 - loss: 0.2771 - val_accuracy: 0.5044 - val_loss: 20.9311
Epoch 711/1000
196/196 1s 2ms/step - accuracy: 0.8229 - loss: 0.2720 - val_accuracy: 0.5042 - val_loss: 18.6077
Epoch 712/1000
196/196 0s 2ms/step - accuracy: 0.8233 - loss: 0.3042 - val_accuracy: 0.5047 - val_loss: 23.5797
Epoch 713/1000
196/196 0s 2ms/step - accuracy: 0.8223 - loss: 0.2691 - val_accuracy: 0.5056 - val_loss: 23.6413
Epoch 714/1000
196/196 0s 2ms/step - accuracy: 0.8314 - loss: 0.2769 - val_accuracy: 0.5039 - val_loss: 23.4857
Epoch 715/1000
196/196 0s 2ms/step - accuracy: 0.8220 - loss: 0.2912 - val_accuracy: 0.5052 - val_loss: 22.8283
Epoch 716/1000
196/196 0s 2ms/step - accuracy: 0.8192 - loss: 0.2779 - val_accuracy: 0.5056 - val_loss: 24.2952
Epoch 717/1000
196/196 0s 2ms/step - accuracy: 0.8248 - loss: 0.2768 - val_accuracy: 0.5050 - val_loss: 24.7400
Epoch 718/1000
196/196 0s 2ms/step - accuracy: 0.8243 - loss: 0.2702 - val_accuracy: 0.5055 - val_loss: 23.5352
Epoch 719/1000
196/196 0s 2ms/step - accuracy: 0.8222 - loss: 0.2821 - val_accuracy: 0.5056 - val_loss: 24.7922
Epoch 720/1000
196/196 0s 2ms/step - accuracy: 0.8187 - loss: 0.2757 - val_accuracy: 0.5081 - val_loss: 26.0164

Epoch 721/1000
196/196 0s 2ms/step - accuracy: 0.8229 - loss: 0.3028 - val_accuracy: 0.5048 - val_loss: 22.3087
Epoch 722/1000
196/196 0s 2ms/step - accuracy: 0.8259 - loss: 0.2741 - val_accuracy: 0.5044 - val_loss: 21.9103
Epoch 723/1000
196/196 0s 2ms/step - accuracy: 0.8242 - loss: 0.2709 - val_accuracy: 0.5062 - val_loss: 27.0816
Epoch 724/1000
196/196 0s 2ms/step - accuracy: 0.8236 - loss: 0.2796 - val_accuracy: 0.5035 - val_loss: 24.5735
Epoch 725/1000
196/196 0s 2ms/step - accuracy: 0.8260 - loss: 0.2714 - val_accuracy: 0.5051 - val_loss: 25.1300
Epoch 726/1000
196/196 0s 2ms/step - accuracy: 0.8251 - loss: 0.2824 - val_accuracy: 0.5050 - val_loss: 22.7799
Epoch 727/1000
196/196 0s 2ms/step - accuracy: 0.8146 - loss: 0.2843 - val_accuracy: 0.5044 - val_loss: 21.4386
Epoch 728/1000
196/196 0s 2ms/step - accuracy: 0.8196 - loss: 0.2751 - val_accuracy: 0.5044 - val_loss: 24.4302
Epoch 729/1000
196/196 0s 2ms/step - accuracy: 0.8191 - loss: 0.2770 - val_accuracy: 0.5058 - val_loss: 22.3145
Epoch 730/1000
196/196 0s 2ms/step - accuracy: 0.8267 - loss: 0.2675 - val_accuracy: 0.5059 - val_loss: 23.1301
Epoch 731/1000
196/196 0s 2ms/step - accuracy: 0.8248 - loss: 0.2659 - val_accuracy: 0.5037 - val_loss: 23.5076
Epoch 732/1000
196/196 0s 2ms/step - accuracy: 0.8220 - loss: 0.2705 - val_accuracy: 0.5063 - val_loss: 27.2860
Epoch 733/1000
196/196 0s 2ms/step - accuracy: 0.8218 - loss: 0.2784 - val_accuracy: 0.5059 - val_loss: 23.1339
Epoch 734/1000
196/196 0s 2ms/step - accuracy: 0.8225 - loss: 0.2858 - val_accuracy: 0.5058 - val_loss: 28.0762
Epoch 735/1000
196/196 0s 2ms/step - accuracy: 0.8201 - loss: 0.2829 - val_accuracy: 0.5057 - val_loss: 26.6622
Epoch 736/1000
196/196 0s 2ms/step - accuracy: 0.8176 - loss: 0.2976 - val_accuracy: 0.5048 - val_loss: 29.8294
Epoch 737/1000
196/196 0s 2ms/step - accuracy: 0.8137 - loss: 0.3066 - val_accuracy: 0.5051 - val_loss: 30.7958
Epoch 738/1000
196/196 0s 2ms/step - accuracy: 0.8109 - loss: 0.3065 - val_accuracy: 0.5045 - val_loss: 25.6325
Epoch 739/1000
196/196 0s 2ms/step - accuracy: 0.8160 - loss: 0.2863 - val_accuracy: 0.5070 - val_loss: 23.9942
Epoch 740/1000
196/196 0s 2ms/step - accuracy: 0.8181 - loss: 0.2790 - val_accuracy: 0.5055 - val_loss: 23.9915

Epoch 741/1000
196/196 0s 2ms/step - accuracy: 0.8241 - loss: 0.2751 - val_accuracy: 0.5050 - val_loss: 27.8623
Epoch 742/1000
196/196 0s 2ms/step - accuracy: 0.8243 - loss: 0.2796 - val_accuracy: 0.5051 - val_loss: 28.1246
Epoch 743/1000
196/196 0s 2ms/step - accuracy: 0.8198 - loss: 0.2818 - val_accuracy: 0.5059 - val_loss: 31.4921
Epoch 744/1000
196/196 0s 2ms/step - accuracy: 0.8269 - loss: 0.2638 - val_accuracy: 0.5060 - val_loss: 28.6677
Epoch 745/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2747 - val_accuracy: 0.5046 - val_loss: 30.7064
Epoch 746/1000
196/196 0s 2ms/step - accuracy: 0.8219 - loss: 0.2708 - val_accuracy: 0.5048 - val_loss: 26.9937
Epoch 747/1000
196/196 0s 2ms/step - accuracy: 0.8222 - loss: 0.2720 - val_accuracy: 0.5036 - val_loss: 29.8717
Epoch 748/1000
196/196 0s 2ms/step - accuracy: 0.8199 - loss: 0.2835 - val_accuracy: 0.5033 - val_loss: 30.9291
Epoch 749/1000
196/196 0s 2ms/step - accuracy: 0.8227 - loss: 0.2848 - val_accuracy: 0.5034 - val_loss: 27.9811
Epoch 750/1000
196/196 0s 2ms/step - accuracy: 0.8210 - loss: 0.2903 - val_accuracy: 0.5050 - val_loss: 27.4847
Epoch 751/1000
196/196 0s 2ms/step - accuracy: 0.8228 - loss: 0.2703 - val_accuracy: 0.5035 - val_loss: 31.3259
Epoch 752/1000
196/196 0s 2ms/step - accuracy: 0.8227 - loss: 0.2799 - val_accuracy: 0.5030 - val_loss: 29.9476
Epoch 753/1000
196/196 0s 2ms/step - accuracy: 0.8200 - loss: 0.2874 - val_accuracy: 0.5050 - val_loss: 25.4194
Epoch 754/1000
196/196 0s 2ms/step - accuracy: 0.8210 - loss: 0.2853 - val_accuracy: 0.5036 - val_loss: 26.9266
Epoch 755/1000
196/196 0s 2ms/step - accuracy: 0.8207 - loss: 0.3051 - val_accuracy: 0.5030 - val_loss: 26.8904
Epoch 756/1000
196/196 0s 2ms/step - accuracy: 0.8202 - loss: 0.2854 - val_accuracy: 0.5056 - val_loss: 22.2684
Epoch 757/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2744 - val_accuracy: 0.5061 - val_loss: 28.0409
Epoch 758/1000
196/196 0s 2ms/step - accuracy: 0.8179 - loss: 0.2897 - val_accuracy: 0.5041 - val_loss: 26.7488
Epoch 759/1000
196/196 0s 2ms/step - accuracy: 0.8255 - loss: 0.2703 - val_accuracy: 0.5036 - val_loss: 26.8932
Epoch 760/1000
196/196 0s 2ms/step - accuracy: 0.8192 - loss: 0.2935 - val_accuracy: 0.5038 - val_loss: 28.0661

Epoch 761/1000
196/196 0s 2ms/step - accuracy: 0.8258 - loss: 0.2722 - val_accuracy: 0.5043 - val_loss: 28.5526
Epoch 762/1000
196/196 0s 2ms/step - accuracy: 0.8221 - loss: 0.2780 - val_accuracy: 0.5054 - val_loss: 22.8837
Epoch 763/1000
196/196 0s 2ms/step - accuracy: 0.8263 - loss: 0.2659 - val_accuracy: 0.5051 - val_loss: 23.9593
Epoch 764/1000
196/196 0s 2ms/step - accuracy: 0.8241 - loss: 0.2705 - val_accuracy: 0.5035 - val_loss: 22.9081
Epoch 765/1000
196/196 0s 2ms/step - accuracy: 0.8260 - loss: 0.2771 - val_accuracy: 0.5028 - val_loss: 27.2776
Epoch 766/1000
196/196 0s 2ms/step - accuracy: 0.8186 - loss: 0.2873 - val_accuracy: 0.5047 - val_loss: 31.5130
Epoch 767/1000
196/196 0s 2ms/step - accuracy: 0.8261 - loss: 0.2665 - val_accuracy: 0.5057 - val_loss: 35.0372
Epoch 768/1000
196/196 0s 2ms/step - accuracy: 0.8181 - loss: 0.2819 - val_accuracy: 0.5020 - val_loss: 28.5444
Epoch 769/1000
196/196 0s 2ms/step - accuracy: 0.8209 - loss: 0.2671 - val_accuracy: 0.5021 - val_loss: 29.3688
Epoch 770/1000
196/196 0s 2ms/step - accuracy: 0.8212 - loss: 0.2780 - val_accuracy: 0.5040 - val_loss: 26.1314
Epoch 771/1000
196/196 0s 2ms/step - accuracy: 0.8253 - loss: 0.2740 - val_accuracy: 0.5036 - val_loss: 23.5235
Epoch 772/1000
196/196 0s 2ms/step - accuracy: 0.8229 - loss: 0.2776 - val_accuracy: 0.5044 - val_loss: 22.2975
Epoch 773/1000
196/196 0s 2ms/step - accuracy: 0.8120 - loss: 0.2936 - val_accuracy: 0.5032 - val_loss: 24.4551
Epoch 774/1000
196/196 0s 2ms/step - accuracy: 0.8232 - loss: 0.2707 - val_accuracy: 0.5036 - val_loss: 28.4592
Epoch 775/1000
196/196 0s 2ms/step - accuracy: 0.8267 - loss: 0.2731 - val_accuracy: 0.5032 - val_loss: 28.2757
Epoch 776/1000
196/196 0s 2ms/step - accuracy: 0.8218 - loss: 0.2696 - val_accuracy: 0.5041 - val_loss: 33.1733
Epoch 777/1000
196/196 0s 2ms/step - accuracy: 0.8228 - loss: 0.2746 - val_accuracy: 0.5040 - val_loss: 32.1651
Epoch 778/1000
196/196 0s 2ms/step - accuracy: 0.8222 - loss: 0.3037 - val_accuracy: 0.5036 - val_loss: 26.0864
Epoch 779/1000
196/196 0s 2ms/step - accuracy: 0.8138 - loss: 0.2791 - val_accuracy: 0.5066 - val_loss: 27.8122
Epoch 780/1000
196/196 0s 2ms/step - accuracy: 0.8200 - loss: 0.2782 - val_accuracy: 0.5058 - val_loss: 29.0563

Epoch 781/1000
196/196 0s 2ms/step - accuracy: 0.8243 - loss: 0.2720 - val_accuracy: 0.5072 - val_loss: 29.1240
Epoch 782/1000
196/196 0s 2ms/step - accuracy: 0.8294 - loss: 0.2692 - val_accuracy: 0.5067 - val_loss: 27.8192
Epoch 783/1000
196/196 0s 2ms/step - accuracy: 0.8253 - loss: 0.2666 - val_accuracy: 0.5074 - val_loss: 28.8744
Epoch 784/1000
196/196 0s 2ms/step - accuracy: 0.8235 - loss: 0.2723 - val_accuracy: 0.5058 - val_loss: 31.7356
Epoch 785/1000
196/196 0s 2ms/step - accuracy: 0.8205 - loss: 0.2749 - val_accuracy: 0.5059 - val_loss: 30.1374
Epoch 786/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2919 - val_accuracy: 0.5030 - val_loss: 26.6203
Epoch 787/1000
196/196 0s 2ms/step - accuracy: 0.8192 - loss: 0.2937 - val_accuracy: 0.5058 - val_loss: 32.3672
Epoch 788/1000
196/196 0s 2ms/step - accuracy: 0.8217 - loss: 0.2806 - val_accuracy: 0.5038 - val_loss: 28.5146
Epoch 789/1000
196/196 0s 2ms/step - accuracy: 0.8168 - loss: 0.2856 - val_accuracy: 0.5048 - val_loss: 31.3613
Epoch 790/1000
196/196 0s 2ms/step - accuracy: 0.8256 - loss: 0.2756 - val_accuracy: 0.5023 - val_loss: 26.8181
Epoch 791/1000
196/196 0s 2ms/step - accuracy: 0.8213 - loss: 0.2834 - val_accuracy: 0.5049 - val_loss: 27.2648
Epoch 792/1000
196/196 0s 2ms/step - accuracy: 0.8246 - loss: 0.2808 - val_accuracy: 0.5056 - val_loss: 34.3397
Epoch 793/1000
196/196 0s 2ms/step - accuracy: 0.8217 - loss: 0.2906 - val_accuracy: 0.5056 - val_loss: 31.9004
Epoch 794/1000
196/196 0s 2ms/step - accuracy: 0.8183 - loss: 0.2861 - val_accuracy: 0.5029 - val_loss: 31.5358
Epoch 795/1000
196/196 0s 2ms/step - accuracy: 0.8220 - loss: 0.2724 - val_accuracy: 0.5054 - val_loss: 32.8670
Epoch 796/1000
196/196 0s 2ms/step - accuracy: 0.8190 - loss: 0.2745 - val_accuracy: 0.5046 - val_loss: 34.3924
Epoch 797/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2752 - val_accuracy: 0.5050 - val_loss: 30.7744
Epoch 798/1000
196/196 0s 2ms/step - accuracy: 0.8229 - loss: 0.2738 - val_accuracy: 0.5062 - val_loss: 32.7581
Epoch 799/1000
196/196 0s 2ms/step - accuracy: 0.8231 - loss: 0.2738 - val_accuracy: 0.5039 - val_loss: 29.2428
Epoch 800/1000
196/196 0s 2ms/step - accuracy: 0.8206 - loss: 0.2898 - val_accuracy: 0.5024 - val_loss: 28.8983

Epoch 801/1000
196/196 0s 2ms/step - accuracy: 0.8218 - loss: 0.2871 - val_accuracy: 0.5043 - val_loss: 29.5801
Epoch 802/1000
196/196 0s 2ms/step - accuracy: 0.8224 - loss: 0.2808 - val_accuracy: 0.5016 - val_loss: 26.3639
Epoch 803/1000
196/196 0s 2ms/step - accuracy: 0.8252 - loss: 0.2772 - val_accuracy: 0.5020 - val_loss: 25.9112
Epoch 804/1000
196/196 0s 2ms/step - accuracy: 0.8241 - loss: 0.2693 - val_accuracy: 0.5030 - val_loss: 23.0050
Epoch 805/1000
196/196 0s 2ms/step - accuracy: 0.8238 - loss: 0.2600 - val_accuracy: 0.5040 - val_loss: 21.9046
Epoch 806/1000
196/196 0s 2ms/step - accuracy: 0.8256 - loss: 0.2725 - val_accuracy: 0.5040 - val_loss: 25.0439
Epoch 807/1000
196/196 0s 2ms/step - accuracy: 0.8284 - loss: 0.2798 - val_accuracy: 0.5023 - val_loss: 29.4388
Epoch 808/1000
196/196 0s 2ms/step - accuracy: 0.8213 - loss: 0.2813 - val_accuracy: 0.5030 - val_loss: 35.5000
Epoch 809/1000
196/196 0s 2ms/step - accuracy: 0.8222 - loss: 0.2771 - val_accuracy: 0.5022 - val_loss: 35.4444
Epoch 810/1000
196/196 0s 2ms/step - accuracy: 0.8276 - loss: 0.2793 - val_accuracy: 0.5006 - val_loss: 33.2451
Epoch 811/1000
196/196 0s 2ms/step - accuracy: 0.8213 - loss: 0.2742 - val_accuracy: 0.5018 - val_loss: 30.8024
Epoch 812/1000
196/196 0s 2ms/step - accuracy: 0.8254 - loss: 0.2662 - val_accuracy: 0.5036 - val_loss: 30.3694
Epoch 813/1000
196/196 0s 2ms/step - accuracy: 0.8288 - loss: 0.2581 - val_accuracy: 0.5044 - val_loss: 26.1682
Epoch 814/1000
196/196 0s 2ms/step - accuracy: 0.8270 - loss: 0.2696 - val_accuracy: 0.5047 - val_loss: 31.2603
Epoch 815/1000
196/196 0s 2ms/step - accuracy: 0.8248 - loss: 0.2772 - val_accuracy: 0.5045 - val_loss: 32.8508
Epoch 816/1000
196/196 0s 2ms/step - accuracy: 0.8270 - loss: 0.2822 - val_accuracy: 0.5016 - val_loss: 30.0853
Epoch 817/1000
196/196 0s 2ms/step - accuracy: 0.8218 - loss: 0.2730 - val_accuracy: 0.5022 - val_loss: 32.0605
Epoch 818/1000
196/196 0s 2ms/step - accuracy: 0.8222 - loss: 0.2669 - val_accuracy: 0.5018 - val_loss: 28.8975
Epoch 819/1000
196/196 0s 2ms/step - accuracy: 0.8183 - loss: 0.2901 - val_accuracy: 0.5056 - val_loss: 29.9214
Epoch 820/1000
196/196 0s 2ms/step - accuracy: 0.8220 - loss: 0.2776 - val_accuracy: 0.5046 - val_loss: 31.2144

Epoch 821/1000
196/196 0s 2ms/step - accuracy: 0.8265 - loss: 0.2802 - val_accuracy: 0.5042 - val_loss: 27.6273
Epoch 822/1000
196/196 0s 2ms/step - accuracy: 0.8184 - loss: 0.2821 - val_accuracy: 0.5050 - val_loss: 26.9333
Epoch 823/1000
196/196 0s 2ms/step - accuracy: 0.8234 - loss: 0.2664 - val_accuracy: 0.5038 - val_loss: 29.2407
Epoch 824/1000
196/196 0s 2ms/step - accuracy: 0.8243 - loss: 0.2680 - val_accuracy: 0.5045 - val_loss: 28.3259
Epoch 825/1000
196/196 0s 2ms/step - accuracy: 0.8276 - loss: 0.2685 - val_accuracy: 0.5039 - val_loss: 29.4678
Epoch 826/1000
196/196 0s 2ms/step - accuracy: 0.8259 - loss: 0.2741 - val_accuracy: 0.5046 - val_loss: 29.9976
Epoch 827/1000
196/196 0s 2ms/step - accuracy: 0.8302 - loss: 0.2603 - val_accuracy: 0.5045 - val_loss: 29.1884
Epoch 828/1000
196/196 0s 2ms/step - accuracy: 0.8320 - loss: 0.2597 - val_accuracy: 0.5053 - val_loss: 29.7566
Epoch 829/1000
196/196 0s 2ms/step - accuracy: 0.8302 - loss: 0.2621 - val_accuracy: 0.5072 - val_loss: 31.6569
Epoch 830/1000
196/196 0s 2ms/step - accuracy: 0.8294 - loss: 0.2613 - val_accuracy: 0.5043 - val_loss: 30.6027
Epoch 831/1000
196/196 0s 2ms/step - accuracy: 0.8250 - loss: 0.2837 - val_accuracy: 0.5061 - val_loss: 26.0028
Epoch 832/1000
196/196 1s 2ms/step - accuracy: 0.8278 - loss: 0.2709 - val_accuracy: 0.5036 - val_loss: 28.3152
Epoch 833/1000
196/196 0s 2ms/step - accuracy: 0.8281 - loss: 0.2679 - val_accuracy: 0.5020 - val_loss: 31.3906
Epoch 834/1000
196/196 0s 2ms/step - accuracy: 0.8304 - loss: 0.2735 - val_accuracy: 0.5059 - val_loss: 31.5453
Epoch 835/1000
196/196 0s 2ms/step - accuracy: 0.8264 - loss: 0.2596 - val_accuracy: 0.5066 - val_loss: 31.2604
Epoch 836/1000
196/196 0s 2ms/step - accuracy: 0.8262 - loss: 0.2891 - val_accuracy: 0.5042 - val_loss: 29.2967
Epoch 837/1000
196/196 0s 2ms/step - accuracy: 0.8236 - loss: 0.2846 - val_accuracy: 0.5024 - val_loss: 31.9479
Epoch 838/1000
196/196 0s 2ms/step - accuracy: 0.8225 - loss: 0.2695 - val_accuracy: 0.5042 - val_loss: 31.8672
Epoch 839/1000
196/196 0s 2ms/step - accuracy: 0.8208 - loss: 0.2772 - val_accuracy: 0.5030 - val_loss: 31.7156
Epoch 840/1000
196/196 0s 2ms/step - accuracy: 0.8289 - loss: 0.2759 - val_accuracy: 0.5029 - val_loss: 28.2064

Epoch 841/1000
196/196 0s 2ms/step - accuracy: 0.8268 - loss: 0.2824 - val_accuracy: 0.5037 - val_loss: 27.8943
Epoch 842/1000
196/196 0s 2ms/step - accuracy: 0.8237 - loss: 0.2679 - val_accuracy: 0.5074 - val_loss: 32.6094
Epoch 843/1000
196/196 0s 2ms/step - accuracy: 0.8262 - loss: 0.2627 - val_accuracy: 0.5053 - val_loss: 30.7756
Epoch 844/1000
196/196 0s 2ms/step - accuracy: 0.8322 - loss: 0.2555 - val_accuracy: 0.5052 - val_loss: 28.2180
Epoch 845/1000
196/196 0s 2ms/step - accuracy: 0.8354 - loss: 0.2585 - val_accuracy: 0.5054 - val_loss: 30.2997
Epoch 846/1000
196/196 0s 2ms/step - accuracy: 0.8273 - loss: 0.2705 - val_accuracy: 0.5038 - val_loss: 26.1401
Epoch 847/1000
196/196 0s 2ms/step - accuracy: 0.8265 - loss: 0.2676 - val_accuracy: 0.5042 - val_loss: 27.0418
Epoch 848/1000
196/196 0s 2ms/step - accuracy: 0.8277 - loss: 0.2636 - val_accuracy: 0.5036 - val_loss: 24.8254
Epoch 849/1000
196/196 0s 2ms/step - accuracy: 0.8286 - loss: 0.2758 - val_accuracy: 0.5084 - val_loss: 31.1021
Epoch 850/1000
196/196 0s 2ms/step - accuracy: 0.8257 - loss: 0.2951 - val_accuracy: 0.5060 - val_loss: 25.2535
Epoch 851/1000
196/196 0s 2ms/step - accuracy: 0.8185 - loss: 0.2861 - val_accuracy: 0.5052 - val_loss: 24.6643
Epoch 852/1000
196/196 0s 2ms/step - accuracy: 0.8309 - loss: 0.2655 - val_accuracy: 0.5072 - val_loss: 26.4923
Epoch 853/1000
196/196 0s 2ms/step - accuracy: 0.8254 - loss: 0.2681 - val_accuracy: 0.5044 - val_loss: 25.8831
Epoch 854/1000
196/196 0s 2ms/step - accuracy: 0.8250 - loss: 0.2684 - val_accuracy: 0.5043 - val_loss: 29.0658
Epoch 855/1000
196/196 0s 2ms/step - accuracy: 0.8267 - loss: 0.2698 - val_accuracy: 0.5037 - val_loss: 27.3916
Epoch 856/1000
196/196 0s 2ms/step - accuracy: 0.8210 - loss: 0.2734 - val_accuracy: 0.5050 - val_loss: 30.4202
Epoch 857/1000
196/196 0s 2ms/step - accuracy: 0.8285 - loss: 0.2602 - val_accuracy: 0.5070 - val_loss: 30.7456
Epoch 858/1000
196/196 0s 2ms/step - accuracy: 0.8281 - loss: 0.2681 - val_accuracy: 0.5046 - val_loss: 30.0027
Epoch 859/1000
196/196 0s 2ms/step - accuracy: 0.8241 - loss: 0.2832 - val_accuracy: 0.5074 - val_loss: 33.8014
Epoch 860/1000
196/196 0s 2ms/step - accuracy: 0.8252 - loss: 0.2757 - val_accuracy: 0.5040 - val_loss: 32.7565

Epoch 861/1000
196/196 0s 2ms/step - accuracy: 0.8199 - loss: 0.2910 - val_accuracy: 0.5042 - val_loss: 34.5854
Epoch 862/1000
196/196 0s 2ms/step - accuracy: 0.8235 - loss: 0.2749 - val_accuracy: 0.5034 - val_loss: 31.5549
Epoch 863/1000
196/196 0s 2ms/step - accuracy: 0.8283 - loss: 0.2778 - val_accuracy: 0.5054 - val_loss: 29.8435
Epoch 864/1000
196/196 0s 2ms/step - accuracy: 0.8217 - loss: 0.2693 - val_accuracy: 0.5029 - val_loss: 25.5770
Epoch 865/1000
196/196 0s 2ms/step - accuracy: 0.8243 - loss: 0.2711 - val_accuracy: 0.5030 - val_loss: 25.5513
Epoch 866/1000
196/196 0s 2ms/step - accuracy: 0.8246 - loss: 0.2703 - val_accuracy: 0.5033 - val_loss: 30.0287
Epoch 867/1000
196/196 0s 2ms/step - accuracy: 0.8321 - loss: 0.2593 - val_accuracy: 0.5049 - val_loss: 28.2516
Epoch 868/1000
196/196 0s 2ms/step - accuracy: 0.8334 - loss: 0.2576 - val_accuracy: 0.5034 - val_loss: 24.8904
Epoch 869/1000
196/196 0s 2ms/step - accuracy: 0.8318 - loss: 0.2605 - val_accuracy: 0.5044 - val_loss: 33.1068
Epoch 870/1000
196/196 0s 2ms/step - accuracy: 0.8242 - loss: 0.2697 - val_accuracy: 0.5050 - val_loss: 36.2863
Epoch 871/1000
196/196 0s 2ms/step - accuracy: 0.8202 - loss: 0.2764 - val_accuracy: 0.5035 - val_loss: 35.0576
Epoch 872/1000
196/196 0s 2ms/step - accuracy: 0.8228 - loss: 0.2730 - val_accuracy: 0.5022 - val_loss: 40.6585
Epoch 873/1000
196/196 0s 2ms/step - accuracy: 0.8214 - loss: 0.2910 - val_accuracy: 0.5035 - val_loss: 36.8418
Epoch 874/1000
196/196 0s 2ms/step - accuracy: 0.8197 - loss: 0.2757 - val_accuracy: 0.5018 - val_loss: 35.4466
Epoch 875/1000
196/196 0s 2ms/step - accuracy: 0.8206 - loss: 0.2772 - val_accuracy: 0.5044 - val_loss: 32.5246
Epoch 876/1000
196/196 0s 2ms/step - accuracy: 0.8255 - loss: 0.2704 - val_accuracy: 0.5041 - val_loss: 36.2355
Epoch 877/1000
196/196 0s 2ms/step - accuracy: 0.8222 - loss: 0.2858 - val_accuracy: 0.5035 - val_loss: 39.1576
Epoch 878/1000
196/196 0s 2ms/step - accuracy: 0.8284 - loss: 0.2701 - val_accuracy: 0.5026 - val_loss: 36.2528
Epoch 879/1000
196/196 0s 2ms/step - accuracy: 0.8283 - loss: 0.2754 - val_accuracy: 0.5060 - val_loss: 36.3917
Epoch 880/1000
196/196 0s 2ms/step - accuracy: 0.8228 - loss: 0.2785 - val_accuracy: 0.5020 - val_loss: 33.9961

Epoch 881/1000
196/196 0s 2ms/step - accuracy: 0.8256 - loss: 0.2736 - val_accuracy: 0.5052 - val_loss: 33.3850
Epoch 882/1000
196/196 0s 2ms/step - accuracy: 0.8261 - loss: 0.2677 - val_accuracy: 0.5050 - val_loss: 37.4248
Epoch 883/1000
196/196 0s 2ms/step - accuracy: 0.8243 - loss: 0.2681 - val_accuracy: 0.5039 - val_loss: 33.7488
Epoch 884/1000
196/196 0s 2ms/step - accuracy: 0.8276 - loss: 0.2742 - val_accuracy: 0.5036 - val_loss: 36.5875
Epoch 885/1000
196/196 0s 2ms/step - accuracy: 0.8177 - loss: 0.2931 - val_accuracy: 0.5030 - val_loss: 35.5713
Epoch 886/1000
196/196 0s 2ms/step - accuracy: 0.8181 - loss: 0.2968 - val_accuracy: 0.5014 - val_loss: 33.5055
Epoch 887/1000
196/196 0s 2ms/step - accuracy: 0.8207 - loss: 0.2876 - val_accuracy: 0.5040 - val_loss: 34.7711
Epoch 888/1000
196/196 0s 2ms/step - accuracy: 0.8185 - loss: 0.2829 - val_accuracy: 0.5040 - val_loss: 34.4540
Epoch 889/1000
196/196 0s 2ms/step - accuracy: 0.8174 - loss: 0.2879 - val_accuracy: 0.5026 - val_loss: 33.5411
Epoch 890/1000
196/196 0s 2ms/step - accuracy: 0.8256 - loss: 0.2678 - val_accuracy: 0.5040 - val_loss: 33.7104
Epoch 891/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2709 - val_accuracy: 0.5043 - val_loss: 41.0235
Epoch 892/1000
196/196 0s 2ms/step - accuracy: 0.8233 - loss: 0.2816 - val_accuracy: 0.5040 - val_loss: 36.3099
Epoch 893/1000
196/196 0s 2ms/step - accuracy: 0.8245 - loss: 0.2676 - val_accuracy: 0.5057 - val_loss: 38.5998
Epoch 894/1000
196/196 0s 2ms/step - accuracy: 0.8256 - loss: 0.3078 - val_accuracy: 0.5048 - val_loss: 30.4927
Epoch 895/1000
196/196 0s 2ms/step - accuracy: 0.8262 - loss: 0.2625 - val_accuracy: 0.5054 - val_loss: 36.7874
Epoch 896/1000
196/196 0s 2ms/step - accuracy: 0.8314 - loss: 0.2623 - val_accuracy: 0.5046 - val_loss: 33.7113
Epoch 897/1000
196/196 0s 2ms/step - accuracy: 0.8286 - loss: 0.2644 - val_accuracy: 0.5045 - val_loss: 33.6730
Epoch 898/1000
196/196 0s 2ms/step - accuracy: 0.8257 - loss: 0.2686 - val_accuracy: 0.5046 - val_loss: 31.1380
Epoch 899/1000
196/196 0s 2ms/step - accuracy: 0.8247 - loss: 0.2715 - val_accuracy: 0.5054 - val_loss: 42.3164
Epoch 900/1000
196/196 0s 2ms/step - accuracy: 0.8263 - loss: 0.2709 - val_accuracy: 0.5047 - val_loss: 37.0544

Epoch 901/1000
196/196 0s 2ms/step - accuracy: 0.8312 - loss: 0.2590 - val_accuracy: 0.5035 - val_loss: 35.7827
Epoch 902/1000
196/196 0s 2ms/step - accuracy: 0.8242 - loss: 0.2641 - val_accuracy: 0.5047 - val_loss: 37.3474
Epoch 903/1000
196/196 0s 2ms/step - accuracy: 0.8246 - loss: 0.2678 - val_accuracy: 0.5043 - val_loss: 38.1010
Epoch 904/1000
196/196 0s 2ms/step - accuracy: 0.8213 - loss: 0.2723 - val_accuracy: 0.5051 - val_loss: 35.6107
Epoch 905/1000
196/196 0s 2ms/step - accuracy: 0.8235 - loss: 0.2663 - val_accuracy: 0.5062 - val_loss: 38.5716
Epoch 906/1000
196/196 0s 2ms/step - accuracy: 0.8204 - loss: 0.2895 - val_accuracy: 0.5055 - val_loss: 44.6967
Epoch 907/1000
196/196 0s 2ms/step - accuracy: 0.8149 - loss: 0.3009 - val_accuracy: 0.5055 - val_loss: 36.7717
Epoch 908/1000
196/196 0s 2ms/step - accuracy: 0.8210 - loss: 0.2749 - val_accuracy: 0.5043 - val_loss: 37.4919
Epoch 909/1000
196/196 0s 2ms/step - accuracy: 0.8160 - loss: 0.2890 - val_accuracy: 0.5056 - val_loss: 36.8517
Epoch 910/1000
196/196 0s 2ms/step - accuracy: 0.8223 - loss: 0.2709 - val_accuracy: 0.5042 - val_loss: 34.0575
Epoch 911/1000
196/196 0s 2ms/step - accuracy: 0.8195 - loss: 0.2776 - val_accuracy: 0.5023 - val_loss: 26.8156
Epoch 912/1000
196/196 0s 2ms/step - accuracy: 0.8196 - loss: 0.2703 - val_accuracy: 0.5053 - val_loss: 29.1605
Epoch 913/1000
196/196 0s 2ms/step - accuracy: 0.8201 - loss: 0.2738 - val_accuracy: 0.5048 - val_loss: 29.3636
Epoch 914/1000
196/196 0s 2ms/step - accuracy: 0.8215 - loss: 0.2661 - val_accuracy: 0.5036 - val_loss: 28.2085
Epoch 915/1000
196/196 0s 2ms/step - accuracy: 0.8290 - loss: 0.2596 - val_accuracy: 0.5038 - val_loss: 29.0126
Epoch 916/1000
196/196 0s 2ms/step - accuracy: 0.8290 - loss: 0.2576 - val_accuracy: 0.5049 - val_loss: 30.8691
Epoch 917/1000
196/196 0s 2ms/step - accuracy: 0.8245 - loss: 0.2741 - val_accuracy: 0.5052 - val_loss: 30.5504
Epoch 918/1000
196/196 0s 2ms/step - accuracy: 0.8272 - loss: 0.2624 - val_accuracy: 0.5053 - val_loss: 33.6069
Epoch 919/1000
196/196 0s 2ms/step - accuracy: 0.8313 - loss: 0.2681 - val_accuracy: 0.5040 - val_loss: 29.7234
Epoch 920/1000
196/196 0s 2ms/step - accuracy: 0.8247 - loss: 0.2718 - val_accuracy: 0.5042 - val_loss: 26.6346

Epoch 921/1000
196/196 0s 2ms/step - accuracy: 0.8189 - loss: 0.2780 - val_accuracy: 0.5036 - val_loss: 30.5904
Epoch 922/1000
196/196 0s 2ms/step - accuracy: 0.8237 - loss: 0.2738 - val_accuracy: 0.5050 - val_loss: 33.1672
Epoch 923/1000
196/196 0s 2ms/step - accuracy: 0.8234 - loss: 0.2707 - val_accuracy: 0.5039 - val_loss: 38.6639
Epoch 924/1000
196/196 0s 2ms/step - accuracy: 0.8198 - loss: 0.3106 - val_accuracy: 0.5038 - val_loss: 35.5105
Epoch 925/1000
196/196 0s 2ms/step - accuracy: 0.8190 - loss: 0.2851 - val_accuracy: 0.5042 - val_loss: 30.0874
Epoch 926/1000
196/196 0s 2ms/step - accuracy: 0.8205 - loss: 0.2738 - val_accuracy: 0.5040 - val_loss: 35.5374
Epoch 927/1000
196/196 0s 2ms/step - accuracy: 0.8256 - loss: 0.2715 - val_accuracy: 0.5034 - val_loss: 34.9953
Epoch 928/1000
196/196 0s 2ms/step - accuracy: 0.8249 - loss: 0.2584 - val_accuracy: 0.5044 - val_loss: 36.4383
Epoch 929/1000
196/196 0s 2ms/step - accuracy: 0.8269 - loss: 0.2639 - val_accuracy: 0.5030 - val_loss: 38.4331
Epoch 930/1000
196/196 0s 2ms/step - accuracy: 0.8288 - loss: 0.2965 - val_accuracy: 0.5026 - val_loss: 30.9326
Epoch 931/1000
196/196 0s 2ms/step - accuracy: 0.8234 - loss: 0.2692 - val_accuracy: 0.5067 - val_loss: 35.5763
Epoch 932/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2681 - val_accuracy: 0.5057 - val_loss: 37.0206
Epoch 933/1000
196/196 0s 2ms/step - accuracy: 0.8288 - loss: 0.2660 - val_accuracy: 0.5068 - val_loss: 37.5341
Epoch 934/1000
196/196 0s 2ms/step - accuracy: 0.8252 - loss: 0.2789 - val_accuracy: 0.5053 - val_loss: 33.1743
Epoch 935/1000
196/196 0s 2ms/step - accuracy: 0.8236 - loss: 0.2677 - val_accuracy: 0.5062 - val_loss: 32.2776
Epoch 936/1000
196/196 0s 2ms/step - accuracy: 0.8274 - loss: 0.2688 - val_accuracy: 0.5052 - val_loss: 33.1762
Epoch 937/1000
196/196 0s 2ms/step - accuracy: 0.8268 - loss: 0.2810 - val_accuracy: 0.5050 - val_loss: 32.2706
Epoch 938/1000
196/196 0s 2ms/step - accuracy: 0.8283 - loss: 0.2602 - val_accuracy: 0.5050 - val_loss: 37.5512
Epoch 939/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2734 - val_accuracy: 0.5030 - val_loss: 31.0436
Epoch 940/1000
196/196 0s 2ms/step - accuracy: 0.8213 - loss: 0.2678 - val_accuracy: 0.5045 - val_loss: 32.2217

Epoch 941/1000
196/196 0s 2ms/step - accuracy: 0.8286 - loss: 0.2635 - val_accuracy: 0.5036 - val_loss: 31.7924
Epoch 942/1000
196/196 0s 2ms/step - accuracy: 0.8216 - loss: 0.2666 - val_accuracy: 0.5051 - val_loss: 33.6090
Epoch 943/1000
196/196 0s 2ms/step - accuracy: 0.8283 - loss: 0.2636 - val_accuracy: 0.5040 - val_loss: 31.9474
Epoch 944/1000
196/196 0s 2ms/step - accuracy: 0.8238 - loss: 0.2789 - val_accuracy: 0.5033 - val_loss: 35.7154
Epoch 945/1000
196/196 0s 2ms/step - accuracy: 0.8240 - loss: 0.2705 - val_accuracy: 0.5042 - val_loss: 32.3779
Epoch 946/1000
196/196 0s 2ms/step - accuracy: 0.8278 - loss: 0.2719 - val_accuracy: 0.5043 - val_loss: 34.7790
Epoch 947/1000
196/196 0s 2ms/step - accuracy: 0.8260 - loss: 0.2679 - val_accuracy: 0.5037 - val_loss: 34.4789
Epoch 948/1000
196/196 0s 2ms/step - accuracy: 0.8288 - loss: 0.2647 - val_accuracy: 0.5029 - val_loss: 37.6718
Epoch 949/1000
196/196 0s 2ms/step - accuracy: 0.8262 - loss: 0.2653 - val_accuracy: 0.5046 - val_loss: 40.1157
Epoch 950/1000
196/196 0s 2ms/step - accuracy: 0.8263 - loss: 0.2745 - val_accuracy: 0.5021 - val_loss: 39.5439
Epoch 951/1000
196/196 0s 2ms/step - accuracy: 0.8287 - loss: 0.2660 - val_accuracy: 0.5028 - val_loss: 35.2327
Epoch 952/1000
196/196 0s 2ms/step - accuracy: 0.8272 - loss: 0.2605 - val_accuracy: 0.5021 - val_loss: 41.3383
Epoch 953/1000
196/196 0s 2ms/step - accuracy: 0.8255 - loss: 0.2828 - val_accuracy: 0.5037 - val_loss: 37.2738
Epoch 954/1000
196/196 0s 2ms/step - accuracy: 0.8262 - loss: 0.2722 - val_accuracy: 0.5036 - val_loss: 37.2211
Epoch 955/1000
196/196 0s 2ms/step - accuracy: 0.8242 - loss: 0.2702 - val_accuracy: 0.5032 - val_loss: 34.7016
Epoch 956/1000
196/196 0s 2ms/step - accuracy: 0.8224 - loss: 0.2740 - val_accuracy: 0.5015 - val_loss: 31.6868
Epoch 957/1000
196/196 0s 2ms/step - accuracy: 0.8317 - loss: 0.2551 - val_accuracy: 0.5033 - val_loss: 38.6765
Epoch 958/1000
196/196 0s 2ms/step - accuracy: 0.8260 - loss: 0.2715 - val_accuracy: 0.5025 - val_loss: 34.6042
Epoch 959/1000
196/196 0s 2ms/step - accuracy: 0.8271 - loss: 0.2681 - val_accuracy: 0.5024 - val_loss: 31.6386
Epoch 960/1000
196/196 0s 2ms/step - accuracy: 0.8319 - loss: 0.2622 - val_accuracy: 0.5027 - val_loss: 33.2637

Epoch 961/1000
196/196 0s 2ms/step - accuracy: 0.8290 - loss: 0.2633 - val_accuracy: 0.5035 - val_loss: 29.9325
Epoch 962/1000
196/196 0s 2ms/step - accuracy: 0.8242 - loss: 0.2642 - val_accuracy: 0.5021 - val_loss: 28.0263
Epoch 963/1000
196/196 0s 2ms/step - accuracy: 0.8290 - loss: 0.2586 - val_accuracy: 0.5032 - val_loss: 31.5554
Epoch 964/1000
196/196 0s 2ms/step - accuracy: 0.8285 - loss: 0.2635 - val_accuracy: 0.5030 - val_loss: 32.4254
Epoch 965/1000
196/196 0s 2ms/step - accuracy: 0.8267 - loss: 0.2749 - val_accuracy: 0.5019 - val_loss: 36.3159
Epoch 966/1000
196/196 0s 2ms/step - accuracy: 0.8211 - loss: 0.2871 - val_accuracy: 0.5038 - val_loss: 34.8706
Epoch 967/1000
196/196 0s 2ms/step - accuracy: 0.8214 - loss: 0.2897 - val_accuracy: 0.5030 - val_loss: 32.0529
Epoch 968/1000
196/196 0s 2ms/step - accuracy: 0.8223 - loss: 0.2749 - val_accuracy: 0.5041 - val_loss: 33.2351
Epoch 969/1000
196/196 0s 2ms/step - accuracy: 0.8223 - loss: 0.2776 - val_accuracy: 0.5031 - val_loss: 33.7176
Epoch 970/1000
196/196 0s 2ms/step - accuracy: 0.8238 - loss: 0.2645 - val_accuracy: 0.5040 - val_loss: 35.3101
Epoch 971/1000
196/196 0s 2ms/step - accuracy: 0.8274 - loss: 0.2735 - val_accuracy: 0.5038 - val_loss: 31.9548
Epoch 972/1000
196/196 0s 2ms/step - accuracy: 0.8230 - loss: 0.2667 - val_accuracy: 0.5040 - val_loss: 39.4785
Epoch 973/1000
196/196 0s 2ms/step - accuracy: 0.8279 - loss: 0.2686 - val_accuracy: 0.5057 - val_loss: 40.0393
Epoch 974/1000
196/196 0s 2ms/step - accuracy: 0.8285 - loss: 0.2622 - val_accuracy: 0.5029 - val_loss: 36.8163
Epoch 975/1000
196/196 0s 2ms/step - accuracy: 0.8239 - loss: 0.2749 - val_accuracy: 0.5047 - val_loss: 40.1649
Epoch 976/1000
196/196 0s 2ms/step - accuracy: 0.8308 - loss: 0.2592 - val_accuracy: 0.5045 - val_loss: 40.5652
Epoch 977/1000
196/196 0s 2ms/step - accuracy: 0.8333 - loss: 0.2613 - val_accuracy: 0.5054 - val_loss: 37.6995
Epoch 978/1000
196/196 0s 2ms/step - accuracy: 0.8276 - loss: 0.2625 - val_accuracy: 0.5044 - val_loss: 31.6185
Epoch 979/1000
196/196 0s 2ms/step - accuracy: 0.8275 - loss: 0.2568 - val_accuracy: 0.5056 - val_loss: 42.9902
Epoch 980/1000
196/196 0s 2ms/step - accuracy: 0.8289 - loss: 0.2711 - val_accuracy: 0.5064 - val_loss: 43.2813

Epoch 981/1000
196/196 0s 2ms/step - accuracy: 0.8262 - loss: 0.2596 - val_accuracy: 0.5039 - val_loss: 39.6796
Epoch 982/1000
196/196 0s 2ms/step - accuracy: 0.8301 - loss: 0.2655 - val_accuracy: 0.5044 - val_loss: 45.6443
Epoch 983/1000
196/196 0s 2ms/step - accuracy: 0.8256 - loss: 0.2668 - val_accuracy: 0.5052 - val_loss: 43.1367
Epoch 984/1000
196/196 0s 2ms/step - accuracy: 0.8308 - loss: 0.2586 - val_accuracy: 0.5048 - val_loss: 40.3017
Epoch 985/1000
196/196 0s 2ms/step - accuracy: 0.8337 - loss: 0.2610 - val_accuracy: 0.5052 - val_loss: 40.0802
Epoch 986/1000
196/196 0s 2ms/step - accuracy: 0.8327 - loss: 0.2560 - val_accuracy: 0.5039 - val_loss: 39.6116
Epoch 987/1000
196/196 0s 2ms/step - accuracy: 0.8285 - loss: 0.2665 - val_accuracy: 0.5042 - val_loss: 30.0408
Epoch 988/1000
196/196 0s 2ms/step - accuracy: 0.8230 - loss: 0.2821 - val_accuracy: 0.5058 - val_loss: 34.2982
Epoch 989/1000
196/196 0s 2ms/step - accuracy: 0.8312 - loss: 0.2650 - val_accuracy: 0.5073 - val_loss: 32.3718
Epoch 990/1000
196/196 0s 2ms/step - accuracy: 0.8302 - loss: 0.2816 - val_accuracy: 0.5063 - val_loss: 39.4130
Epoch 991/1000
196/196 0s 2ms/step - accuracy: 0.8296 - loss: 0.2681 - val_accuracy: 0.5044 - val_loss: 40.4975
Epoch 992/1000
196/196 0s 2ms/step - accuracy: 0.8273 - loss: 0.2620 - val_accuracy: 0.5063 - val_loss: 40.5254
Epoch 993/1000
196/196 0s 2ms/step - accuracy: 0.8207 - loss: 0.2706 - val_accuracy: 0.5029 - val_loss: 40.0435
Epoch 994/1000
196/196 0s 2ms/step - accuracy: 0.8191 - loss: 0.2678 - val_accuracy: 0.5084 - val_loss: 43.1439
Epoch 995/1000
196/196 0s 2ms/step - accuracy: 0.8309 - loss: 0.2680 - val_accuracy: 0.5070 - val_loss: 39.5978
Epoch 996/1000
196/196 0s 2ms/step - accuracy: 0.8286 - loss: 0.2771 - val_accuracy: 0.5043 - val_loss: 41.2127
Epoch 997/1000
196/196 0s 2ms/step - accuracy: 0.8275 - loss: 0.2805 - val_accuracy: 0.5057 - val_loss: 32.0810
Epoch 998/1000
196/196 0s 2ms/step - accuracy: 0.8308 - loss: 0.2581 - val_accuracy: 0.5048 - val_loss: 35.4641
Epoch 999/1000
196/196 0s 2ms/step - accuracy: 0.8248 - loss: 0.3142 - val_accuracy: 0.5040 - val_loss: 33.9774
Epoch 1000/1000
196/196 0s 2ms/step - accuracy: 0.8209 - loss: 0.3069 - val_accuracy: 0.5029 - val_loss: 36.7923

782/782 ————— 0s 564us/step - accuracy: 0.5039 - loss: 37.1064
Test Accuracy: 50.29%

```
In [18]: print(f"Test Accuracy: {accuracy*100:.2f}%")
```

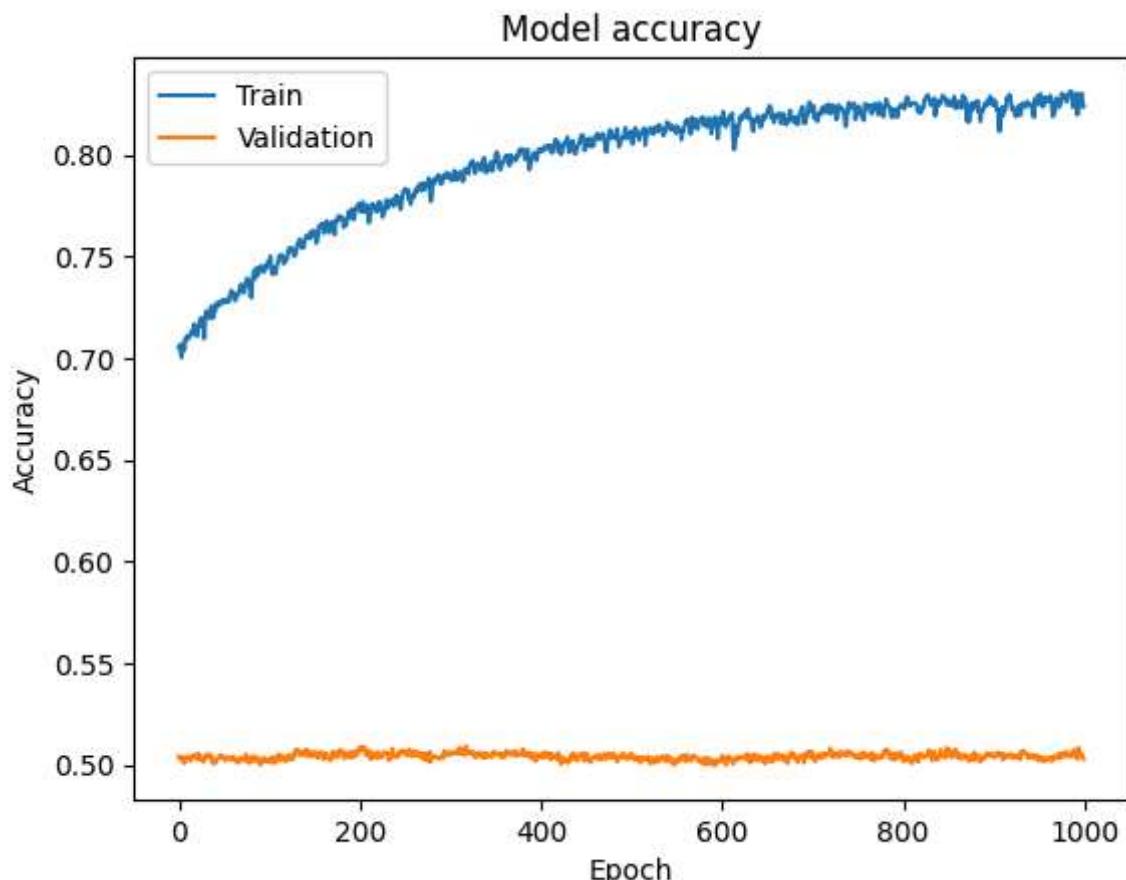
Test Accuracy: 50.29%

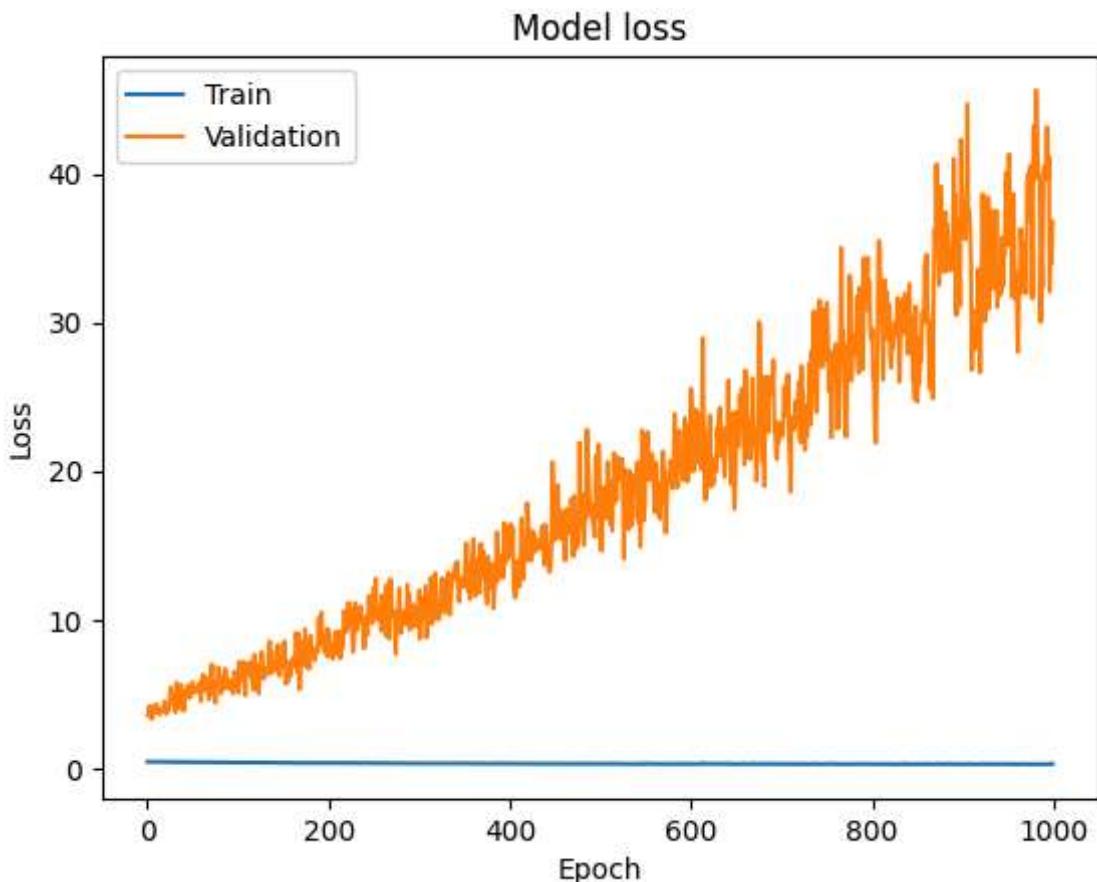
Model performance Evaluation

- **Accuracy Plot:** Shows how the model's accuracy improves over epochs for both training and validation sets.
- **Loss Plot:** Tracks how the loss reduces as the model learns.

```
In [16]: plt.plot(history.history['accuracy'])
plt.plot(history.history['val_accuracy'])
plt.title('Model accuracy')
plt.ylabel('Accuracy')
plt.xlabel('Epoch')
plt.legend(['Train', 'Validation'], loc='upper left')
plt.show()

plt.plot(history.history['loss'])
plt.plot(history.history['val_loss'])
plt.title('Model loss')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Train', 'Validation'], loc='upper left')
plt.show()
```





Justifying Activation Functions

ReLU Activation:

- Rectified Linear Unit (ReLU) is used in the hidden layers because it helps with faster convergence and avoids the vanishing gradient problem.
- ReLU outputs 0 for negative values and the input itself for positive values, ensuring non-linear learning.

Sigmoid Activation:

- Sigmoid is used in the output layer for binary classification because it squashes the output between 0 and 1, which is ideal for predicting probabilities in binary tasks.

Model inference

```
In [17]: predictions = model.predict(X_test)
predictions = [1 if p > 0.5 else 0 for p in predictions]

print(predictions[:10])
```

782/782 **0s** 580us/step
[0, 1, 1, 1, 1, 1, 1, 1, 1, 1]

Explain why binary cross-entropy is suitable for this task.

Binary Cross-Entropy Loss:

- Binary cross-entropy is ideal for binary classification problems as it measures the performance of a classification model whose output is a probability value between 0 and 1.
- It is designed to minimize the difference between the predicted probability and the actual class.