In [2]:
```
import os
import matplotlib.pyplot as plt
import tensorflow as tf
import pandas as pd
import numpy as np
print(tf.__version__)
```

```
2.8.0
```

In [3]:
```
TRAIN_DATA_URL = "https://storage.googleapis.com/tf-datasets/titanic/train.csv"
TEST_DATA_URL = "https://storage.googleapis.com/tf-datasets/titanic/eval.csv"

train_file_path = tf.keras.utils.get_file("train.csv", TRAIN_DATA_URL)
test_file_path = tf.keras.utils.get_file("eval.csv", TEST_DATA_URL)

column_names = ['survived', 'sex', 'age', 'n_siblings_spouses', 'parch', 'fare',
       'class', 'deck', 'embark_town', 'alone']

df = pd.read_csv(TRAIN_DATA_URL)
# pd.set_option('display.max_rows', None)
print(df)
# 데이터 정보 확인
print(df.info())
# 수치형 데이터 확인
print(df.describe())
# 범주형 데이터 확인
df.describe(include = np.object_)
# 결측치 확인
df.isnull().sum()
```

```
     survived     sex   age  n_siblings_spouses  parch     fare   class  \
0           0    male  22.0                   1      0   7.2500   Third
1           1  female  38.0                   1      0  71.2833   First
2           1  female  26.0                   0      0   7.9250   Third
3           1  female  35.0                   1      0  53.1000   First
4           0    male  28.0                   0      0   8.4583   Third
..        ...     ...   ...                 ...    ...      ...     ...
622         0    male  28.0                   0      0  10.5000  Second
623         0    male  25.0                   0      0   7.0500   Third
624         1  female  19.0                   0      0  30.0000   First
625         0  female  28.0                   1      2  23.4500   Third
626         0    male  32.0                   0      0   7.7500   Third

        deck  embark_town alone
0    unknown  Southampton     n
1          C    Cherbourg     n
2    unknown  Southampton     y
3          C  Southampton     n
4    unknown   Queenstown     y
..       ...          ...   ...
622  unknown  Southampton     y
623  unknown  Southampton     y
624        B  Southampton     y
625  unknown  Southampton     n
626  unknown   Queenstown     y

[627 rows x 10 columns]
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 627 entries, 0 to 626
Data columns (total 10 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   survived            627 non-null    int64
 1   sex                 627 non-null    object
```

```
 2   age                  627 non-null    float64
 3   n_siblings_spouses   627 non-null    int64
 4   parch                627 non-null    int64
 5   fare                 627 non-null    float64
 6   class                627 non-null    object
 7   deck                 627 non-null    object
 8   embark_town          627 non-null    object
 9   alone                627 non-null    object
dtypes: float64(2), int64(3), object(5)
memory usage: 49.1+ KB
None
```

	survived	age	n_siblings_spouses	parch	fare
count	627.000000	627.000000	627.000000	627.000000	627.000000
mean	0.387560	29.631308	0.545455	0.379585	34.385399
std	0.487582	12.511818	1.151090	0.792999	54.597730
min	0.000000	0.750000	0.000000	0.000000	0.000000
25%	0.000000	23.000000	0.000000	0.000000	7.895800
50%	0.000000	28.000000	0.000000	0.000000	15.045800
75%	1.000000	35.000000	1.000000	0.000000	31.387500
max	1.000000	80.000000	8.000000	5.000000	512.329200

Out[3]:

```
survived              0
sex                   0
age                   0
n_siblings_spouses    0
parch                 0
fare                  0
class                 0
deck                  0
embark_town           0
alone                 0
dtype: int64
```

In [4]:

```
# 데이터 요약

print("전체 데이터 수:", df.shape[0] * df.shape[1])
print(f"결측치 수: {df.isnull().sum().sum()}")
print("총 인원 수:", df["age"].count())
print("중복된 데이터:",df.duplicated().sum())
```

```
전체 데이터 수: 6270
결측치 수: 0
총 인원 수: 627
중복된 데이터: 69
```

In [16]:

```
class_names = ['UnSurvived', 'Survived']

feature_names = column_names[1:]
label_name = column_names[0]

print(feature_names)
print(label_name)

batch_size = 32
train_dataset = tf.data.experimental.make_csv_dataset(
    train_file_path,
    batch_size,
    column_names=column_names,
    label_name=label_name,
    num_epochs=1)

test_dataset = tf.data.experimental.make_csv_dataset(
    train_file_path,
    batch_size,
    column_names=column_names,
    label_name=label_name,
    num_epochs=1)
```

```
features, labels = next(iter(train_dataset))

print(f"##features \n {features}")
```

```
['sex', 'age', 'n_siblings_spouses', 'parch', 'fare', 'class', 'deck', 'embark_town', 'a
lone']
survived
##features
 OrderedDict([('sex', <tf.Tensor: shape=(32,), dtype=string, numpy=
array([b'male', b'female', b'male', b'male', b'male', b'male', b'male',
       b'female', b'male', b'male', b'male', b'male', b'male', b'male',
       b'male', b'female', b'male', b'male', b'male', b'female', b'male',
       b'male', b'male', b'male', b'male', b'male', b'female', b'male',
       b'female', b'male', b'male', b'female'], dtype=object)>), ('age', <tf.Tensor: sha
pe=(32,), dtype=float32, numpy=
array([18. , 45. , 30.5, 28. , 19. , 22. , 28. ,  2. , 28. , 24. , 28. ,
       23. , 15. , 48. , 31. , 26. , 41. , 32. , 28. , 23. , 20. , 35. ,
       46. , 28. , 31. , 26. , 49. , 29. , 32. , 71. , 28. , 52. ],
      dtype=float32)>), ('n_siblings_spouses', <tf.Tensor: shape=(32,), dtype=int32, num
py=
array([0, 1, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1, 0, 0, 2, 0, 0, 0, 0, 0,
       0, 0, 1, 0, 0, 1, 0, 0, 0, 1], dtype=int32)>), ('parch', <tf.Tensor: shape=(32,),
dtype=int32, numpy=
array([0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 1], dtype=int32)>), ('fare', <tf.Tensor: shape=(32,),
dtype=float32, numpy=
array([  8.3   , 164.8667,   8.05  ,  56.4958,   8.05  ,   7.25  ,
        15.5   ,  26.    ,  13.    ,   8.05  ,  35.5   ,  13.    ,
         7.2292,  52.    ,   7.775 ,  78.85  ,  14.1083,   7.75  ,
         7.75  ,   7.55  ,   8.05  ,   7.05  ,  79.2   ,  10.5   ,
        57.    ,  18.7875,  25.9292,  27.7208,  13.    ,  34.6542,
         6.95  ,  93.5   ], dtype=float32)>), ('class', <tf.Tensor: shape=(32,), dtype=s
tring, numpy=
array([b'Third', b'First', b'Third', b'Third', b'Third', b'Third',
       b'Third', b'Second', b'Second', b'Third', b'First', b'Second',
       b'Third', b'First', b'Third', b'First', b'Third', b'Third',
       b'Third', b'Third', b'Third', b'Third', b'First', b'Second',
       b'First', b'Third', b'First', b'Second', b'Second', b'First',
       b'Third', b'First'], dtype=object)>), ('deck', <tf.Tensor: shape=(32,), dtype=str
ing, numpy=
array([b'unknown', b'unknown', b'unknown', b'unknown', b'unknown',
       b'unknown', b'unknown', b'unknown', b'unknown', b'unknown', b'C',
       b'unknown', b'unknown', b'C', b'unknown', b'unknown', b'unknown',
       b'unknown', b'unknown', b'unknown', b'unknown', b'unknown', b'B',
       b'unknown', b'B', b'unknown', b'D', b'unknown', b'unknown', b'A',
       b'unknown', b'B'], dtype=object)>), ('embark_town', <tf.Tensor: shape=(32,), dtyp
e=string, numpy=
array([b'Southampton', b'Southampton', b'Southampton', b'Southampton',
       b'Southampton', b'Southampton', b'Queenstown', b'Southampton',
       b'Southampton', b'Southampton', b'Southampton', b'Southampton',
       b'Cherbourg', b'Southampton', b'Southampton', b'Southampton',
       b'Southampton', b'Queenstown', b'Queenstown', b'Southampton',
       b'Southampton', b'Southampton', b'Cherbourg', b'Southampton',
       b'Southampton', b'Cherbourg', b'Southampton', b'Cherbourg',
       b'Southampton', b'Cherbourg', b'Queenstown', b'Southampton'],
      dtype=object)>), ('alone', <tf.Tensor: shape=(32,), dtype=string, numpy=
array([b'y', b'n', b'y', b'y', b'y', b'n', b'n', b'n', b'y', b'y', b'y',
       b'y', b'n', b'n', b'y', b'y', b'n', b'y', b'y', b'y', b'y', b'y',
       b'y', b'y', b'n', b'y', b'y', b'n', b'y', b'y', b'y', b'n'],
      dtype=object)>)])
```

In [17]:

```
# 불필요한 컬럼 삭제 -> embark_town
def remove_columns(features, labels):
    del(features['embark_town'])
    return features, labels
```

```
train_dataset = train_dataset.map(remove_columns)
test_dataset = test_dataset.map(remove_columns)
features, labels = next(iter(train_dataset))

print(f"features \n {features}")
```

```
features
 OrderedDict([('sex', <tf.Tensor: shape=(32,), dtype=string, numpy=
array([b'male', b'male', b'male', b'male', b'male', b'female', b'female',
       b'male', b'male', b'male', b'female', b'male', b'female', b'male',
       b'male', b'male', b'female', b'male', b'female', b'female',
       b'male', b'male', b'male', b'male', b'male', b'male', b'male',
       b'female', b'female', b'female', b'male', b'male'], dtype=object)>), ('age', <tf.
Tensor: shape=(32,), dtype=float32, numpy=
array([16. , 61. , 50. , 22. , 56. , 11. , 15. , 17. , 39. , 28. , 19. ,
       32. , 42. , 22. , 34. , 21. , 28. , 28. , 17. , 18. , 20. , 19. ,
       28.5, 28. , 33. , 25. , 44. , 28. , 14. , 14. , 36. , 28. ],
      dtype=float32)>), ('n_siblings_spouses', <tf.Tensor: shape=(32,), dtype=int32, num
py=
array([4, 0, 1, 1, 0, 4, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 2, 0, 0,
       0, 0, 0, 1, 0, 1, 1, 1, 0, 0], dtype=int32)>), ('parch', <tf.Tensor: shape=(32,),
dtype=int32, numpy=
array([1, 0, 0, 0, 0, 2, 0, 2, 0, 0, 2, 0, 0, 0, 0, 0, 0, 0, 2, 0, 0,
       0, 0, 0, 0, 1, 2, 0, 0, 1, 0], dtype=int32)>), ('fare', <tf.Tensor: shape=(32,),
dtype=float32, numpy=
array([ 39.6875,   6.2375,  55.9   ,   7.25  ,  26.55  ,  31.275 ,
        14.4542, 110.8833,  26.    ,   7.25  ,  26.2833,   7.75  ,
        13.    ,   9.35  ,  13.    ,  73.5   ,  15.5   ,   8.4583,
       108.9   , 262.375 ,   9.8458,   8.05  ,   7.2292,   7.25  ,
         5.    ,  26.    ,  16.1   ,  23.45  ,  11.2417,  30.0708,
       512.3292,   7.55  ], dtype=float32)>), ('class', <tf.Tensor: shape=(32,), dtype=s
tring, numpy=
array([b'Third', b'Third', b'First', b'Third', b'First', b'Third',
       b'Third', b'First', b'Second', b'Third', b'First', b'Third',
       b'Second', b'Third', b'Second', b'Second', b'Third', b'Third',
       b'First', b'First', b'Third', b'Third', b'Third', b'Third',
       b'First', b'Second', b'Third', b'Third', b'Third', b'Second',
       b'First', b'Third'], dtype=object)>), ('deck', <tf.Tensor: shape=(32,), dtype=str
ing, numpy=
array([b'unknown', b'unknown', b'E', b'unknown', b'unknown', b'unknown',
       b'unknown', b'C', b'unknown', b'unknown', b'D', b'unknown',
       b'unknown', b'unknown', b'unknown', b'unknown', b'unknown',
       b'unknown', b'C', b'B', b'unknown', b'unknown', b'unknown',
       b'unknown', b'B', b'unknown', b'unknown', b'unknown', b'unknown',
       b'unknown', b'B', b'unknown'], dtype=object)>), ('alone', <tf.Tensor: shape=(3
2,), dtype=string, numpy=
array([b'n', b'y', b'n', b'n', b'y', b'n', b'n', b'n', b'y', b'y', b'n',
       b'y', b'y', b'y', b'y', b'y', b'n', b'y', b'n', b'n', b'y', b'y',
       b'y', b'y', b'y', b'n', b'n', b'n', b'n', b'n', b'n', b'y'],
      dtype=object)>)])
```

In [18]:

```
# 문자열 처리 -> sex, deck, alone, class를 문자열로
def convert_to_int(feature, label):
    if feature['sex'] == 'male':
        feature['sex'] = 0.
    else:
        feature['sex'] = 1.

    feature['sex'] = tf.cast(feature['sex'], tf.float32)

    return feature, label

CAT_COLUMNS = ['sex', 'deck', 'alone', 'class']
NUM_COLUMNS = ['age', 'fare', 'n_siblings_spouses', 'parch']
```

```
feature_cols = []

# Create IndicatorColumn for categorical features
for feature in CAT_COLUMNS:
  vocab = df[feature].unique()
  feature_cols.append(tf.feature_column.indicator_column(
      tf.feature_column.categorical_column_with_vocabulary_list(feature, vocab)))

# Create NumericColumn for numerical features
for feature in NUM_COLUMNS:
  feature_cols.append(tf.feature_column.numeric_column(feature, dtype=tf.float32))

print(feature_cols)
```

```
[IndicatorColumn(categorical_column=VocabularyListCategoricalColumn(key='sex', vocabular
y_list=('male', 'female'), dtype=tf.string, default_value=-1, num_oov_buckets=0)), Indic
atorColumn(categorical_column=VocabularyListCategoricalColumn(key='deck', vocabulary_lis
t=('unknown', 'C', 'G', 'A', 'B', 'D', 'F', 'E'), dtype=tf.string, default_value=-1, num
_oov_buckets=0)), IndicatorColumn(categorical_column=VocabularyListCategoricalColumn(key
='alone', vocabulary_list=('n', 'y'), dtype=tf.string, default_value=-1, num_oov_buckets
=0)), IndicatorColumn(categorical_column=VocabularyListCategoricalColumn(key='class', vo
cabulary_list=('Third', 'First', 'Second'), dtype=tf.string, default_value=-1, num_oov_b
uckets=0)), NumericColumn(key='age', shape=(1,), default_value=None, dtype=tf.float32, n
ormalizer_fn=None), NumericColumn(key='fare', shape=(1,), default_value=None, dtype=tf.f
loat32, normalizer_fn=None), NumericColumn(key='n_siblings_spouses', shape=(1,), default
_value=None, dtype=tf.float32, normalizer_fn=None), NumericColumn(key='parch', shape=
(1,), default_value=None, dtype=tf.float32, normalizer_fn=None)]
```

In [15]:

```
# 모델 생성
model = tf.keras.Sequential()
model.add(tf.keras.layers.DenseFeatures(feature_cols))
model.add(tf.keras.layers.Dense(10, activation='relu'))
model.add(tf.keras.layers.Dense(10, activation='relu'))
model.add(tf.keras.layers.Dense(10, activation='relu'))
model.add(tf.keras.layers.Dense(1, activation='sigmoid'))

model.compile(optimizer='sgd', loss='binary_crossentropy', metrics=['binary_accuracy'])

model.fit(train_dataset, epochs=100)
```

```
Epoch 1/1000
WARNING:tensorflow:Layers in a Sequential model should only have a single input tensor.
Received: inputs=OrderedDict([('sex', <tf.Tensor 'IteratorGetNext:7' shape=(None,) dtype
=string>), ('age', <tf.Tensor 'IteratorGetNext:0' shape=(None,) dtype=float32>), ('n_sib
lings_spouses', <tf.Tensor 'IteratorGetNext:5' shape=(None,) dtype=int32>), ('parch', <t
f.Tensor 'IteratorGetNext:6' shape=(None,) dtype=int32>), ('fare', <tf.Tensor 'IteratorG
etNext:4' shape=(None,) dtype=float32>), ('class', <tf.Tensor 'IteratorGetNext:2' shape=
(None,) dtype=string>), ('deck', <tf.Tensor 'IteratorGetNext:3' shape=(None,) dtype=stri
ng>), ('alone', <tf.Tensor 'IteratorGetNext:1' shape=(None,) dtype=string>)]). Consider
rewriting this model with the Functional API.
WARNING:tensorflow:Layers in a Sequential model should only have a single input tensor.
Received: inputs=OrderedDict([('sex', <tf.Tensor 'IteratorGetNext:7' shape=(None,) dtype
=string>), ('age', <tf.Tensor 'IteratorGetNext:0' shape=(None,) dtype=float32>), ('n_sib
lings_spouses', <tf.Tensor 'IteratorGetNext:5' shape=(None,) dtype=int32>), ('parch', <t
f.Tensor 'IteratorGetNext:6' shape=(None,) dtype=int32>), ('fare', <tf.Tensor 'IteratorG
etNext:4' shape=(None,) dtype=float32>), ('class', <tf.Tensor 'IteratorGetNext:2' shape=
(None,) dtype=string>), ('deck', <tf.Tensor 'IteratorGetNext:3' shape=(None,) dtype=stri
ng>), ('alone', <tf.Tensor 'IteratorGetNext:1' shape=(None,) dtype=string>)]). Consider
rewriting this model with the Functional API.
2022-05-15 12:15:11.331207: I tensorflow/core/grappler/optimizers/custom_graph_optimizer
_registry.cc:113] Plugin optimizer for device_type GPU is enabled.
20/20 [==============================] - 1s 26ms/step - loss: 0.7944 - binary_accuracy:
0.6762
Epoch 2/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.6728 - binary_accuracy:
```

```
0.6730
Epoch 3/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6472 - binary_accuracy:
0.6715
Epoch 4/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6188 - binary_accuracy:
0.6890
Epoch 5/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6241 - binary_accuracy:
0.6842
Epoch 6/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6162 - binary_accuracy:
0.6810
Epoch 7/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6103 - binary_accuracy:
0.7002
Epoch 8/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6075 - binary_accuracy:
0.6906
Epoch 9/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.6427 - binary_accuracy:
0.6746
Epoch 10/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.6121 - binary_accuracy:
0.7049
Epoch 11/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5982 - binary_accuracy:
0.7081
Epoch 12/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5904 - binary_accuracy:
0.6986
Epoch 13/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5902 - binary_accuracy:
0.6938
Epoch 14/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5998 - binary_accuracy:
0.7097
Epoch 15/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5903 - binary_accuracy:
0.7145
Epoch 16/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.6013 - binary_accuracy:
0.6986
Epoch 17/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5907 - binary_accuracy:
0.7129
Epoch 18/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5847 - binary_accuracy:
0.7193
Epoch 19/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5833 - binary_accuracy:
0.7113
Epoch 20/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5855 - binary_accuracy:
0.6986
Epoch 21/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.5869 - binary_accuracy:
0.7193
Epoch 22/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5942 - binary_accuracy:
0.7209
Epoch 23/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5798 - binary_accuracy:
0.7209
Epoch 24/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5872 - binary_accuracy:
```

```
0.7049
Epoch 25/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5809 - binary_accuracy:
0.7241
Epoch 26/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5748 - binary_accuracy:
0.7113
Epoch 27/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5859 - binary_accuracy:
0.7113
Epoch 28/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5829 - binary_accuracy:
0.7129
Epoch 29/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5744 - binary_accuracy:
0.7145
Epoch 30/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5691 - binary_accuracy:
0.7289
Epoch 31/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5776 - binary_accuracy:
0.7081
Epoch 32/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5879 - binary_accuracy:
0.7049
Epoch 33/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5732 - binary_accuracy:
0.7225
Epoch 34/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5724 - binary_accuracy:
0.7273
Epoch 35/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5694 - binary_accuracy:
0.7305
Epoch 36/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5754 - binary_accuracy:
0.7161
Epoch 37/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5615 - binary_accuracy:
0.7384
Epoch 38/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5660 - binary_accuracy:
0.7129
Epoch 39/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5662 - binary_accuracy:
0.7321
Epoch 40/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5555 - binary_accuracy:
0.7384
Epoch 41/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5828 - binary_accuracy:
0.7018
Epoch 42/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5702 - binary_accuracy:
0.7033
Epoch 43/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5630 - binary_accuracy:
0.7289
Epoch 44/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5373 - binary_accuracy:
0.7400
Epoch 45/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5586 - binary_accuracy:
0.7225
Epoch 46/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5440 - binary_accuracy:
```

```
0.7352
Epoch 47/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.5693 - binary_accuracy:
0.7400
Epoch 48/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5583 - binary_accuracy:
0.7416
Epoch 49/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5599 - binary_accuracy:
0.7480
Epoch 50/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6134 - binary_accuracy:
0.6683
Epoch 51/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5727 - binary_accuracy:
0.7193
Epoch 52/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5432 - binary_accuracy:
0.7432
Epoch 53/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5536 - binary_accuracy:
0.7416
Epoch 54/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5597 - binary_accuracy:
0.7464
Epoch 55/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5448 - binary_accuracy:
0.7432
Epoch 56/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5388 - binary_accuracy:
0.7544
Epoch 57/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5669 - binary_accuracy:
0.7352
Epoch 58/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5341 - binary_accuracy:
0.7560
Epoch 59/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5600 - binary_accuracy:
0.7273
Epoch 60/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5710 - binary_accuracy:
0.7161
Epoch 61/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5481 - binary_accuracy:
0.7400
Epoch 62/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5425 - binary_accuracy:
0.7448
Epoch 63/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5451 - binary_accuracy:
0.7384
Epoch 64/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5748 - binary_accuracy:
0.7273
Epoch 65/1000
20/20 [==============================] - 0s 13ms/step - loss: 0.5460 - binary_accuracy:
0.7480
Epoch 66/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5479 - binary_accuracy:
0.7337
Epoch 67/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5382 - binary_accuracy:
0.7432
Epoch 68/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5381 - binary_accuracy:
```

```
0.7432
Epoch 69/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5374 - binary_accuracy:
0.7496
Epoch 70/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5396 - binary_accuracy:
0.7289
Epoch 71/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6142 - binary_accuracy:
0.6730
Epoch 72/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5495 - binary_accuracy:
0.7321
Epoch 73/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5190 - binary_accuracy:
0.7560
Epoch 74/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5957 - binary_accuracy:
0.6810
Epoch 75/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5643 - binary_accuracy:
0.7305
Epoch 76/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5178 - binary_accuracy:
0.7671
Epoch 77/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5411 - binary_accuracy:
0.7448
Epoch 78/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5269 - binary_accuracy:
0.7592
Epoch 79/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5363 - binary_accuracy:
0.7432
Epoch 80/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5677 - binary_accuracy:
0.7049
Epoch 81/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5107 - binary_accuracy:
0.7799
Epoch 82/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5505 - binary_accuracy:
0.7496
Epoch 83/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5404 - binary_accuracy:
0.7480
Epoch 84/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5327 - binary_accuracy:
0.7671
Epoch 85/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5266 - binary_accuracy:
0.7352
Epoch 86/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5597 - binary_accuracy:
0.7049
Epoch 87/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5494 - binary_accuracy:
0.7321
Epoch 88/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5408 - binary_accuracy:
0.7368
Epoch 89/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5333 - binary_accuracy:
0.7384
Epoch 90/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5000 - binary_accuracy:
```

```
0.7847
Epoch 91/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5193 - binary_accuracy:
0.7624
Epoch 92/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5403 - binary_accuracy:
0.7464
Epoch 93/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5155 - binary_accuracy:
0.7544
Epoch 94/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5223 - binary_accuracy:
0.7608
Epoch 95/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5093 - binary_accuracy:
0.7735
Epoch 96/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5401 - binary_accuracy:
0.7400
Epoch 97/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5281 - binary_accuracy:
0.7624
Epoch 98/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5078 - binary_accuracy:
0.7608
Epoch 99/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5405 - binary_accuracy:
0.7400
Epoch 100/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5249 - binary_accuracy:
0.7480
Epoch 101/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5158 - binary_accuracy:
0.7528
Epoch 102/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5278 - binary_accuracy:
0.7560
Epoch 103/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5192 - binary_accuracy:
0.7640
Epoch 104/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5199 - binary_accuracy:
0.7560
Epoch 105/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5233 - binary_accuracy:
0.7544
Epoch 106/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.6072 - binary_accuracy:
0.6890
Epoch 107/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5825 - binary_accuracy:
0.7081
Epoch 108/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6425 - binary_accuracy:
0.6475
Epoch 109/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.6259 - binary_accuracy:
0.6858
Epoch 110/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6105 - binary_accuracy:
0.6683
Epoch 111/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6085 - binary_accuracy:
0.6715
Epoch 112/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6035 - binary_accuracy:
```

```
0.6794
Epoch 113/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6046 - binary_accuracy:
0.6794
Epoch 114/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5991 - binary_accuracy:
0.6874
Epoch 115/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6026 - binary_accuracy:
0.6810
Epoch 116/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5995 - binary_accuracy:
0.6970
Epoch 117/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6036 - binary_accuracy:
0.6874
Epoch 118/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5920 - binary_accuracy:
0.6938
Epoch 119/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6023 - binary_accuracy:
0.6810
Epoch 120/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5856 - binary_accuracy:
0.6954
Epoch 121/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5887 - binary_accuracy:
0.6922
Epoch 122/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5879 - binary_accuracy:
0.6922
Epoch 123/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5881 - binary_accuracy:
0.6954
Epoch 124/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5848 - binary_accuracy:
0.7033
Epoch 125/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5876 - binary_accuracy:
0.7002
Epoch 126/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5816 - binary_accuracy:
0.7129
Epoch 127/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5717 - binary_accuracy:
0.6970
Epoch 128/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5827 - binary_accuracy:
0.7018
Epoch 129/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5736 - binary_accuracy:
0.6970
Epoch 130/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5663 - binary_accuracy:
0.7033
Epoch 131/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5785 - binary_accuracy:
0.6970
Epoch 132/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5764 - binary_accuracy:
0.6986
Epoch 133/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5680 - binary_accuracy:
0.7002
Epoch 134/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5647 - binary_accuracy:
```

```
0.7002
Epoch 135/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5749 - binary_accuracy:
0.7065
Epoch 136/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5633 - binary_accuracy:
0.7145
Epoch 137/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5904 - binary_accuracy:
0.6842
Epoch 138/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5731 - binary_accuracy:
0.7033
Epoch 139/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5578 - binary_accuracy:
0.7097
Epoch 140/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5529 - binary_accuracy:
0.7145
Epoch 141/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5922 - binary_accuracy:
0.6778
Epoch 142/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5591 - binary_accuracy:
0.7002
Epoch 143/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5896 - binary_accuracy:
0.6922
Epoch 144/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5578 - binary_accuracy:
0.7097
Epoch 145/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5493 - binary_accuracy:
0.7033
Epoch 146/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5633 - binary_accuracy:
0.6922
Epoch 147/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5573 - binary_accuracy:
0.7065
Epoch 148/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5811 - binary_accuracy:
0.6858
Epoch 149/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5569 - binary_accuracy:
0.7193
Epoch 150/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5650 - binary_accuracy:
0.7097
Epoch 151/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5641 - binary_accuracy:
0.7177
Epoch 152/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5464 - binary_accuracy:
0.7129
Epoch 153/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5907 - binary_accuracy:
0.6906
Epoch 154/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5483 - binary_accuracy:
0.7241
Epoch 155/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5696 - binary_accuracy:
0.7065
Epoch 156/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5477 - binary_accuracy:
```

```
0.7049
Epoch 157/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5495 - binary_accuracy:
0.7257
Epoch 158/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5572 - binary_accuracy:
0.7097
Epoch 159/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5591 - binary_accuracy:
0.7065
Epoch 160/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5517 - binary_accuracy:
0.7161
Epoch 161/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5584 - binary_accuracy:
0.7177
Epoch 162/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5607 - binary_accuracy:
0.6858
Epoch 163/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5473 - binary_accuracy:
0.7177
Epoch 164/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5521 - binary_accuracy:
0.7177
Epoch 165/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5773 - binary_accuracy:
0.7145
Epoch 166/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5815 - binary_accuracy:
0.7018
Epoch 167/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5733 - binary_accuracy:
0.7065
Epoch 168/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5565 - binary_accuracy:
0.7177
Epoch 169/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5565 - binary_accuracy:
0.7289
Epoch 170/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5558 - binary_accuracy:
0.7209
Epoch 171/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6331 - binary_accuracy:
0.6938
Epoch 172/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5764 - binary_accuracy:
0.6794
Epoch 173/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5662 - binary_accuracy:
0.6874
Epoch 174/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5571 - binary_accuracy:
0.7081
Epoch 175/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5508 - binary_accuracy:
0.7145
Epoch 176/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5573 - binary_accuracy:
0.7209
Epoch 177/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5480 - binary_accuracy:
0.7177
Epoch 178/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5421 - binary_accuracy:
```

```
0.7305
Epoch 179/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5576 - binary_accuracy:
0.7241
Epoch 180/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5623 - binary_accuracy:
0.6970
Epoch 181/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.5470 - binary_accuracy:
0.7113
Epoch 182/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5453 - binary_accuracy:
0.7337
Epoch 183/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5588 - binary_accuracy:
0.7049
Epoch 184/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5416 - binary_accuracy:
0.7113
Epoch 185/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5526 - binary_accuracy:
0.7193
Epoch 186/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5487 - binary_accuracy:
0.7400
Epoch 187/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5445 - binary_accuracy:
0.7241
Epoch 188/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5413 - binary_accuracy:
0.7097
Epoch 189/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5376 - binary_accuracy:
0.7337
Epoch 190/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5549 - binary_accuracy:
0.7225
Epoch 191/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5480 - binary_accuracy:
0.7193
Epoch 192/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5550 - binary_accuracy:
0.6890
Epoch 193/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5370 - binary_accuracy:
0.7400
Epoch 194/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5505 - binary_accuracy:
0.7177
Epoch 195/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5784 - binary_accuracy:
0.7097
Epoch 196/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5583 - binary_accuracy:
0.7177
Epoch 197/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5780 - binary_accuracy:
0.7065
Epoch 198/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5458 - binary_accuracy:
0.7241
Epoch 199/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5368 - binary_accuracy:
0.7225
Epoch 200/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5402 - binary_accuracy:
```

```
0.7273
Epoch 201/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5467 - binary_accuracy:
0.7368
Epoch 202/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5536 - binary_accuracy:
0.7097
Epoch 203/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.5432 - binary_accuracy:
0.7337
Epoch 204/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5488 - binary_accuracy:
0.7018
Epoch 205/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5481 - binary_accuracy:
0.7129
Epoch 206/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5488 - binary_accuracy:
0.7400
Epoch 207/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5478 - binary_accuracy:
0.7352
Epoch 208/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5385 - binary_accuracy:
0.7241
Epoch 209/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5345 - binary_accuracy:
0.7241
Epoch 210/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5871 - binary_accuracy:
0.7002
Epoch 211/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5420 - binary_accuracy:
0.7065
Epoch 212/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5350 - binary_accuracy:
0.7368
Epoch 213/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5321 - binary_accuracy:
0.7289
Epoch 214/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5678 - binary_accuracy:
0.7337
Epoch 215/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.6308 - binary_accuracy:
0.6651
Epoch 216/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5432 - binary_accuracy:
0.7321
Epoch 217/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5392 - binary_accuracy:
0.7225
Epoch 218/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5427 - binary_accuracy:
0.7368
Epoch 219/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5335 - binary_accuracy:
0.7384
Epoch 220/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5336 - binary_accuracy:
0.7400
Epoch 221/1000
20/20 [==============================] - 0s 16ms/step - loss: 0.5563 - binary_accuracy:
0.7145
Epoch 222/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5487 - binary_accuracy:
```

```
0.7273
Epoch 223/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5385 - binary_accuracy:
0.7528
Epoch 224/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5429 - binary_accuracy:
0.7368
Epoch 225/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5279 - binary_accuracy:
0.7528
Epoch 226/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5493 - binary_accuracy:
0.7193
Epoch 227/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5323 - binary_accuracy:
0.7416
Epoch 228/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5251 - binary_accuracy:
0.7400
Epoch 229/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5539 - binary_accuracy:
0.7193
Epoch 230/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5330 - binary_accuracy:
0.7289
Epoch 231/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5541 - binary_accuracy:
0.7273
Epoch 232/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5378 - binary_accuracy:
0.7321
Epoch 233/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5215 - binary_accuracy:
0.7496
Epoch 234/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5621 - binary_accuracy:
0.7193
Epoch 235/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5380 - binary_accuracy:
0.7400
Epoch 236/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5241 - binary_accuracy:
0.7608
Epoch 237/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5354 - binary_accuracy:
0.7416
Epoch 238/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5089 - binary_accuracy:
0.7576
Epoch 239/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5084 - binary_accuracy:
0.7640
Epoch 240/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5181 - binary_accuracy:
0.7687
Epoch 241/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5339 - binary_accuracy:
0.7496
Epoch 242/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5311 - binary_accuracy:
0.7576
Epoch 243/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5124 - binary_accuracy:
0.7640
Epoch 244/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5124 - binary_accuracy:
```

```
0.7560
Epoch 245/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5087 - binary_accuracy:
0.7656
Epoch 246/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4980 - binary_accuracy:
0.7687
Epoch 247/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5102 - binary_accuracy:
0.7719
Epoch 248/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5606 - binary_accuracy:
0.7113
Epoch 249/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5005 - binary_accuracy:
0.7847
Epoch 250/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5151 - binary_accuracy:
0.7656
Epoch 251/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5071 - binary_accuracy:
0.7767
Epoch 252/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5616 - binary_accuracy:
0.7416
Epoch 253/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5165 - binary_accuracy:
0.7592
Epoch 254/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5049 - binary_accuracy:
0.7608
Epoch 255/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4847 - binary_accuracy:
0.7719
Epoch 256/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5436 - binary_accuracy:
0.7193
Epoch 257/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4949 - binary_accuracy:
0.7671
Epoch 258/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4867 - binary_accuracy:
0.7735
Epoch 259/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5119 - binary_accuracy:
0.7576
Epoch 260/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5018 - binary_accuracy:
0.7656
Epoch 261/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4749 - binary_accuracy:
0.7959
Epoch 262/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5088 - binary_accuracy:
0.7767
Epoch 263/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4865 - binary_accuracy:
0.7815
Epoch 264/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4871 - binary_accuracy:
0.7767
Epoch 265/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5046 - binary_accuracy:
0.7576
Epoch 266/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5118 - binary_accuracy:
```

```
0.7608
Epoch 267/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4799 - binary_accuracy:
0.7911
Epoch 268/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5300 - binary_accuracy:
0.7671
Epoch 269/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5099 - binary_accuracy:
0.7528
Epoch 270/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4764 - binary_accuracy:
0.8006
Epoch 271/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5462 - binary_accuracy:
0.7751
Epoch 272/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4851 - binary_accuracy:
0.7895
Epoch 273/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4912 - binary_accuracy:
0.7863
Epoch 274/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5160 - binary_accuracy:
0.7624
Epoch 275/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4868 - binary_accuracy:
0.7863
Epoch 276/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4831 - binary_accuracy:
0.7799
Epoch 277/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4917 - binary_accuracy:
0.7815
Epoch 278/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5086 - binary_accuracy:
0.7783
Epoch 279/1000
20/20 [==============================] - 0s 14ms/step - loss: 0.4771 - binary_accuracy:
0.7799
Epoch 280/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4826 - binary_accuracy:
0.7767
Epoch 281/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5021 - binary_accuracy:
0.7783
Epoch 282/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5670 - binary_accuracy:
0.7432
Epoch 283/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4947 - binary_accuracy:
0.7783
Epoch 284/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4942 - binary_accuracy:
0.7671
Epoch 285/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5045 - binary_accuracy:
0.7719
Epoch 286/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4676 - binary_accuracy:
0.7911
Epoch 287/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4801 - binary_accuracy:
0.7943
Epoch 288/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4950 - binary_accuracy:
```

```
0.7687
Epoch 289/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5233 - binary_accuracy:
0.7512
Epoch 290/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4873 - binary_accuracy:
0.7719
Epoch 291/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4904 - binary_accuracy:
0.7735
Epoch 292/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4800 - binary_accuracy:
0.7863
Epoch 293/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5075 - binary_accuracy:
0.7640
Epoch 294/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4705 - binary_accuracy:
0.7799
Epoch 295/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4687 - binary_accuracy:
0.8038
Epoch 296/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4926 - binary_accuracy:
0.7703
Epoch 297/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.6041 - binary_accuracy:
0.7209
Epoch 298/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.5381 - binary_accuracy:
0.7257
Epoch 299/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5090 - binary_accuracy:
0.7703
Epoch 300/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4994 - binary_accuracy:
0.7751
Epoch 301/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4802 - binary_accuracy:
0.7895
Epoch 302/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5304 - binary_accuracy:
0.7544
Epoch 303/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4723 - binary_accuracy:
0.7895
Epoch 304/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4906 - binary_accuracy:
0.7751
Epoch 305/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4775 - binary_accuracy:
0.7911
Epoch 306/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4620 - binary_accuracy:
0.8022
Epoch 307/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4844 - binary_accuracy:
0.7735
Epoch 308/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4622 - binary_accuracy:
0.7959
Epoch 309/1000
20/20 [==============================] - 0s 12ms/step - loss: 0.4695 - binary_accuracy:
0.7815
Epoch 310/1000
20/20 [==============================] - 0s 13ms/step - loss: 0.4660 - binary_accuracy:
```

```
0.7847
Epoch 311/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5076 - binary_accuracy:
0.7751
Epoch 312/1000
20/20 [==============================] - 0s 12ms/step - loss: 0.5191 - binary_accuracy:
0.7624
Epoch 313/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4665 - binary_accuracy:
0.7959
Epoch 314/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4772 - binary_accuracy:
0.7799
Epoch 315/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4754 - binary_accuracy:
0.7735
Epoch 316/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4861 - binary_accuracy:
0.7895
Epoch 317/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4865 - binary_accuracy:
0.7943
Epoch 318/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4605 - binary_accuracy:
0.7974
Epoch 319/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4809 - binary_accuracy:
0.7815
Epoch 320/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4486 - binary_accuracy:
0.8086
Epoch 321/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4866 - binary_accuracy:
0.7767
Epoch 322/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4771 - binary_accuracy:
0.7895
Epoch 323/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4768 - binary_accuracy:
0.7799
Epoch 324/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4702 - binary_accuracy:
0.7799
Epoch 325/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4814 - binary_accuracy:
0.7815
Epoch 326/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4747 - binary_accuracy:
0.7863
Epoch 327/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4631 - binary_accuracy:
0.7974
Epoch 328/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4852 - binary_accuracy:
0.7783
Epoch 329/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4910 - binary_accuracy:
0.7671
Epoch 330/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4754 - binary_accuracy:
0.7767
Epoch 331/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4893 - binary_accuracy:
0.7847
Epoch 332/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5002 - binary_accuracy:
```

```
0.7735
Epoch 333/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4712 - binary_accuracy:
0.7895
Epoch 334/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4598 - binary_accuracy:
0.7895
Epoch 335/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4900 - binary_accuracy:
0.7767
Epoch 336/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4711 - binary_accuracy:
0.7927
Epoch 337/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4614 - binary_accuracy:
0.7783
Epoch 338/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4759 - binary_accuracy:
0.7879
Epoch 339/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4660 - binary_accuracy:
0.7943
Epoch 340/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4816 - binary_accuracy:
0.7735
Epoch 341/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4592 - binary_accuracy:
0.7974
Epoch 342/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4442 - binary_accuracy:
0.7895
Epoch 343/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4852 - binary_accuracy:
0.7719
Epoch 344/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4830 - binary_accuracy:
0.7879
Epoch 345/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4957 - binary_accuracy:
0.7879
Epoch 346/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4739 - binary_accuracy:
0.7990
Epoch 347/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4593 - binary_accuracy:
0.7990
Epoch 348/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4604 - binary_accuracy:
0.8150
Epoch 349/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4725 - binary_accuracy:
0.7863
Epoch 350/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5074 - binary_accuracy:
0.7624
Epoch 351/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4684 - binary_accuracy:
0.7879
Epoch 352/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4847 - binary_accuracy:
0.8006
Epoch 353/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4697 - binary_accuracy:
0.7815
Epoch 354/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4623 - binary_accuracy:
```

```
0.8006
Epoch 355/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4608 - binary_accuracy:
0.7943
Epoch 356/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4833 - binary_accuracy:
0.7959
Epoch 357/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4712 - binary_accuracy:
0.8022
Epoch 358/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4940 - binary_accuracy:
0.7863
Epoch 359/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4699 - binary_accuracy:
0.7943
Epoch 360/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4625 - binary_accuracy:
0.7879
Epoch 361/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4695 - binary_accuracy:
0.7863
Epoch 362/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4569 - binary_accuracy:
0.7974
Epoch 363/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4709 - binary_accuracy:
0.7783
Epoch 364/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4714 - binary_accuracy:
0.7703
Epoch 365/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4680 - binary_accuracy:
0.7799
Epoch 366/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4554 - binary_accuracy:
0.8054
Epoch 367/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4742 - binary_accuracy:
0.7767
Epoch 368/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4750 - binary_accuracy:
0.7943
Epoch 369/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4614 - binary_accuracy:
0.7990
Epoch 370/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4912 - binary_accuracy:
0.7847
Epoch 371/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4834 - binary_accuracy:
0.7927
Epoch 372/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4665 - binary_accuracy:
0.8006
Epoch 373/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4624 - binary_accuracy:
0.7927
Epoch 374/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4833 - binary_accuracy:
0.7783
Epoch 375/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4671 - binary_accuracy:
0.7927
Epoch 376/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4879 - binary_accuracy:
```

```
0.7767
Epoch 377/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4611 - binary_accuracy:
 0.7895
Epoch 378/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4646 - binary_accuracy:
 0.7831
Epoch 379/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4737 - binary_accuracy:
 0.7895
Epoch 380/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4436 - binary_accuracy:
 0.8086
Epoch 381/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4553 - binary_accuracy:
 0.8038
Epoch 382/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4815 - binary_accuracy:
 0.7911
Epoch 383/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4918 - binary_accuracy:
 0.7799
Epoch 384/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4519 - binary_accuracy:
 0.7911
Epoch 385/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4926 - binary_accuracy:
 0.7671
Epoch 386/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4671 - binary_accuracy:
 0.7974
Epoch 387/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4428 - binary_accuracy:
 0.7959
Epoch 388/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.5165 - binary_accuracy:
 0.7783
Epoch 389/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4716 - binary_accuracy:
 0.7990
Epoch 390/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4724 - binary_accuracy:
 0.7847
Epoch 391/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4663 - binary_accuracy:
 0.7799
Epoch 392/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4627 - binary_accuracy:
 0.8022
Epoch 393/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4612 - binary_accuracy:
 0.7990
Epoch 394/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4559 - binary_accuracy:
 0.7974
Epoch 395/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4654 - binary_accuracy:
 0.7751
Epoch 396/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4803 - binary_accuracy:
 0.7927
Epoch 397/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4366 - binary_accuracy:
 0.8070
Epoch 398/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4560 - binary_accuracy:
```

```
 0.7879
Epoch 399/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4577 - binary_accuracy:
 0.7927
Epoch 400/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4545 - binary_accuracy:
 0.7895
Epoch 401/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4669 - binary_accuracy:
 0.8070
Epoch 402/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4611 - binary_accuracy:
 0.8022
Epoch 403/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5044 - binary_accuracy:
 0.7703
Epoch 404/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4518 - binary_accuracy:
 0.7990
Epoch 405/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4597 - binary_accuracy:
 0.7879
Epoch 406/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4513 - binary_accuracy:
 0.7831
Epoch 407/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4800 - binary_accuracy:
 0.7990
Epoch 408/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4811 - binary_accuracy:
 0.7927
Epoch 409/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4640 - binary_accuracy:
 0.7799
Epoch 410/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4527 - binary_accuracy:
 0.8038
Epoch 411/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4453 - binary_accuracy:
 0.7974
Epoch 412/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4600 - binary_accuracy:
 0.7974
Epoch 413/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4604 - binary_accuracy:
 0.8038
Epoch 414/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4863 - binary_accuracy:
 0.7911
Epoch 415/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4625 - binary_accuracy:
 0.7990
Epoch 416/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4713 - binary_accuracy:
 0.8054
Epoch 417/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4525 - binary_accuracy:
 0.7959
Epoch 418/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4794 - binary_accuracy:
 0.7927
Epoch 419/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4737 - binary_accuracy:
 0.8022
Epoch 420/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4536 - binary_accuracy:
```

```
 0.8038
Epoch 421/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4550 - binary_accuracy:
 0.7974
Epoch 422/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4639 - binary_accuracy:
 0.7879
Epoch 423/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4548 - binary_accuracy:
 0.7863
Epoch 424/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4702 - binary_accuracy:
 0.7783
Epoch 425/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4548 - binary_accuracy:
 0.7974
Epoch 426/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4415 - binary_accuracy:
 0.8006
Epoch 427/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4763 - binary_accuracy:
 0.7959
Epoch 428/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4498 - binary_accuracy:
 0.7974
Epoch 429/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4770 - binary_accuracy:
 0.7959
Epoch 430/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4504 - binary_accuracy:
 0.8038
Epoch 431/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4633 - binary_accuracy:
 0.7895
Epoch 432/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4493 - binary_accuracy:
 0.7974
Epoch 433/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4712 - binary_accuracy:
 0.7927
Epoch 434/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4650 - binary_accuracy:
 0.7927
Epoch 435/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4688 - binary_accuracy:
 0.7974
Epoch 436/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4574 - binary_accuracy:
 0.8070
Epoch 437/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5029 - binary_accuracy:
 0.7831
Epoch 438/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4504 - binary_accuracy:
 0.7895
Epoch 439/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4875 - binary_accuracy:
 0.7815
Epoch 440/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4451 - binary_accuracy:
 0.8022
Epoch 441/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4699 - binary_accuracy:
 0.7767
Epoch 442/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4476 - binary_accuracy:
```

```
 0.7974
Epoch 443/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4471 - binary_accuracy:
 0.8006
Epoch 444/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4629 - binary_accuracy:
 0.7927
Epoch 445/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4481 - binary_accuracy:
 0.8070
Epoch 446/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4866 - binary_accuracy:
 0.7751
Epoch 447/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4569 - binary_accuracy:
 0.7863
Epoch 448/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4558 - binary_accuracy:
 0.8054
Epoch 449/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4650 - binary_accuracy:
 0.7974
Epoch 450/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4765 - binary_accuracy:
 0.7927
Epoch 451/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4569 - binary_accuracy:
 0.7911
Epoch 452/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4601 - binary_accuracy:
 0.8006
Epoch 453/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4525 - binary_accuracy:
 0.7959
Epoch 454/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4590 - binary_accuracy:
 0.8070
Epoch 455/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4635 - binary_accuracy:
 0.7911
Epoch 456/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4726 - binary_accuracy:
 0.7943
Epoch 457/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4538 - binary_accuracy:
 0.7974
Epoch 458/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4654 - binary_accuracy:
 0.7911
Epoch 459/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4723 - binary_accuracy:
 0.7911
Epoch 460/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4487 - binary_accuracy:
 0.8070
Epoch 461/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4630 - binary_accuracy:
 0.7895
Epoch 462/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4744 - binary_accuracy:
 0.7927
Epoch 463/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5536 - binary_accuracy:
 0.7448
Epoch 464/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5218 - binary_accuracy:
```

```
 0.7432
Epoch 465/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5025 - binary_accuracy:
 0.7480
Epoch 466/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.5140 - binary_accuracy:
 0.7624
Epoch 467/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4669 - binary_accuracy:
 0.7943
Epoch 468/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4558 - binary_accuracy:
 0.8070
Epoch 469/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4729 - binary_accuracy:
 0.7895
Epoch 470/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4901 - binary_accuracy:
 0.7911
Epoch 471/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4589 - binary_accuracy:
 0.7990
Epoch 472/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4356 - binary_accuracy:
 0.8038
Epoch 473/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4497 - binary_accuracy:
 0.7990
Epoch 474/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4491 - binary_accuracy:
 0.8054
Epoch 475/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4682 - binary_accuracy:
 0.7959
Epoch 476/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4237 - binary_accuracy:
 0.8134
Epoch 477/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4295 - binary_accuracy:
 0.8166
Epoch 478/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4480 - binary_accuracy:
 0.7911
Epoch 479/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4598 - binary_accuracy:
 0.7831
Epoch 480/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4486 - binary_accuracy:
 0.8118
Epoch 481/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4654 - binary_accuracy:
 0.7879
Epoch 482/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4514 - binary_accuracy:
 0.7943
Epoch 483/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4814 - binary_accuracy:
 0.7847
Epoch 484/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4504 - binary_accuracy:
 0.7959
Epoch 485/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4476 - binary_accuracy:
 0.7943
Epoch 486/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4417 - binary_accuracy:
```

```
 0.8022
Epoch 487/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4354 - binary_accuracy:
 0.8166
Epoch 488/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4673 - binary_accuracy:
 0.7815
Epoch 489/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4386 - binary_accuracy:
 0.8150
Epoch 490/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4884 - binary_accuracy:
 0.7863
Epoch 491/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4675 - binary_accuracy:
 0.7911
Epoch 492/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4471 - binary_accuracy:
 0.7959
Epoch 493/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4422 - binary_accuracy:
 0.8022
Epoch 494/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4316 - binary_accuracy:
 0.8086
Epoch 495/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4477 - binary_accuracy:
 0.8086
Epoch 496/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4427 - binary_accuracy:
 0.8006
Epoch 497/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4379 - binary_accuracy:
 0.8054
Epoch 498/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4447 - binary_accuracy:
 0.8022
Epoch 499/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4736 - binary_accuracy:
 0.7974
Epoch 500/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4576 - binary_accuracy:
 0.7974
Epoch 501/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4642 - binary_accuracy:
 0.8038
Epoch 502/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4662 - binary_accuracy:
 0.7990
Epoch 503/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4446 - binary_accuracy:
 0.8070
Epoch 504/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4752 - binary_accuracy:
 0.7927
Epoch 505/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4486 - binary_accuracy:
 0.8118
Epoch 506/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4363 - binary_accuracy:
 0.8006
Epoch 507/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4327 - binary_accuracy:
 0.8086
Epoch 508/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4440 - binary_accuracy:
```

```
 0.8022
Epoch 509/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4314 - binary_accuracy:
 0.8038
Epoch 510/1000
20/20 [==============================] - 0s 13ms/step - loss: 0.4676 - binary_accuracy:
 0.7831
Epoch 511/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4626 - binary_accuracy:
 0.7879
Epoch 512/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4591 - binary_accuracy:
 0.7847
Epoch 513/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4540 - binary_accuracy:
 0.7990
Epoch 514/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4332 - binary_accuracy:
 0.8118
Epoch 515/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4419 - binary_accuracy:
 0.8054
Epoch 516/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4315 - binary_accuracy:
 0.8118
Epoch 517/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4827 - binary_accuracy:
 0.7815
Epoch 518/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4539 - binary_accuracy:
 0.7927
Epoch 519/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4398 - binary_accuracy:
 0.8006
Epoch 520/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4354 - binary_accuracy:
 0.8086
Epoch 521/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4563 - binary_accuracy:
 0.8006
Epoch 522/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4473 - binary_accuracy:
 0.8118
Epoch 523/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4389 - binary_accuracy:
 0.8102
Epoch 524/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4524 - binary_accuracy:
 0.7863
Epoch 525/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4465 - binary_accuracy:
 0.8054
Epoch 526/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4544 - binary_accuracy:
 0.7927
Epoch 527/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4334 - binary_accuracy:
 0.8006
Epoch 528/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4545 - binary_accuracy:
 0.7959
Epoch 529/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4453 - binary_accuracy:
 0.8086
Epoch 530/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4639 - binary_accuracy:
```

```
 0.7959
Epoch 531/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4406 - binary_accuracy:
 0.8118
Epoch 532/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4470 - binary_accuracy:
 0.8054
Epoch 533/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4440 - binary_accuracy:
 0.8070
Epoch 534/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4258 - binary_accuracy:
 0.8198
Epoch 535/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4541 - binary_accuracy:
 0.7879
Epoch 536/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4405 - binary_accuracy:
 0.8054
Epoch 537/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4506 - binary_accuracy:
 0.7927
Epoch 538/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4597 - binary_accuracy:
 0.7943
Epoch 539/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4453 - binary_accuracy:
 0.7990
Epoch 540/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4559 - binary_accuracy:
 0.8038
Epoch 541/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4419 - binary_accuracy:
 0.8022
Epoch 542/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4291 - binary_accuracy:
 0.8166
Epoch 543/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4705 - binary_accuracy:
 0.7895
Epoch 544/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4487 - binary_accuracy:
 0.7959
Epoch 545/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4548 - binary_accuracy:
 0.7974
Epoch 546/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4298 - binary_accuracy:
 0.8150
Epoch 547/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4362 - binary_accuracy:
 0.8102
Epoch 548/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4235 - binary_accuracy:
 0.8166
Epoch 549/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4362 - binary_accuracy:
 0.8022
Epoch 550/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4784 - binary_accuracy:
 0.7895
Epoch 551/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4567 - binary_accuracy:
 0.8006
Epoch 552/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4399 - binary_accuracy:
```

```
 0.8006
Epoch 553/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4472 - binary_accuracy:
 0.7959
Epoch 554/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4445 - binary_accuracy:
 0.8134
Epoch 555/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4494 - binary_accuracy:
 0.8102
Epoch 556/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4673 - binary_accuracy:
 0.7959
Epoch 557/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4378 - binary_accuracy:
 0.8006
Epoch 558/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4165 - binary_accuracy:
 0.8118
Epoch 559/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4378 - binary_accuracy:
 0.8070
Epoch 560/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4808 - binary_accuracy:
 0.7847
Epoch 561/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4363 - binary_accuracy:
 0.8118
Epoch 562/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4601 - binary_accuracy:
 0.7911
Epoch 563/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4402 - binary_accuracy:
 0.8038
Epoch 564/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4282 - binary_accuracy:
 0.8038
Epoch 565/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4295 - binary_accuracy:
 0.8134
Epoch 566/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4614 - binary_accuracy:
 0.7895
Epoch 567/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4354 - binary_accuracy:
 0.8070
Epoch 568/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4478 - binary_accuracy:
 0.8022
Epoch 569/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4516 - binary_accuracy:
 0.7879
Epoch 570/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4243 - binary_accuracy:
 0.8070
Epoch 571/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4392 - binary_accuracy:
 0.8006
Epoch 572/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4313 - binary_accuracy:
 0.8022
Epoch 573/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4471 - binary_accuracy:
 0.7927
Epoch 574/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4676 - binary_accuracy:
```

```
 0.7959
Epoch 575/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4346 - binary_accuracy:
 0.8086
Epoch 576/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4459 - binary_accuracy:
 0.8006
Epoch 577/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4431 - binary_accuracy:
 0.7943
Epoch 578/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4626 - binary_accuracy:
 0.7911
Epoch 579/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4392 - binary_accuracy:
 0.8022
Epoch 580/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4426 - binary_accuracy:
 0.8086
Epoch 581/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4569 - binary_accuracy:
 0.8070
Epoch 582/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4467 - binary_accuracy:
 0.7911
Epoch 583/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4239 - binary_accuracy:
 0.8086
Epoch 584/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4545 - binary_accuracy:
 0.7990
Epoch 585/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4157 - binary_accuracy:
 0.8118
Epoch 586/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4377 - binary_accuracy:
 0.8006
Epoch 587/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4591 - binary_accuracy:
 0.8006
Epoch 588/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4455 - binary_accuracy:
 0.7927
Epoch 589/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4356 - binary_accuracy:
 0.8086
Epoch 590/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4724 - binary_accuracy:
 0.7863
Epoch 591/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4445 - binary_accuracy:
 0.7974
Epoch 592/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4203 - binary_accuracy:
 0.8102
Epoch 593/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4311 - binary_accuracy:
 0.8038
Epoch 594/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4517 - binary_accuracy:
 0.8102
Epoch 595/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4241 - binary_accuracy:
 0.8134
Epoch 596/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4530 - binary_accuracy:
```

```
 0.7863
Epoch 597/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4255 - binary_accuracy:
 0.8198
Epoch 598/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4424 - binary_accuracy:
 0.8102
Epoch 599/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4471 - binary_accuracy:
 0.7959
Epoch 600/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4254 - binary_accuracy:
 0.7943
Epoch 601/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4444 - binary_accuracy:
 0.8102
Epoch 602/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4377 - binary_accuracy:
 0.8166
Epoch 603/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4424 - binary_accuracy:
 0.8102
Epoch 604/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4706 - binary_accuracy:
 0.7767
Epoch 605/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4495 - binary_accuracy:
 0.8070
Epoch 606/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4311 - binary_accuracy:
 0.8134
Epoch 607/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4174 - binary_accuracy:
 0.8134
Epoch 608/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4558 - binary_accuracy:
 0.7847
Epoch 609/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4786 - binary_accuracy:
 0.7863
Epoch 610/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4347 - binary_accuracy:
 0.7927
Epoch 611/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4325 - binary_accuracy:
 0.8086
Epoch 612/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4534 - binary_accuracy:
 0.8070
Epoch 613/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4432 - binary_accuracy:
 0.7959
Epoch 614/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4434 - binary_accuracy:
 0.7943
Epoch 615/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4459 - binary_accuracy:
 0.8070
Epoch 616/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4156 - binary_accuracy:
 0.8102
Epoch 617/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4721 - binary_accuracy:
 0.7863
Epoch 618/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4509 - binary_accuracy:
```

```
 0.8006
Epoch 619/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4343 - binary_accuracy:
 0.8118
Epoch 620/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4469 - binary_accuracy:
 0.7959
Epoch 621/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4293 - binary_accuracy:
 0.8150
Epoch 622/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4338 - binary_accuracy:
 0.8118
Epoch 623/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4343 - binary_accuracy:
 0.8086
Epoch 624/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4263 - binary_accuracy:
 0.8086
Epoch 625/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4510 - binary_accuracy:
 0.8086
Epoch 626/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4204 - binary_accuracy:
 0.8118
Epoch 627/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4702 - binary_accuracy:
 0.7831
Epoch 628/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4246 - binary_accuracy:
 0.8022
Epoch 629/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4591 - binary_accuracy:
 0.8038
Epoch 630/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4639 - binary_accuracy:
 0.7879
Epoch 631/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4221 - binary_accuracy:
 0.8086
Epoch 632/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4689 - binary_accuracy:
 0.7879
Epoch 633/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4487 - binary_accuracy:
 0.7927
Epoch 634/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4533 - binary_accuracy:
 0.7927
Epoch 635/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4384 - binary_accuracy:
 0.8022
Epoch 636/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4320 - binary_accuracy:
 0.8070
Epoch 637/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4582 - binary_accuracy:
 0.8006
Epoch 638/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4343 - binary_accuracy:
 0.8006
Epoch 639/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4279 - binary_accuracy:
 0.8150
Epoch 640/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4403 - binary_accuracy:
```

```
 0.8070
Epoch 641/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4264 - binary_accuracy:
 0.8054
Epoch 642/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4240 - binary_accuracy:
 0.8118
Epoch 643/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4451 - binary_accuracy:
 0.7974
Epoch 644/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4481 - binary_accuracy:
 0.7831
Epoch 645/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4341 - binary_accuracy:
 0.8038
Epoch 646/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4395 - binary_accuracy:
 0.8118
Epoch 647/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4507 - binary_accuracy:
 0.8086
Epoch 648/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4428 - binary_accuracy:
 0.7927
Epoch 649/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4409 - binary_accuracy:
 0.8102
Epoch 650/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4342 - binary_accuracy:
 0.8086
Epoch 651/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4474 - binary_accuracy:
 0.8054
Epoch 652/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4452 - binary_accuracy:
 0.8054
Epoch 653/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4246 - binary_accuracy:
 0.8150
Epoch 654/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4308 - binary_accuracy:
 0.7974
Epoch 655/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4341 - binary_accuracy:
 0.8102
Epoch 656/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4386 - binary_accuracy:
 0.8102
Epoch 657/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4347 - binary_accuracy:
 0.8006
Epoch 658/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4380 - binary_accuracy:
 0.7927
Epoch 659/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4634 - binary_accuracy:
 0.7911
Epoch 660/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4484 - binary_accuracy:
 0.8086
Epoch 661/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.5535 - binary_accuracy:
 0.7576
Epoch 662/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4750 - binary_accuracy:
```

```
 0.7927
Epoch 663/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4605 - binary_accuracy:
 0.7990
Epoch 664/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4378 - binary_accuracy:
 0.8086
Epoch 665/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4613 - binary_accuracy:
 0.8006
Epoch 666/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4352 - binary_accuracy:
 0.8022
Epoch 667/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4409 - binary_accuracy:
 0.8022
Epoch 668/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4381 - binary_accuracy:
 0.8166
Epoch 669/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4668 - binary_accuracy:
 0.8022
Epoch 670/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4598 - binary_accuracy:
 0.8038
Epoch 671/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4499 - binary_accuracy:
 0.8006
Epoch 672/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4256 - binary_accuracy:
 0.7974
Epoch 673/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4582 - binary_accuracy:
 0.8022
Epoch 674/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4212 - binary_accuracy:
 0.8134
Epoch 675/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4382 - binary_accuracy:
 0.8070
Epoch 676/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4400 - binary_accuracy:
 0.8070
Epoch 677/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4536 - binary_accuracy:
 0.7959
Epoch 678/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4255 - binary_accuracy:
 0.8054
Epoch 679/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4166 - binary_accuracy:
 0.8038
Epoch 680/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4237 - binary_accuracy:
 0.8022
Epoch 681/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4449 - binary_accuracy:
 0.8006
Epoch 682/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4314 - binary_accuracy:
 0.8166
Epoch 683/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4590 - binary_accuracy:
 0.8054
Epoch 684/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4190 - binary_accuracy:
```

```
 0.8166
Epoch 685/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4336 - binary_accuracy:
 0.8150
Epoch 686/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4333 - binary_accuracy:
 0.7990
Epoch 687/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4243 - binary_accuracy:
 0.8182
Epoch 688/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4256 - binary_accuracy:
 0.7990
Epoch 689/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4153 - binary_accuracy:
 0.8214
Epoch 690/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4447 - binary_accuracy:
 0.8038
Epoch 691/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4423 - binary_accuracy:
 0.8038
Epoch 692/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4276 - binary_accuracy:
 0.8070
Epoch 693/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4232 - binary_accuracy:
 0.8102
Epoch 694/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4416 - binary_accuracy:
 0.8038
Epoch 695/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4295 - binary_accuracy:
 0.8166
Epoch 696/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4251 - binary_accuracy:
 0.8022
Epoch 697/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4333 - binary_accuracy:
 0.7974
Epoch 698/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4391 - binary_accuracy:
 0.8022
Epoch 699/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4387 - binary_accuracy:
 0.8102
Epoch 700/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4152 - binary_accuracy:
 0.8150
Epoch 701/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4296 - binary_accuracy:
 0.7959
Epoch 702/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4441 - binary_accuracy:
 0.8038
Epoch 703/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4259 - binary_accuracy:
 0.8198
Epoch 704/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4393 - binary_accuracy:
 0.8086
Epoch 705/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4189 - binary_accuracy:
 0.8054
Epoch 706/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4368 - binary_accuracy:
```

```
 0.8054
Epoch 707/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4553 - binary_accuracy:
 0.8022
Epoch 708/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4438 - binary_accuracy:
 0.8118
Epoch 709/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4437 - binary_accuracy:
 0.7911
Epoch 710/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4246 - binary_accuracy:
 0.8054
Epoch 711/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4615 - binary_accuracy:
 0.8006
Epoch 712/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4410 - binary_accuracy:
 0.8086
Epoch 713/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4281 - binary_accuracy:
 0.8086
Epoch 714/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4380 - binary_accuracy:
 0.8134
Epoch 715/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4340 - binary_accuracy:
 0.8006
Epoch 716/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4339 - binary_accuracy:
 0.8166
Epoch 717/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4388 - binary_accuracy:
 0.8150
Epoch 718/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4296 - binary_accuracy:
 0.7990
Epoch 719/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4151 - binary_accuracy:
 0.8230
Epoch 720/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4331 - binary_accuracy:
 0.8166
Epoch 721/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4557 - binary_accuracy:
 0.7911
Epoch 722/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4177 - binary_accuracy:
 0.8182
Epoch 723/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4575 - binary_accuracy:
 0.8070
Epoch 724/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4369 - binary_accuracy:
 0.8054
Epoch 725/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4349 - binary_accuracy:
 0.8150
Epoch 726/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4516 - binary_accuracy:
 0.7990
Epoch 727/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4218 - binary_accuracy:
 0.8054
Epoch 728/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4578 - binary_accuracy:
```

```
 0.7990
Epoch 729/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4265 - binary_accuracy:
 0.8086
Epoch 730/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4160 - binary_accuracy:
 0.8118
Epoch 731/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4311 - binary_accuracy:
 0.8006
Epoch 732/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4161 - binary_accuracy:
 0.8214
Epoch 733/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4468 - binary_accuracy:
 0.8198
Epoch 734/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4453 - binary_accuracy:
 0.7911
Epoch 735/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4430 - binary_accuracy:
 0.7990
Epoch 736/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4251 - binary_accuracy:
 0.8198
Epoch 737/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4438 - binary_accuracy:
 0.7974
Epoch 738/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4279 - binary_accuracy:
 0.8150
Epoch 739/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4403 - binary_accuracy:
 0.8070
Epoch 740/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4234 - binary_accuracy:
 0.8230
Epoch 741/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4265 - binary_accuracy:
 0.8054
Epoch 742/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4312 - binary_accuracy:
 0.8070
Epoch 743/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4272 - binary_accuracy:
 0.8118
Epoch 744/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4479 - binary_accuracy:
 0.8006
Epoch 745/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4372 - binary_accuracy:
 0.8054
Epoch 746/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4299 - binary_accuracy:
 0.7990
Epoch 747/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4360 - binary_accuracy:
 0.8054
Epoch 748/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4294 - binary_accuracy:
 0.8006
Epoch 749/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4540 - binary_accuracy:
 0.8038
Epoch 750/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4350 - binary_accuracy:
```

```
 0.8070
Epoch 751/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4644 - binary_accuracy:
 0.8054
Epoch 752/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4234 - binary_accuracy:
 0.8166
Epoch 753/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4247 - binary_accuracy:
 0.8102
Epoch 754/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4629 - binary_accuracy:
 0.7879
Epoch 755/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4402 - binary_accuracy:
 0.8070
Epoch 756/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4470 - binary_accuracy:
 0.7959
Epoch 757/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4206 - binary_accuracy:
 0.8150
Epoch 758/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4540 - binary_accuracy:
 0.8006
Epoch 759/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4494 - binary_accuracy:
 0.8006
Epoch 760/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4152 - binary_accuracy:
 0.8214
Epoch 761/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4575 - binary_accuracy:
 0.8022
Epoch 762/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4378 - binary_accuracy:
 0.8102
Epoch 763/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4268 - binary_accuracy:
 0.8070
Epoch 764/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4320 - binary_accuracy:
 0.7974
Epoch 765/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4402 - binary_accuracy:
 0.8070
Epoch 766/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4299 - binary_accuracy:
 0.8246
Epoch 767/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4291 - binary_accuracy:
 0.8198
Epoch 768/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4277 - binary_accuracy:
 0.8150
Epoch 769/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4388 - binary_accuracy:
 0.7990
Epoch 770/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4169 - binary_accuracy:
 0.8166
Epoch 771/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4599 - binary_accuracy:
 0.7863
Epoch 772/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4072 - binary_accuracy:
```

```
 0.8262
Epoch 773/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4378 - binary_accuracy:
 0.8118
Epoch 774/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4298 - binary_accuracy:
 0.8246
Epoch 775/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4227 - binary_accuracy:
 0.8150
Epoch 776/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4330 - binary_accuracy:
 0.8150
Epoch 777/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4284 - binary_accuracy:
 0.8038
Epoch 778/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4392 - binary_accuracy:
 0.7911
Epoch 779/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4350 - binary_accuracy:
 0.8006
Epoch 780/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4436 - binary_accuracy:
 0.8038
Epoch 781/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4537 - binary_accuracy:
 0.7990
Epoch 782/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4362 - binary_accuracy:
 0.8102
Epoch 783/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4363 - binary_accuracy:
 0.8006
Epoch 784/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4387 - binary_accuracy:
 0.8054
Epoch 785/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4288 - binary_accuracy:
 0.8166
Epoch 786/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4308 - binary_accuracy:
 0.8070
Epoch 787/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4304 - binary_accuracy:
 0.8102
Epoch 788/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4157 - binary_accuracy:
 0.8102
Epoch 789/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4274 - binary_accuracy:
 0.8086
Epoch 790/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4245 - binary_accuracy:
 0.8278
Epoch 791/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4277 - binary_accuracy:
 0.8070
Epoch 792/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4307 - binary_accuracy:
 0.8022
Epoch 793/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4405 - binary_accuracy:
 0.8054
Epoch 794/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4305 - binary_accuracy:
```

```
 0.8118
Epoch 795/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4314 - binary_accuracy:
 0.8006
Epoch 796/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4417 - binary_accuracy:
 0.7959
Epoch 797/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4300 - binary_accuracy:
 0.8198
Epoch 798/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4510 - binary_accuracy:
 0.8022
Epoch 799/1000
20/20 [==============================] - 0s 14ms/step - loss: 0.4282 - binary_accuracy:
 0.8309
Epoch 800/1000
20/20 [==============================] - 0s 17ms/step - loss: 0.4311 - binary_accuracy:
 0.8102
Epoch 801/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4417 - binary_accuracy:
 0.7990
Epoch 802/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4291 - binary_accuracy:
 0.8102
Epoch 803/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4183 - binary_accuracy:
 0.8118
Epoch 804/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4200 - binary_accuracy:
 0.8198
Epoch 805/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4393 - binary_accuracy:
 0.8022
Epoch 806/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4408 - binary_accuracy:
 0.8070
Epoch 807/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4632 - binary_accuracy:
 0.7927
Epoch 808/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4204 - binary_accuracy:
 0.8198
Epoch 809/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4590 - binary_accuracy:
 0.7974
Epoch 810/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4352 - binary_accuracy:
 0.8086
Epoch 811/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4392 - binary_accuracy:
 0.8054
Epoch 812/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4607 - binary_accuracy:
 0.8022
Epoch 813/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4195 - binary_accuracy:
 0.8086
Epoch 814/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4230 - binary_accuracy:
 0.8150
Epoch 815/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4311 - binary_accuracy:
 0.8118
Epoch 816/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4216 - binary_accuracy:
```

```
 0.8214
Epoch 817/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4228 - binary_accuracy:
 0.8150
Epoch 818/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4285 - binary_accuracy:
 0.8166
Epoch 819/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4308 - binary_accuracy:
 0.8118
Epoch 820/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4144 - binary_accuracy:
 0.8070
Epoch 821/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4391 - binary_accuracy:
 0.7895
Epoch 822/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4486 - binary_accuracy:
 0.7974
Epoch 823/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4134 - binary_accuracy:
 0.8134
Epoch 824/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4431 - binary_accuracy:
 0.7927
Epoch 825/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4106 - binary_accuracy:
 0.8182
Epoch 826/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4224 - binary_accuracy:
 0.8086
Epoch 827/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4250 - binary_accuracy:
 0.8070
Epoch 828/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4283 - binary_accuracy:
 0.8150
Epoch 829/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4340 - binary_accuracy:
 0.8150
Epoch 830/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4307 - binary_accuracy:
 0.8006
Epoch 831/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4222 - binary_accuracy:
 0.8038
Epoch 832/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4090 - binary_accuracy:
 0.8214
Epoch 833/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4250 - binary_accuracy:
 0.8118
Epoch 834/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4161 - binary_accuracy:
 0.8102
Epoch 835/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4260 - binary_accuracy:
 0.8054
Epoch 836/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4280 - binary_accuracy:
 0.8262
Epoch 837/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4277 - binary_accuracy:
 0.8214
Epoch 838/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4344 - binary_accuracy:
```

```
 0.8166
Epoch 839/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4236 - binary_accuracy:
 0.8150
Epoch 840/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4291 - binary_accuracy:
 0.8086
Epoch 841/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4405 - binary_accuracy:
 0.8102
Epoch 842/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4207 - binary_accuracy:
 0.8086
Epoch 843/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4157 - binary_accuracy:
 0.8198
Epoch 844/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4151 - binary_accuracy:
 0.8118
Epoch 845/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4338 - binary_accuracy:
 0.8086
Epoch 846/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4543 - binary_accuracy:
 0.7911
Epoch 847/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4124 - binary_accuracy:
 0.8182
Epoch 848/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4303 - binary_accuracy:
 0.8086
Epoch 849/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4142 - binary_accuracy:
 0.8214
Epoch 850/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4197 - binary_accuracy:
 0.8054
Epoch 851/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4190 - binary_accuracy:
 0.8134
Epoch 852/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4329 - binary_accuracy:
 0.8102
Epoch 853/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4285 - binary_accuracy:
 0.8214
Epoch 854/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4279 - binary_accuracy:
 0.8150
Epoch 855/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4162 - binary_accuracy:
 0.8230
Epoch 856/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4205 - binary_accuracy:
 0.8166
Epoch 857/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4165 - binary_accuracy:
 0.8182
Epoch 858/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4168 - binary_accuracy:
 0.8134
Epoch 859/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4815 - binary_accuracy:
 0.7974
Epoch 860/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4314 - binary_accuracy:
```

```
 0.7974
Epoch 861/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4356 - binary_accuracy:
 0.8166
Epoch 862/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4329 - binary_accuracy:
 0.8102
Epoch 863/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4287 - binary_accuracy:
 0.8118
Epoch 864/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4031 - binary_accuracy:
 0.8182
Epoch 865/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4256 - binary_accuracy:
 0.8198
Epoch 866/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4753 - binary_accuracy:
 0.7879
Epoch 867/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4285 - binary_accuracy:
 0.8118
Epoch 868/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4174 - binary_accuracy:
 0.8134
Epoch 869/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4288 - binary_accuracy:
 0.8262
Epoch 870/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4230 - binary_accuracy:
 0.8198
Epoch 871/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4201 - binary_accuracy:
 0.8198
Epoch 872/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4644 - binary_accuracy:
 0.7911
Epoch 873/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4387 - binary_accuracy:
 0.8134
Epoch 874/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4380 - binary_accuracy:
 0.8070
Epoch 875/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4101 - binary_accuracy:
 0.8134
Epoch 876/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4443 - binary_accuracy:
 0.8054
Epoch 877/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4128 - binary_accuracy:
 0.8230
Epoch 878/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4328 - binary_accuracy:
 0.8038
Epoch 879/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4161 - binary_accuracy:
 0.8118
Epoch 880/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4150 - binary_accuracy:
 0.8214
Epoch 881/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4199 - binary_accuracy:
 0.8150
Epoch 882/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4140 - binary_accuracy:
```

```
 0.8118
Epoch 883/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4303 - binary_accuracy:
 0.8182
Epoch 884/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4074 - binary_accuracy:
 0.8214
Epoch 885/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4222 - binary_accuracy:
 0.8182
Epoch 886/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4068 - binary_accuracy:
 0.8182
Epoch 887/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4684 - binary_accuracy:
 0.7959
Epoch 888/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4254 - binary_accuracy:
 0.8022
Epoch 889/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4151 - binary_accuracy:
 0.8134
Epoch 890/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4062 - binary_accuracy:
 0.8262
Epoch 891/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4307 - binary_accuracy:
 0.7990
Epoch 892/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4132 - binary_accuracy:
 0.8198
Epoch 893/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4198 - binary_accuracy:
 0.8246
Epoch 894/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4213 - binary_accuracy:
 0.8102
Epoch 895/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4289 - binary_accuracy:
 0.8198
Epoch 896/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4223 - binary_accuracy:
 0.8070
Epoch 897/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4372 - binary_accuracy:
 0.8054
Epoch 898/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4043 - binary_accuracy:
 0.8182
Epoch 899/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4310 - binary_accuracy:
 0.8182
Epoch 900/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4186 - binary_accuracy:
 0.8086
Epoch 901/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4399 - binary_accuracy:
 0.8006
Epoch 902/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4455 - binary_accuracy:
 0.8102
Epoch 903/1000
20/20 [==============================] - 0s 12ms/step - loss: 0.4658 - binary_accuracy:
 0.7974
Epoch 904/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4375 - binary_accuracy:
```

```
 0.8054
Epoch 905/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4322 - binary_accuracy:
 0.8070
Epoch 906/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4130 - binary_accuracy:
 0.8166
Epoch 907/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4242 - binary_accuracy:
 0.7990
Epoch 908/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4243 - binary_accuracy:
 0.8150
Epoch 909/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4236 - binary_accuracy:
 0.8086
Epoch 910/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4545 - binary_accuracy:
 0.7895
Epoch 911/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4331 - binary_accuracy:
 0.8214
Epoch 912/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4183 - binary_accuracy:
 0.8198
Epoch 913/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4575 - binary_accuracy:
 0.7943
Epoch 914/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4438 - binary_accuracy:
 0.7863
Epoch 915/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4376 - binary_accuracy:
 0.8118
Epoch 916/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4273 - binary_accuracy:
 0.8150
Epoch 917/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4335 - binary_accuracy:
 0.8166
Epoch 918/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4144 - binary_accuracy:
 0.8134
Epoch 919/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4146 - binary_accuracy:
 0.8246
Epoch 920/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.3963 - binary_accuracy:
 0.8134
Epoch 921/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4270 - binary_accuracy:
 0.8102
Epoch 922/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4138 - binary_accuracy:
 0.8134
Epoch 923/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4239 - binary_accuracy:
 0.8118
Epoch 924/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4245 - binary_accuracy:
 0.8102
Epoch 925/1000
20/20 [==============================] - 0s 8ms/step - loss: 0.4260 - binary_accuracy:
 0.8118
Epoch 926/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4231 - binary_accuracy:
```

```
 0.8198
Epoch 927/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4217 - binary_accuracy:
 0.8038
Epoch 928/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4157 - binary_accuracy:
 0.8134
Epoch 929/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4214 - binary_accuracy:
 0.8278
Epoch 930/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4230 - binary_accuracy:
 0.8038
Epoch 931/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4123 - binary_accuracy:
 0.8182
Epoch 932/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4117 - binary_accuracy:
 0.8118
Epoch 933/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4411 - binary_accuracy:
 0.8086
Epoch 934/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4248 - binary_accuracy:
 0.8006
Epoch 935/1000
20/20 [==============================] - 0s 12ms/step - loss: 0.4092 - binary_accuracy:
 0.8134
Epoch 936/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.3984 - binary_accuracy:
 0.8373
Epoch 937/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4214 - binary_accuracy:
 0.8086
Epoch 938/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4067 - binary_accuracy:
 0.8198
Epoch 939/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4119 - binary_accuracy:
 0.8214
Epoch 940/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4393 - binary_accuracy:
 0.8102
Epoch 941/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4373 - binary_accuracy:
 0.8070
Epoch 942/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4053 - binary_accuracy:
 0.8214
Epoch 943/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4620 - binary_accuracy:
 0.7974
Epoch 944/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4050 - binary_accuracy:
 0.8198
Epoch 945/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4213 - binary_accuracy:
 0.8134
Epoch 946/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4333 - binary_accuracy:
 0.8006
Epoch 947/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4110 - binary_accuracy:
 0.8214
Epoch 948/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4069 - binary_accuracy:
```

```
 0.8293
Epoch 949/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4138 - binary_accuracy:
 0.8214
Epoch 950/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4342 - binary_accuracy:
 0.8118
Epoch 951/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4051 - binary_accuracy:
 0.8198
Epoch 952/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4254 - binary_accuracy:
 0.8246
Epoch 953/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4118 - binary_accuracy:
 0.8166
Epoch 954/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4276 - binary_accuracy:
 0.8070
Epoch 955/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4125 - binary_accuracy:
 0.8102
Epoch 956/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4215 - binary_accuracy:
 0.8086
Epoch 957/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4338 - binary_accuracy:
 0.8006
Epoch 958/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4291 - binary_accuracy:
 0.8086
Epoch 959/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4217 - binary_accuracy:
 0.8214
Epoch 960/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4161 - binary_accuracy:
 0.8070
Epoch 961/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4229 - binary_accuracy:
 0.8102
Epoch 962/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4448 - binary_accuracy:
 0.8150
Epoch 963/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4331 - binary_accuracy:
 0.8086
Epoch 964/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4217 - binary_accuracy:
 0.8102
Epoch 965/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4178 - binary_accuracy:
 0.8182
Epoch 966/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4148 - binary_accuracy:
 0.8118
Epoch 967/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4200 - binary_accuracy:
 0.8102
Epoch 968/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4311 - binary_accuracy:
 0.8118
Epoch 969/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4279 - binary_accuracy:
 0.7974
Epoch 970/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4269 - binary_accuracy:
```

```
 0.8150
Epoch 971/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4214 - binary_accuracy:
 0.8150
Epoch 972/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4091 - binary_accuracy:
 0.8214
Epoch 973/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4169 - binary_accuracy:
 0.8022
Epoch 974/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4202 - binary_accuracy:
 0.8150
Epoch 975/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4270 - binary_accuracy:
 0.8038
Epoch 976/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4322 - binary_accuracy:
 0.8070
Epoch 977/1000
20/20 [==============================] - 0s 11ms/step - loss: 0.4113 - binary_accuracy:
 0.8166
Epoch 978/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4094 - binary_accuracy:
 0.8134
Epoch 979/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4225 - binary_accuracy:
 0.8182
Epoch 980/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4121 - binary_accuracy:
 0.8278
Epoch 981/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4307 - binary_accuracy:
 0.8198
Epoch 982/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4080 - binary_accuracy:
 0.8150
Epoch 983/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4257 - binary_accuracy:
 0.8150
Epoch 984/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4549 - binary_accuracy:
 0.8054
Epoch 985/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4380 - binary_accuracy:
 0.8166
Epoch 986/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4315 - binary_accuracy:
 0.8166
Epoch 987/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4169 - binary_accuracy:
 0.8150
Epoch 988/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4216 - binary_accuracy:
 0.8134
Epoch 989/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4349 - binary_accuracy:
 0.8134
Epoch 990/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4156 - binary_accuracy:
 0.8150
Epoch 991/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4146 - binary_accuracy:
 0.8102
Epoch 992/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4018 - binary_accuracy:
```

```
 0.8214
Epoch 993/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4167 - binary_accuracy:
 0.8134
Epoch 994/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4150 - binary_accuracy:
 0.8102
Epoch 995/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.4254 - binary_accuracy:
 0.8118
Epoch 996/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4325 - binary_accuracy:
 0.8150
Epoch 997/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4047 - binary_accuracy:
 0.8134
Epoch 998/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4127 - binary_accuracy:
 0.8150
Epoch 999/1000
20/20 [==============================] - 0s 10ms/step - loss: 0.3999 - binary_accuracy:
 0.8198
Epoch 1000/1000
20/20 [==============================] - 0s 9ms/step - loss: 0.4072 - binary_accuracy:
 0.8278
```

Out[15]:
```
<keras.callbacks.History at 0x155a0f250>
```

In [25]:
```
# 모델 평가하기
model.predict(test_dataset)
```

Out[25]:
```
array([[2.60473400e-01],
       [6.75309062e-01],
       [1.04401380e-01],
       [2.50850320e-01],
       [5.20708025e-01],
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       [8.56431127e-02],
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       [9.22640562e-02],
       [1.38402800e-03],
       [1.11529566e-01],
       [1.28538430e-01],
       [7.74761587e-02],
       [6.14254177e-02],
       [4.30676401e-01],
       [7.22485632e-02],
       [8.81086215e-02],
       [9.81070638e-01],
       [9.77286920e-02],
       [1.44205049e-01],
       [3.65358144e-01],
       [1.82940528e-01],
       [9.09213871e-02],
       [3.66293639e-01],
       [2.58289844e-01],
       [9.85048592e-01],
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       [1.62650406e-01],
       [1.28505141e-01],
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[8.60949457e-02],
[4.08979118e-01],
[1.20889775e-01],
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[1.87966768e-02],
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[2.44328886e-01],
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[6.56010389e-01],
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[8.90754759e-01],
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[1.37613758e-01],
[8.36816877e-02],
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[7.91538835e-01],
[1.05756670e-01],
[8.84176567e-02],
[9.36352685e-02],
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[9.83653188e-01],
[9.79833663e-01],
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[8.37910175e-02],
[5.69354892e-01],
[7.65240610e-01],
[3.95587415e-01],
[3.97093624e-01],
[2.03726202e-01],
[9.51316133e-02],
[1.12856194e-01],
[9.85439181e-01],
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