Keras_assignment

February 22, 2019

1 Classify different data sets

1.0.1 Basic includes

In [1]:
```
# Using pandas to load the csv file
import pandas as pd

import numpy as np
import matplotlib.pyplot as plt

from keras import models
from keras import layers
from keras import callbacks
from keras.utils import to_categorical

# reuters and fashin mnist data set from keras
from keras.datasets import reuters
from keras.datasets import fashion_mnist

# needed to preprocess text
from keras.preprocessing.text import Tokenizer
```

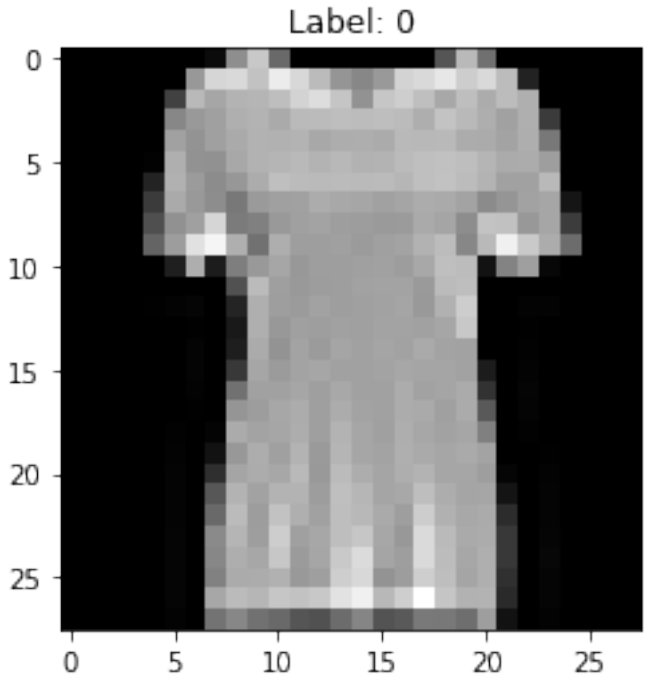
```
Using TensorFlow backend.
```

1.0.2 Classify the Fashion Mnist

In [5]:
```
(fashion_train_data, fashion_train_labels), (fashion_test_data, fashion_test_labels) =

print(fashion_train_data.shape)

test_index = 10

plt.title("Label: " + str(fashion_train_labels[test_index]))
plt.imshow(fashion_train_data[test_index], cmap="gray")
```

```
(60000, 28, 28)
```

```
Out[5]: <matplotlib.image.AxesImage at 0x141ec3908>
```



TO DO: Preprocess the data

1. Normalize the input data set
2. Perform one hot encoding
3. Create a train, test, and validation set

```
In [6]: fashion_train_data = fashion_train_data.reshape((60000, 28 * 28))
        fashion_train_data = fashion_train_data.astype('float32') / 255

        fashion_validation_data = fashion_train_data[:10000]
        fashion_train_data = fashion_train_data[10000:]

        fashion_train_labels = to_categorical(fashion_train_labels)

        fashion_validation_labels = fashion_train_labels[:10000]
        fashion_train_labels = fashion_train_labels[10000:]

        fashion_test_data = fashion_test_data.reshape((10000, 28 * 28))
        fashion_test_data = fashion_test_data.astype('float32') / 255

        fashion_test_labels = to_categorical(fashion_test_labels)
```

TO DO: Define and train a network, then plot the accuracy of the training, validation, and testing

1. Use a validation set
2. Propose and train a network
3. Print the history of the training
4. Evaluate with a test set

In [195]:
```
network = models.Sequential()

network.add(layers.Dense(1024, activation='relu', input_shape=(784,)))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(512, activation='relu'))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(256, activation='relu'))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(128, activation='relu'))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(64, activation='relu'))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(10, activation='softmax'))

early_stop = callbacks.EarlyStopping(monitor="val_loss", patience=5)

network.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy

fit_data = network.fit(
    fashion_train_data,
    fashion_train_labels,
    batch_size=1000,
    epochs=35,
    callbacks=[early_stop],
    validation_data=(fashion_validation_data, fashion_validation_labels)
)

print("Evaluation: ", network.evaluate(fashion_test_data, fashion_test_labels))
```

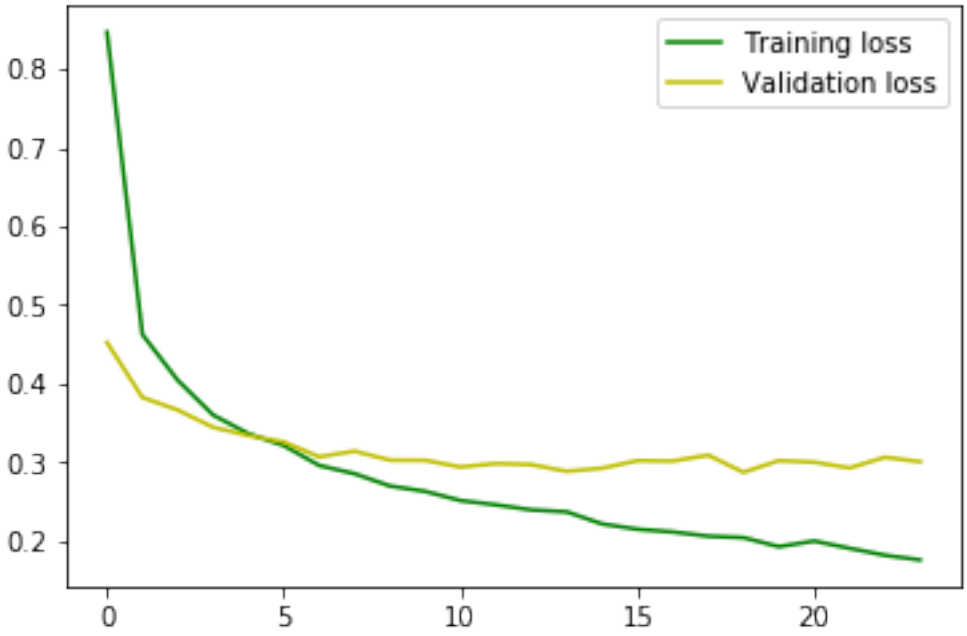
```
Train on 50000 samples, validate on 10000 samples
Epoch 1/35
50000/50000 [==============================] - 15s 290us/step - loss: 0.8469 - acc: 0.6972 - va
Epoch 2/35
50000/50000 [==============================] - 11s 210us/step - loss: 0.4624 - acc: 0.8384 - va
Epoch 3/35
50000/50000 [==============================] - 11s 227us/step - loss: 0.4042 - acc: 0.8562 - va
Epoch 4/35
50000/50000 [==============================] - 11s 217us/step - loss: 0.3600 - acc: 0.8709 - va
Epoch 5/35
50000/50000 [==============================] - 12s 232us/step - loss: 0.3362 - acc: 0.8796 - va
Epoch 6/35
```

```
50000/50000 [==============================] - 12s 230us/step - loss: 0.3212 - acc: 0.8828 - va
Epoch 7/35
50000/50000 [==============================] - 13s 262us/step - loss: 0.2959 - acc: 0.8930 - va
Epoch 8/35
50000/50000 [==============================] - 15s 303us/step - loss: 0.2854 - acc: 0.8937 - va
Epoch 9/35
50000/50000 [==============================] - 12s 231us/step - loss: 0.2698 - acc: 0.9014 - va
Epoch 10/35
50000/50000 [==============================] - 11s 212us/step - loss: 0.2629 - acc: 0.9034 - va
Epoch 11/35
50000/50000 [==============================] - 11s 212us/step - loss: 0.2512 - acc: 0.9079 - va
Epoch 12/35
50000/50000 [==============================] - 11s 225us/step - loss: 0.2458 - acc: 0.9079 - va
Epoch 13/35
50000/50000 [==============================] - 11s 220us/step - loss: 0.2394 - acc: 0.9118 - va
Epoch 14/35
50000/50000 [==============================] - 11s 211us/step - loss: 0.2369 - acc: 0.9111 - va
Epoch 15/35
50000/50000 [==============================] - 12s 250us/step - loss: 0.2216 - acc: 0.9174 - va
Epoch 16/35
50000/50000 [==============================] - 12s 244us/step - loss: 0.2148 - acc: 0.9202 - va
Epoch 17/35
50000/50000 [==============================] - 12s 231us/step - loss: 0.2114 - acc: 0.9207 - va
Epoch 18/35
50000/50000 [==============================] - 11s 218us/step - loss: 0.2060 - acc: 0.9233 - va
Epoch 19/35
50000/50000 [==============================] - 11s 218us/step - loss: 0.2041 - acc: 0.9244 - va
Epoch 20/35
50000/50000 [==============================] - 11s 227us/step - loss: 0.1927 - acc: 0.9276 - va
Epoch 21/35
50000/50000 [==============================] - 12s 245us/step - loss: 0.1998 - acc: 0.9254 - va
Epoch 22/35
50000/50000 [==============================] - 11s 224us/step - loss: 0.1906 - acc: 0.9279 - va
Epoch 23/35
50000/50000 [==============================] - 11s 227us/step - loss: 0.1817 - acc: 0.9317 - va
Epoch 24/35
50000/50000 [==============================] - 12s 233us/step - loss: 0.1757 - acc: 0.9332 - va
10000/10000 [==============================] - 3s 310us/step
Evaluation:  [0.3379497978925705, 0.8948]
```

```
In [196]: loss = fit_data.history['loss']
          acc = fit_data.history['acc']
          val_acc = fit_data.history['val_acc']
          val_loss = fit_data.history['val_loss']

          plt.plot(range(len(loss)), loss, 'g', label='Training loss')
          plt.plot(range(len(val_loss)), val_loss, 'y', label='Validation loss')
```

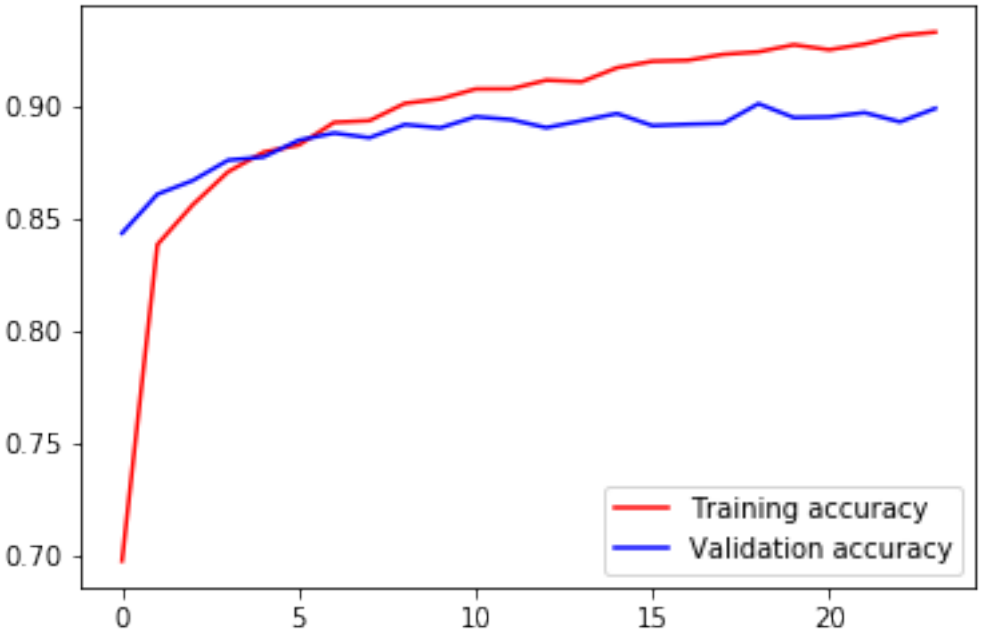
```
plt.legend()
```

```
Out[196]: <matplotlib.legend.Legend at 0x1774807b8>
```




```
In [197]: plt.plot(range(len(acc)), acc, 'r', label='Training accuracy')
          plt.plot(range(len(val_acc)), val_acc, 'b', label='Validation accuracy')
          plt.legend()
```

```
Out[197]: <matplotlib.legend.Legend at 0x1774a69e8>
```



1.0.3 Obtained accuracy: 89%

Comments:

Since we are analyzing images, it is appropriate to use a large neural network and to leverage dropout.

Applied techniques:

- Dropout
- Early stopping

1.1 Classifying newswires

Build a network to classify Reuters newswires into 46 different mutually-exclusive topics.

1.1.1 Load and review the data

```
In [198]: (reuters_train_data, reuters_train_labels), (reuters_test_data, reuters_test_labels)

          print(reuters_train_data.shape)
          print(reuters_train_labels.shape)
          print(reuters_train_data[0])
          print(reuters_train_labels[0])

          print(set(reuters_train_labels))
```

```
(8982,)
(8982,)
[1, 2, 2, 8, 43, 10, 447, 5, 25, 207, 270, 5, 3095, 111, 16, 369, 186, 90, 67, 7, 89, 5, 19, 10
3
{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25,
```

Load the word index to decode the train data.

```
In [199]: word_index = reuters.get_word_index()

          reverse_index = dict([(value+3, key) for (key, value) in word_index.items()])

          reverse_index[0] = "<PAD>"
          reverse_index[1] = "<START>"
          reverse_index[2] = "<UNKNOWN>"  # unknown
          reverse_index[3] = "<UNUSED>"

          decoded_review = ' '.join([reverse_index.get(i,'?') for i in reuters_train_data[0]])

          print(decoded_review)
```

```
<START> <UNKNOWN> <UNKNOWN> said as a result of its december acquisition of space co it expects
```

TO DO: Preprocess the data

1. Normalize the input data set
2. Perform one hot encoding
3. Create a train, test, and validation set

```
In [200]: # Turning the output into vector mode, each of length 5000
          tokenizer = Tokenizer(num_words=4000)
          train_data_token = tokenizer.sequences_to_matrix(reuters_train_data, mode='binary')
          test_data_token = tokenizer.sequences_to_matrix(reuters_test_data, mode='binary')
          print(train_data_token.shape)
          print(test_data_token.shape)

          # One-hot encoding the output
          one_hot_train_labels = to_categorical(reuters_train_labels)
          one_hot_test_labels = to_categorical(reuters_test_labels)
          print(one_hot_train_labels.shape)
          print(one_hot_test_labels.shape)

          # Creating a validation set with the first 10000 reviews
          validation_data = train_data_token[:1000]
          validation_labels = one_hot_train_labels[:1000]

          # Creating the input set
```

```
x_data = train_data_token[1000:]
y_data = one_hot_train_labels[1000:]
print(x_data.shape)
print(y_data.shape)
```

```
(8982, 4000)
(2246, 4000)
(8982, 46)
(2246, 46)
(7982, 4000)
(7982, 46)
```

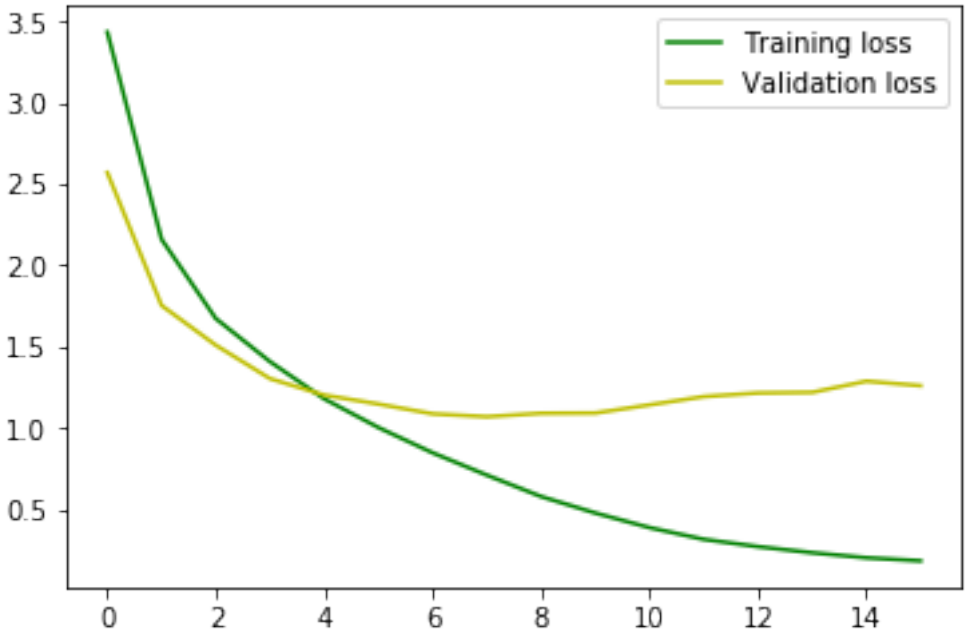
TO DO: Define and train a network, then plot the accuracy of the training, validation, and testing

1. Use a validation set
2. Propose and train a network
3. Print the history of the training
4. Evaluate with a test set

In [201]:
```
network = models.Sequential()

network.add(layers.Dense(512, activation='relu', input_shape=(4000,)))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(256, activation='relu'))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(128, activation='relu'))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(64, activation='relu'))
network.add(layers.Dropout(0.1))
network.add(layers.Dense(46, activation='softmax'))

early_stop = callbacks.EarlyStopping(monitor="val_loss", min_delta= 0.005, patience=8

network.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy

fit_data = network.fit(
    x_data,
    y_data,
    batch_size=1000,
    epochs=35,
    callbacks=[early_stop],
    validation_data=(validation_data, validation_labels)
)

print("Evaluation:", network.evaluate(test_data_token, one_hot_test_labels))
```

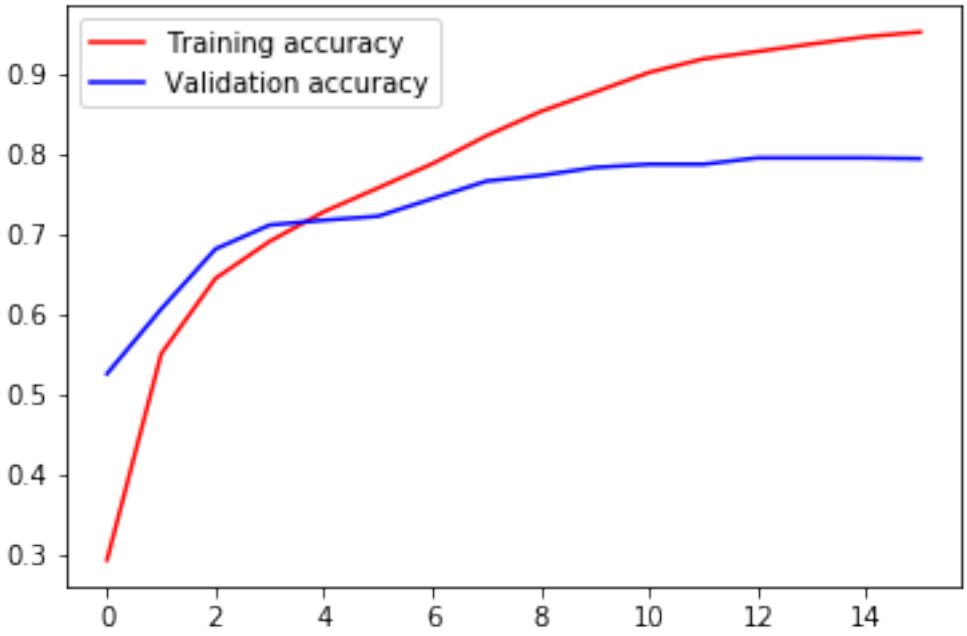
```
Train on 7982 samples, validate on 1000 samples
Epoch 1/35
7982/7982 [==============================] - 7s 822us/step - loss: 3.4333 - acc: 0.2920 - val_l
Epoch 2/35
7982/7982 [==============================] - 2s 272us/step - loss: 2.1599 - acc: 0.5500 - val_l
Epoch 3/35
7982/7982 [==============================] - 3s 318us/step - loss: 1.6731 - acc: 0.6442 - val_l
Epoch 4/35
7982/7982 [==============================] - 2s 274us/step - loss: 1.4082 - acc: 0.6906 - val_l
Epoch 5/35
7982/7982 [==============================] - 2s 272us/step - loss: 1.1795 - acc: 0.7276 - val_l
Epoch 6/35
7982/7982 [==============================] - 2s 272us/step - loss: 1.0031 - acc: 0.7575 - val_l
Epoch 7/35
7982/7982 [==============================] - 2s 292us/step - loss: 0.8477 - acc: 0.7876 - val_l
Epoch 8/35
7982/7982 [==============================] - 2s 279us/step - loss: 0.7105 - acc: 0.8227 - val_l
Epoch 9/35
7982/7982 [==============================] - 2s 271us/step - loss: 0.5790 - acc: 0.8530 - val_l
Epoch 10/35
7982/7982 [==============================] - 2s 276us/step - loss: 0.4777 - acc: 0.8773 - val_l
Epoch 11/35
7982/7982 [==============================] - 2s 268us/step - loss: 0.3879 - acc: 0.9019 - val_l
Epoch 12/35
7982/7982 [==============================] - 3s 317us/step - loss: 0.3159 - acc: 0.9188 - val_l
Epoch 13/35
7982/7982 [==============================] - 2s 270us/step - loss: 0.2711 - acc: 0.9281 - val_l
Epoch 14/35
7982/7982 [==============================] - 2s 287us/step - loss: 0.2336 - acc: 0.9375 - val_l
Epoch 15/35
7982/7982 [==============================] - 3s 323us/step - loss: 0.2026 - acc: 0.9465 - val_l
Epoch 16/35
7982/7982 [==============================] - 2s 271us/step - loss: 0.1838 - acc: 0.9524 - val_l
2246/2246 [==============================] - 1s 269us/step
Evaluation: [1.349426347447206, 0.7894033837934105]
```

```
In [202]: loss = fit_data.history['loss']
          acc = fit_data.history['acc']
          val_acc = fit_data.history['val_acc']
          val_loss = fit_data.history['val_loss']

          plt.plot(range(len(loss)), loss, 'g', label='Training loss')
          plt.plot(range(len(val_loss)), val_loss, 'y', label='Validation loss')
          plt.legend()

Out[202]: <matplotlib.legend.Legend at 0x137ce4048>
```




```
In [203]: plt.plot(range(len(acc)), acc, 'r', label='Training accuracy')
          plt.plot(range(len(val_acc)), val_acc, 'b', label='Validation accuracy')
          plt.legend()
```

```
Out[203]: <matplotlib.legend.Legend at 0x17db3ceb8>
```



1.1.2 Obtained accuracy: 79%

Comments:

It is interesting to see how text data, just like image data, needs a large neural network to produce acceptable accuracy results.

Applied techniques:

- Dropout
- Early stopping

1.2 Predicting Student Admissions

Predict student admissions based on three pieces of data:

- GRE Scores
- GPA Scores
- Class rank

1.2.1 Load and visualize the data

```
In [204]: student_data = pd.read_csv("data/student_data.csv")
          print(student_data)
```

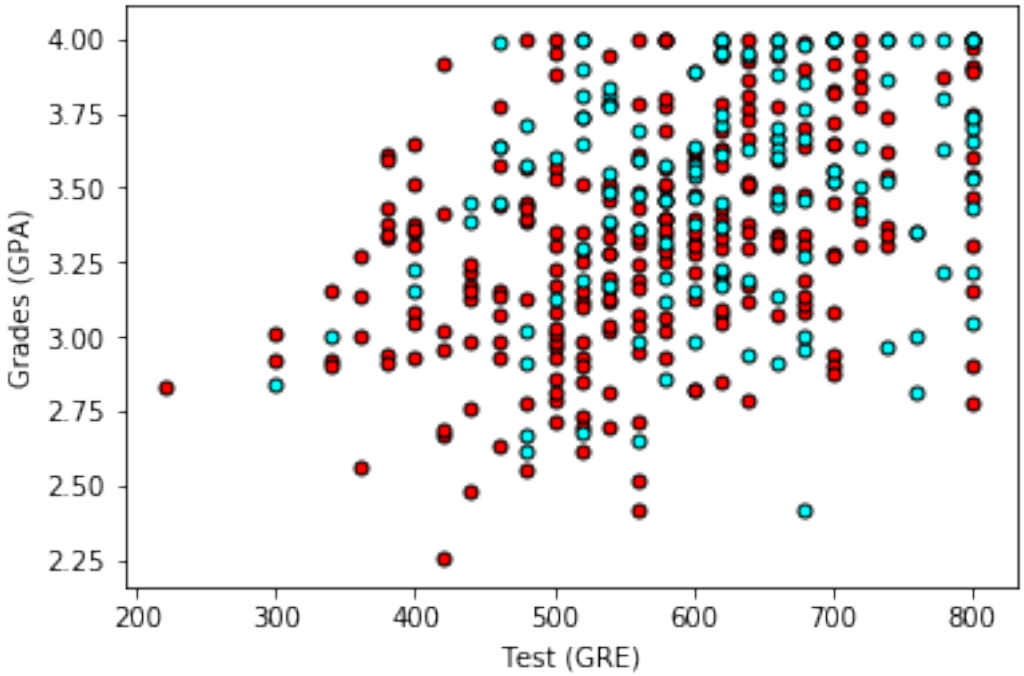
```
     admit    gre   gpa  rank
0        0  380.0  3.61   3.0
1        1  660.0  3.67   3.0
2        1  800.0  4.00   1.0
3        1  640.0  3.19   4.0
4        0  520.0  2.93   4.0
5        1  760.0  3.00   2.0
6        1  560.0  2.98   1.0
7        0  400.0  3.08   2.0
8        1  540.0  3.39   3.0
9        0  700.0  3.92   2.0
10       0  800.0  4.00   4.0
11       0  440.0  3.22   1.0
12       1  760.0  4.00   1.0
13       0  700.0  3.08   2.0
14       1  700.0  4.00   1.0
15       0  480.0  3.44   3.0
16       0  780.0  3.87   4.0
17       0  360.0  2.56   3.0
18       0  800.0  3.75   2.0
19       1  540.0  3.81   1.0
20       0  500.0  3.17   3.0
21       1  660.0  3.63   2.0
22       0  600.0  2.82   4.0
```

```
23       0  680.0  3.19   4.0
24       1  760.0  3.35   2.0
25       1  800.0  3.66   1.0
26       1  620.0  3.61   1.0
27       1  520.0  3.74   4.0
28       1  780.0  3.22   2.0
29       0  520.0  3.29   1.0
..     ...    ...   ...   ...
370      1  540.0  3.77   2.0
371      1  680.0  3.76   3.0
372      1  680.0  2.42   1.0
373      1  620.0  3.37   1.0
374      0  560.0  3.78   2.0
375      0  560.0  3.49   4.0
376      0  620.0  3.63   2.0
377      1  800.0  4.00   2.0
378      0  640.0  3.12   3.0
379      0  540.0  2.70   2.0
380      0  700.0  3.65   2.0
381      1  540.0  3.49   2.0
382      0  540.0  3.51   2.0
383      0  660.0  4.00   1.0
384      1  480.0  2.62   2.0
385      0  420.0  3.02   1.0
386      1  740.0  3.86   2.0
387      0  580.0  3.36   2.0
388      0  640.0  3.17   2.0
389      0  640.0  3.51   2.0
390      1  800.0  3.05   2.0
391      1  660.0  3.88   2.0
392      1  600.0  3.38   3.0
393      1  620.0  3.75   2.0
394      1  460.0  3.99   3.0
395      0  620.0  4.00   2.0
396      0  560.0  3.04   3.0
397      0  460.0  2.63   2.0
398      0  700.0  3.65   2.0
399      0  600.0  3.89   3.0

[400 rows x 4 columns]
```

Plot of the GRE and the GPA from the data.

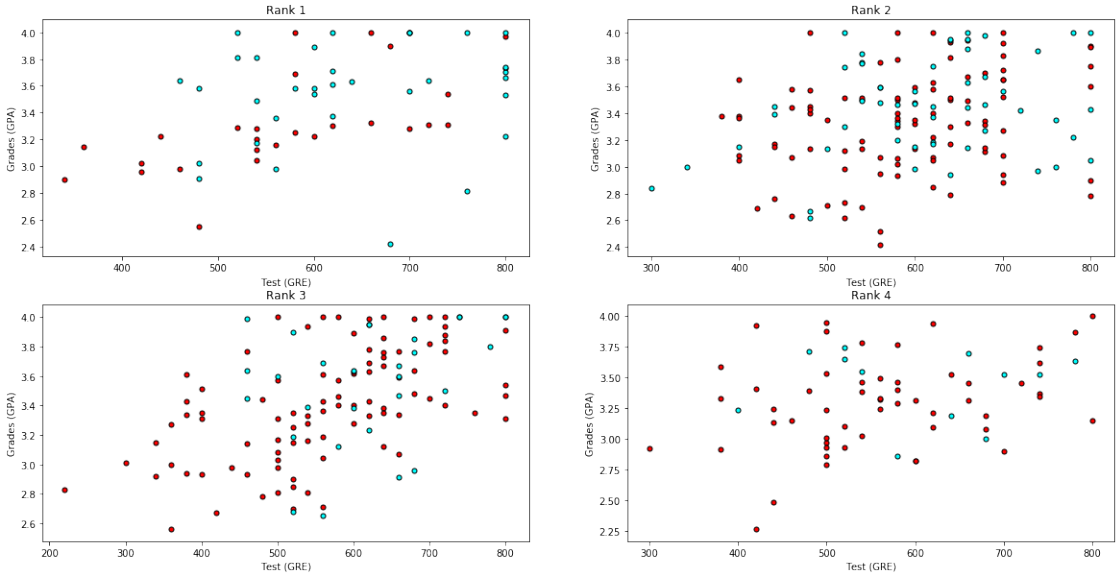
```
In [205]: X = np.array(student_data[["gre","gpa"]])
          y = np.array(student_data["admit"])
          admitted = X[np.argwhere(y==1)]
          rejected = X[np.argwhere(y==0)]
```

```
plt.scatter([s[0][0] for s in rejected], [s[0][1] for s in rejected], s = 25, color =
plt.scatter([s[0][0] for s in admitted], [s[0][1] for s in admitted], s = 25, color =
plt.xlabel('Test (GRE)')
plt.ylabel('Grades (GPA)')

plt.show()
```



Plot of the data by class rank.

In [206]:
```
f, plots = plt.subplots(2, 2, figsize=(20,10))
plots = [plot for sublist in plots for plot in sublist]

for idx, plot in enumerate(plots):
    data_rank = student_data[student_data["rank"]==idx+1]
    plot.set_title("Rank " + str(idx+1))
    X = np.array(data_rank[["gre","gpa"]])
    y = np.array(data_rank["admit"])
    admitted = X[np.argwhere(y==1)]
    rejected = X[np.argwhere(y==0)]
    plot.scatter([s[0][0] for s in rejected], [s[0][1] for s in rejected], s = 25, co
    plot.scatter([s[0][0] for s in admitted], [s[0][1] for s in admitted], s = 25, co
    plot.set_xlabel('Test (GRE)')
    plot.set_ylabel('Grades (GPA)')
```



TO DO: Preprocess the data

1. Normalize the input data set
2. Perform one hot encoding
3. Create a train, test, and validation set

```
In [207]: student_data = np.array(student_data)
          student_data = np.array([[0 if np.isnan(el) else el for el in student] for student in

          gre_mean = np.mean(student_data[:,1])
          gre_std = np.std(student_data[:,1])
          gpa_mean = np.mean(student_data[:,2])
          gpa_std = np.std(student_data[:,2])

          pp_data = []
          pp_labels = []

          for (result, gre, gpa, rank) in student_data:
              pp_gre = (gre - gre_mean) / gre_std
              pp_gpa = (gpa - gpa_mean) / gpa_std
              pp_data.append((
                  pp_gre,
                  pp_gpa,
                  1 if rank == 1 else 0,
                  1 if rank == 2 else 0,
                  1 if rank == 3 else 0,
                  1 if rank == 4 else 0
              ))
```

```
            pp_labels.append((
                1 if result == 0 else 0,
                1 if result == 1 else 0
            ))

        pp_data = np.array(pp_data)
        pp_labels = np.array(pp_labels)

        print(pp_data.shape)
        print(pp_labels.shape)

        test_data = pp_data[:100]
        test_labels = pp_labels[:100]

        train_data = pp_data[100:]
        train_labels = pp_labels[100:]
```

```
(400, 6)
(400, 2)
```

TO DO: Define and train a network, then plot the accuracy of the training, validation, and testing

1. Use a validation set
2. Propose and train a network
3. Print the history of the training
4. Evaluate with a test set

```
In [183]: network = models.Sequential()

        network.add(layers.Dense(128, activation='relu', input_shape=(6,)))
        network.add(layers.Dense(64, activation='relu'))
        network.add(layers.Dense(2, activation='softmax'))

        early_stop = callbacks.EarlyStopping(monitor='val_loss', patience=10)

        network.compile(optimizer='sgd', loss='binary_crossentropy', metrics=['accuracy'])

        fit_data = []

        for i in range(3):
            k_val_data = train_data[100 * i : 100 * (i + 1)]
            k_val_labels = train_labels[100 * i : 100 * (i + 1)]
            k_train_data = np.concatenate([train_data[0 : 100 * i], train_data[100 * (i + 1)
            k_train_labels = np.concatenate([train_labels[0 : 100 * i], train_labels[100 * (
            fit_data.append(network.fit(
                k_train_data,
```

```
                k_train_labels,
                batch_size=200,
                epochs=1000,
                verbose=2,
                callbacks=[early_stop],
                validation_data=(k_val_data, k_val_labels)
            ))

        print("Evaluation:", network.evaluate(test_data, test_labels))
```

```
Train on 200 samples, validate on 100 samples
Epoch 1/1000
 - 3s - loss: 0.7095 - acc: 0.4300 - val_loss: 0.7256 - val_acc: 0.3200
Epoch 2/1000
 - 0s - loss: 0.7074 - acc: 0.4650 - val_loss: 0.7222 - val_acc: 0.3500
Epoch 3/1000
 - 0s - loss: 0.7053 - acc: 0.4700 - val_loss: 0.7188 - val_acc: 0.3800
Epoch 4/1000
 - 0s - loss: 0.7033 - acc: 0.4850 - val_loss: 0.7155 - val_acc: 0.4000
Epoch 5/1000
 - 0s - loss: 0.7014 - acc: 0.5050 - val_loss: 0.7123 - val_acc: 0.4300
Epoch 6/1000
 - 0s - loss: 0.6995 - acc: 0.4950 - val_loss: 0.7092 - val_acc: 0.4600
Epoch 7/1000
 - 0s - loss: 0.6977 - acc: 0.4950 - val_loss: 0.7061 - val_acc: 0.4900
Epoch 8/1000
 - 0s - loss: 0.6959 - acc: 0.4950 - val_loss: 0.7032 - val_acc: 0.5100
Epoch 9/1000
 - 0s - loss: 0.6942 - acc: 0.5100 - val_loss: 0.7003 - val_acc: 0.5200
Epoch 10/1000
 - 0s - loss: 0.6926 - acc: 0.5300 - val_loss: 0.6975 - val_acc: 0.5300
Epoch 11/1000
 - 0s - loss: 0.6909 - acc: 0.5500 - val_loss: 0.6948 - val_acc: 0.5600
Epoch 12/1000
 - 0s - loss: 0.6894 - acc: 0.5750 - val_loss: 0.6921 - val_acc: 0.5800
Epoch 13/1000
 - 0s - loss: 0.6879 - acc: 0.5800 - val_loss: 0.6896 - val_acc: 0.5900
Epoch 14/1000
 - 0s - loss: 0.6864 - acc: 0.5800 - val_loss: 0.6870 - val_acc: 0.6000
Epoch 15/1000
 - 0s - loss: 0.6850 - acc: 0.5900 - val_loss: 0.6845 - val_acc: 0.6200
Epoch 16/1000
 - 0s - loss: 0.6836 - acc: 0.6050 - val_loss: 0.6821 - val_acc: 0.6500
Epoch 17/1000
 - 0s - loss: 0.6822 - acc: 0.6000 - val_loss: 0.6797 - val_acc: 0.6400
Epoch 18/1000
 - 0s - loss: 0.6809 - acc: 0.6050 - val_loss: 0.6774 - val_acc: 0.6700
Epoch 19/1000
```

```
 - 0s - loss: 0.6796 - acc: 0.6300 - val_loss: 0.6752 - val_acc: 0.6800
Epoch 20/1000
 - 0s - loss: 0.6784 - acc: 0.6250 - val_loss: 0.6730 - val_acc: 0.6800
Epoch 21/1000
 - 0s - loss: 0.6771 - acc: 0.6400 - val_loss: 0.6708 - val_acc: 0.6700
Epoch 22/1000
 - 0s - loss: 0.6759 - acc: 0.6400 - val_loss: 0.6687 - val_acc: 0.6800
Epoch 23/1000
 - 0s - loss: 0.6748 - acc: 0.6350 - val_loss: 0.6667 - val_acc: 0.6600
Epoch 24/1000
 - 0s - loss: 0.6737 - acc: 0.6250 - val_loss: 0.6647 - val_acc: 0.6600
Epoch 25/1000
 - 0s - loss: 0.6726 - acc: 0.6350 - val_loss: 0.6627 - val_acc: 0.6700
Epoch 26/1000
 - 0s - loss: 0.6715 - acc: 0.6400 - val_loss: 0.6608 - val_acc: 0.6900
Epoch 27/1000
 - 0s - loss: 0.6705 - acc: 0.6400 - val_loss: 0.6590 - val_acc: 0.7000
Epoch 28/1000
 - 0s - loss: 0.6695 - acc: 0.6450 - val_loss: 0.6572 - val_acc: 0.7200
Epoch 29/1000
 - 0s - loss: 0.6686 - acc: 0.6450 - val_loss: 0.6554 - val_acc: 0.7200
Epoch 30/1000
 - 0s - loss: 0.6676 - acc: 0.6400 - val_loss: 0.6537 - val_acc: 0.7200
Epoch 31/1000
 - 0s - loss: 0.6667 - acc: 0.6450 - val_loss: 0.6520 - val_acc: 0.7200
Epoch 32/1000
 - 0s - loss: 0.6659 - acc: 0.6450 - val_loss: 0.6503 - val_acc: 0.7300
Epoch 33/1000
 - 0s - loss: 0.6650 - acc: 0.6450 - val_loss: 0.6487 - val_acc: 0.7300
Epoch 34/1000
 - 0s - loss: 0.6642 - acc: 0.6500 - val_loss: 0.6472 - val_acc: 0.7400
Epoch 35/1000
 - 0s - loss: 0.6634 - acc: 0.6450 - val_loss: 0.6456 - val_acc: 0.7400
Epoch 36/1000
 - 0s - loss: 0.6626 - acc: 0.6500 - val_loss: 0.6442 - val_acc: 0.7200
Epoch 37/1000
 - 0s - loss: 0.6618 - acc: 0.6550 - val_loss: 0.6427 - val_acc: 0.7200
Epoch 38/1000
 - 0s - loss: 0.6611 - acc: 0.6450 - val_loss: 0.6413 - val_acc: 0.7300
Epoch 39/1000
 - 0s - loss: 0.6603 - acc: 0.6500 - val_loss: 0.6399 - val_acc: 0.7300
Epoch 40/1000
 - 0s - loss: 0.6596 - acc: 0.6550 - val_loss: 0.6385 - val_acc: 0.7300
Epoch 41/1000
 - 0s - loss: 0.6589 - acc: 0.6500 - val_loss: 0.6372 - val_acc: 0.7400
Epoch 42/1000
 - 0s - loss: 0.6582 - acc: 0.6450 - val_loss: 0.6359 - val_acc: 0.7300
Epoch 43/1000
```

```
 - 0s - loss: 0.6576 - acc: 0.6500 - val_loss: 0.6346 - val_acc: 0.7300
Epoch 44/1000
 - 0s - loss: 0.6569 - acc: 0.6500 - val_loss: 0.6334 - val_acc: 0.7300
Epoch 45/1000
 - 0s - loss: 0.6563 - acc: 0.6500 - val_loss: 0.6322 - val_acc: 0.7300
Epoch 46/1000
 - 0s - loss: 0.6557 - acc: 0.6450 - val_loss: 0.6310 - val_acc: 0.7400
Epoch 47/1000
 - 0s - loss: 0.6551 - acc: 0.6450 - val_loss: 0.6298 - val_acc: 0.7400
Epoch 48/1000
 - 0s - loss: 0.6545 - acc: 0.6450 - val_loss: 0.6286 - val_acc: 0.7500
Epoch 49/1000
 - 0s - loss: 0.6539 - acc: 0.6450 - val_loss: 0.6275 - val_acc: 0.7500
Epoch 50/1000
 - 0s - loss: 0.6533 - acc: 0.6550 - val_loss: 0.6264 - val_acc: 0.7500
Epoch 51/1000
 - 0s - loss: 0.6527 - acc: 0.6500 - val_loss: 0.6253 - val_acc: 0.7500
Epoch 52/1000
 - 0s - loss: 0.6522 - acc: 0.6500 - val_loss: 0.6242 - val_acc: 0.7400
Epoch 53/1000
 - 0s - loss: 0.6517 - acc: 0.6500 - val_loss: 0.6232 - val_acc: 0.7400
Epoch 54/1000
 - 0s - loss: 0.6511 - acc: 0.6500 - val_loss: 0.6222 - val_acc: 0.7400
Epoch 55/1000
 - 0s - loss: 0.6506 - acc: 0.6450 - val_loss: 0.6212 - val_acc: 0.7400
Epoch 56/1000
 - 0s - loss: 0.6501 - acc: 0.6450 - val_loss: 0.6202 - val_acc: 0.7400
Epoch 57/1000
 - 0s - loss: 0.6496 - acc: 0.6450 - val_loss: 0.6193 - val_acc: 0.7400
Epoch 58/1000
 - 0s - loss: 0.6492 - acc: 0.6450 - val_loss: 0.6183 - val_acc: 0.7400
Epoch 59/1000
 - 0s - loss: 0.6487 - acc: 0.6450 - val_loss: 0.6174 - val_acc: 0.7400
Epoch 60/1000
 - 0s - loss: 0.6482 - acc: 0.6450 - val_loss: 0.6165 - val_acc: 0.7400
Epoch 61/1000
 - 0s - loss: 0.6478 - acc: 0.6450 - val_loss: 0.6156 - val_acc: 0.7400
Epoch 62/1000
 - 0s - loss: 0.6473 - acc: 0.6400 - val_loss: 0.6147 - val_acc: 0.7400
Epoch 63/1000
 - 0s - loss: 0.6469 - acc: 0.6400 - val_loss: 0.6139 - val_acc: 0.7400
Epoch 64/1000
 - 0s - loss: 0.6465 - acc: 0.6400 - val_loss: 0.6131 - val_acc: 0.7400
Epoch 65/1000
 - 0s - loss: 0.6461 - acc: 0.6500 - val_loss: 0.6123 - val_acc: 0.7400
Epoch 66/1000
 - 0s - loss: 0.6457 - acc: 0.6500 - val_loss: 0.6115 - val_acc: 0.7400
Epoch 67/1000
```

```
 - 0s - loss: 0.6453 - acc: 0.6500 - val_loss: 0.6107 - val_acc: 0.7400
Epoch 68/1000
 - 0s - loss: 0.6449 - acc: 0.6450 - val_loss: 0.6099 - val_acc: 0.7400
Epoch 69/1000
 - 0s - loss: 0.6446 - acc: 0.6450 - val_loss: 0.6092 - val_acc: 0.7400
Epoch 70/1000
 - 0s - loss: 0.6442 - acc: 0.6450 - val_loss: 0.6085 - val_acc: 0.7500
Epoch 71/1000
 - 0s - loss: 0.6438 - acc: 0.6450 - val_loss: 0.6078 - val_acc: 0.7500
Epoch 72/1000
 - 0s - loss: 0.6435 - acc: 0.6450 - val_loss: 0.6071 - val_acc: 0.7500
Epoch 73/1000
 - 0s - loss: 0.6431 - acc: 0.6450 - val_loss: 0.6064 - val_acc: 0.7500
Epoch 74/1000
 - 0s - loss: 0.6428 - acc: 0.6450 - val_loss: 0.6057 - val_acc: 0.7500
Epoch 75/1000
 - 0s - loss: 0.6425 - acc: 0.6450 - val_loss: 0.6051 - val_acc: 0.7500
Epoch 76/1000
 - 0s - loss: 0.6421 - acc: 0.6450 - val_loss: 0.6044 - val_acc: 0.7500
Epoch 77/1000
 - 0s - loss: 0.6418 - acc: 0.6450 - val_loss: 0.6038 - val_acc: 0.7500
Epoch 78/1000
 - 0s - loss: 0.6415 - acc: 0.6450 - val_loss: 0.6032 - val_acc: 0.7500
Epoch 79/1000
 - 0s - loss: 0.6412 - acc: 0.6450 - val_loss: 0.6026 - val_acc: 0.7500
Epoch 80/1000
 - 0s - loss: 0.6409 - acc: 0.6450 - val_loss: 0.6020 - val_acc: 0.7500
Epoch 81/1000
 - 0s - loss: 0.6406 - acc: 0.6450 - val_loss: 0.6014 - val_acc: 0.7500
Epoch 82/1000
 - 0s - loss: 0.6403 - acc: 0.6450 - val_loss: 0.6009 - val_acc: 0.7500
Epoch 83/1000
 - 0s - loss: 0.6400 - acc: 0.6450 - val_loss: 0.6003 - val_acc: 0.7500
Epoch 84/1000
 - 0s - loss: 0.6397 - acc: 0.6450 - val_loss: 0.5997 - val_acc: 0.7500
Epoch 85/1000
 - 0s - loss: 0.6395 - acc: 0.6450 - val_loss: 0.5992 - val_acc: 0.7500
Epoch 86/1000
 - 0s - loss: 0.6392 - acc: 0.6450 - val_loss: 0.5987 - val_acc: 0.7500
Epoch 87/1000
 - 0s - loss: 0.6389 - acc: 0.6450 - val_loss: 0.5982 - val_acc: 0.7500
Epoch 88/1000
 - 0s - loss: 0.6386 - acc: 0.6450 - val_loss: 0.5976 - val_acc: 0.7500
Epoch 89/1000
 - 0s - loss: 0.6384 - acc: 0.6450 - val_loss: 0.5971 - val_acc: 0.7500
Epoch 90/1000
 - 0s - loss: 0.6381 - acc: 0.6450 - val_loss: 0.5967 - val_acc: 0.7500
Epoch 91/1000
```

```
 - 0s - loss: 0.6379 - acc: 0.6450 - val_loss: 0.5962 - val_acc: 0.7500
Epoch 92/1000
 - 0s - loss: 0.6376 - acc: 0.6450 - val_loss: 0.5957 - val_acc: 0.7500
Epoch 93/1000
 - 0s - loss: 0.6374 - acc: 0.6450 - val_loss: 0.5952 - val_acc: 0.7500
Epoch 94/1000
 - 0s - loss: 0.6371 - acc: 0.6450 - val_loss: 0.5948 - val_acc: 0.7500
Epoch 95/1000
 - 0s - loss: 0.6369 - acc: 0.6450 - val_loss: 0.5943 - val_acc: 0.7500
Epoch 96/1000
 - 0s - loss: 0.6367 - acc: 0.6450 - val_loss: 0.5939 - val_acc: 0.7500
Epoch 97/1000
 - 0s - loss: 0.6364 - acc: 0.6450 - val_loss: 0.5934 - val_acc: 0.7500
Epoch 98/1000
 - 0s - loss: 0.6362 - acc: 0.6450 - val_loss: 0.5930 - val_acc: 0.7500
Epoch 99/1000
 - 0s - loss: 0.6360 - acc: 0.6450 - val_loss: 0.5926 - val_acc: 0.7500
Epoch 100/1000
 - 0s - loss: 0.6358 - acc: 0.6450 - val_loss: 0.5922 - val_acc: 0.7500
Epoch 101/1000
 - 0s - loss: 0.6355 - acc: 0.6450 - val_loss: 0.5918 - val_acc: 0.7500
Epoch 102/1000
 - 0s - loss: 0.6353 - acc: 0.6450 - val_loss: 0.5914 - val_acc: 0.7500
Epoch 103/1000
 - 0s - loss: 0.6351 - acc: 0.6450 - val_loss: 0.5910 - val_acc: 0.7500
Epoch 104/1000
 - 0s - loss: 0.6349 - acc: 0.6450 - val_loss: 0.5906 - val_acc: 0.7500
Epoch 105/1000
 - 0s - loss: 0.6347 - acc: 0.6450 - val_loss: 0.5902 - val_acc: 0.7500
Epoch 106/1000
 - 0s - loss: 0.6345 - acc: 0.6450 - val_loss: 0.5898 - val_acc: 0.7500
Epoch 107/1000
 - 0s - loss: 0.6343 - acc: 0.6450 - val_loss: 0.5895 - val_acc: 0.7500
Epoch 108/1000
 - 0s - loss: 0.6341 - acc: 0.6450 - val_loss: 0.5891 - val_acc: 0.7500
Epoch 109/1000
 - 0s - loss: 0.6339 - acc: 0.6450 - val_loss: 0.5888 - val_acc: 0.7500
Epoch 110/1000
 - 0s - loss: 0.6337 - acc: 0.6450 - val_loss: 0.5884 - val_acc: 0.7500
Epoch 111/1000
 - 0s - loss: 0.6335 - acc: 0.6450 - val_loss: 0.5881 - val_acc: 0.7500
Epoch 112/1000
 - 0s - loss: 0.6333 - acc: 0.6450 - val_loss: 0.5877 - val_acc: 0.7500
Epoch 113/1000
 - 0s - loss: 0.6331 - acc: 0.6450 - val_loss: 0.5874 - val_acc: 0.7500
Epoch 114/1000
 - 0s - loss: 0.6330 - acc: 0.6450 - val_loss: 0.5871 - val_acc: 0.7500
Epoch 115/1000
```

```
 - 0s - loss: 0.6328 - acc: 0.6450 - val_loss: 0.5868 - val_acc: 0.7500
Epoch 116/1000
 - 0s - loss: 0.6326 - acc: 0.6450 - val_loss: 0.5864 - val_acc: 0.7500
Epoch 117/1000
 - 0s - loss: 0.6324 - acc: 0.6450 - val_loss: 0.5861 - val_acc: 0.7500
Epoch 118/1000
 - 0s - loss: 0.6323 - acc: 0.6450 - val_loss: 0.5858 - val_acc: 0.7500
Epoch 119/1000
 - 0s - loss: 0.6321 - acc: 0.6450 - val_loss: 0.5855 - val_acc: 0.7500
Epoch 120/1000
 - 0s - loss: 0.6319 - acc: 0.6450 - val_loss: 0.5852 - val_acc: 0.7500
Epoch 121/1000
 - 0s - loss: 0.6317 - acc: 0.6450 - val_loss: 0.5849 - val_acc: 0.7500
Epoch 122/1000
 - 0s - loss: 0.6316 - acc: 0.6450 - val_loss: 0.5846 - val_acc: 0.7500
Epoch 123/1000
 - 0s - loss: 0.6314 - acc: 0.6450 - val_loss: 0.5843 - val_acc: 0.7500
Epoch 124/1000
 - 0s - loss: 0.6312 - acc: 0.6450 - val_loss: 0.5841 - val_acc: 0.7500
Epoch 125/1000
 - 0s - loss: 0.6311 - acc: 0.6450 - val_loss: 0.5838 - val_acc: 0.7500
Epoch 126/1000
 - 0s - loss: 0.6309 - acc: 0.6450 - val_loss: 0.5835 - val_acc: 0.7500
Epoch 127/1000
 - 0s - loss: 0.6307 - acc: 0.6450 - val_loss: 0.5832 - val_acc: 0.7500
Epoch 128/1000
 - 0s - loss: 0.6306 - acc: 0.6450 - val_loss: 0.5830 - val_acc: 0.7500
Epoch 129/1000
 - 0s - loss: 0.6304 - acc: 0.6450 - val_loss: 0.5827 - val_acc: 0.7500
Epoch 130/1000
 - 0s - loss: 0.6303 - acc: 0.6450 - val_loss: 0.5825 - val_acc: 0.7500
Epoch 131/1000
 - 0s - loss: 0.6301 - acc: 0.6450 - val_loss: 0.5822 - val_acc: 0.7500
Epoch 132/1000
 - 0s - loss: 0.6299 - acc: 0.6450 - val_loss: 0.5819 - val_acc: 0.7500
Epoch 133/1000
 - 0s - loss: 0.6298 - acc: 0.6450 - val_loss: 0.5817 - val_acc: 0.7500
Epoch 134/1000
 - 0s - loss: 0.6296 - acc: 0.6450 - val_loss: 0.5815 - val_acc: 0.7500
Epoch 135/1000
 - 0s - loss: 0.6295 - acc: 0.6450 - val_loss: 0.5812 - val_acc: 0.7500
Epoch 136/1000
 - 0s - loss: 0.6293 - acc: 0.6450 - val_loss: 0.5810 - val_acc: 0.7500
Epoch 137/1000
 - 0s - loss: 0.6292 - acc: 0.6450 - val_loss: 0.5808 - val_acc: 0.7500
Epoch 138/1000
 - 0s - loss: 0.6290 - acc: 0.6450 - val_loss: 0.5805 - val_acc: 0.7500
Epoch 139/1000
```

```
 - 0s - loss: 0.6289 - acc: 0.6450 - val_loss: 0.5803 - val_acc: 0.7500
Epoch 140/1000
 - 0s - loss: 0.6287 - acc: 0.6450 - val_loss: 0.5801 - val_acc: 0.7500
Epoch 141/1000
 - 0s - loss: 0.6286 - acc: 0.6450 - val_loss: 0.5799 - val_acc: 0.7500
Epoch 142/1000
 - 0s - loss: 0.6285 - acc: 0.6450 - val_loss: 0.5797 - val_acc: 0.7500
Epoch 143/1000
 - 0s - loss: 0.6283 - acc: 0.6450 - val_loss: 0.5794 - val_acc: 0.7500
Epoch 144/1000
 - 0s - loss: 0.6282 - acc: 0.6450 - val_loss: 0.5792 - val_acc: 0.7500
Epoch 145/1000
 - 0s - loss: 0.6280 - acc: 0.6450 - val_loss: 0.5790 - val_acc: 0.7500
Epoch 146/1000
 - 0s - loss: 0.6279 - acc: 0.6450 - val_loss: 0.5788 - val_acc: 0.7500
Epoch 147/1000
 - 0s - loss: 0.6278 - acc: 0.6450 - val_loss: 0.5786 - val_acc: 0.7500
Epoch 148/1000
 - 0s - loss: 0.6276 - acc: 0.6450 - val_loss: 0.5784 - val_acc: 0.7500
Epoch 149/1000
 - 0s - loss: 0.6275 - acc: 0.6450 - val_loss: 0.5782 - val_acc: 0.7500
Epoch 150/1000
 - 0s - loss: 0.6274 - acc: 0.6450 - val_loss: 0.5780 - val_acc: 0.7500
Epoch 151/1000
 - 0s - loss: 0.6272 - acc: 0.6450 - val_loss: 0.5779 - val_acc: 0.7500
Epoch 152/1000
 - 0s - loss: 0.6271 - acc: 0.6450 - val_loss: 0.5777 - val_acc: 0.7500
Epoch 153/1000
 - 0s - loss: 0.6270 - acc: 0.6450 - val_loss: 0.5775 - val_acc: 0.7500
Epoch 154/1000
 - 0s - loss: 0.6268 - acc: 0.6450 - val_loss: 0.5773 - val_acc: 0.7500
Epoch 155/1000
 - 0s - loss: 0.6267 - acc: 0.6450 - val_loss: 0.5771 - val_acc: 0.7500
Epoch 156/1000
 - 0s - loss: 0.6266 - acc: 0.6450 - val_loss: 0.5769 - val_acc: 0.7500
Epoch 157/1000
 - 0s - loss: 0.6265 - acc: 0.6450 - val_loss: 0.5767 - val_acc: 0.7500
Epoch 158/1000
 - 0s - loss: 0.6263 - acc: 0.6450 - val_loss: 0.5766 - val_acc: 0.7500
Epoch 159/1000
 - 0s - loss: 0.6262 - acc: 0.6450 - val_loss: 0.5764 - val_acc: 0.7500
Epoch 160/1000
 - 0s - loss: 0.6261 - acc: 0.6450 - val_loss: 0.5762 - val_acc: 0.7500
Epoch 161/1000
 - 0s - loss: 0.6260 - acc: 0.6450 - val_loss: 0.5761 - val_acc: 0.7500
Epoch 162/1000
 - 0s - loss: 0.6258 - acc: 0.6450 - val_loss: 0.5759 - val_acc: 0.7500
Epoch 163/1000
```

```
 - 0s - loss: 0.6257 - acc: 0.6450 - val_loss: 0.5757 - val_acc: 0.7500
Epoch 164/1000
 - 0s - loss: 0.6256 - acc: 0.6450 - val_loss: 0.5756 - val_acc: 0.7500
Epoch 165/1000
 - 0s - loss: 0.6255 - acc: 0.6450 - val_loss: 0.5754 - val_acc: 0.7500
Epoch 166/1000
 - 0s - loss: 0.6253 - acc: 0.6450 - val_loss: 0.5753 - val_acc: 0.7500
Epoch 167/1000
 - 0s - loss: 0.6252 - acc: 0.6450 - val_loss: 0.5751 - val_acc: 0.7500
Epoch 168/1000
 - 0s - loss: 0.6251 - acc: 0.6450 - val_loss: 0.5749 - val_acc: 0.7500
Epoch 169/1000
 - 0s - loss: 0.6250 - acc: 0.6450 - val_loss: 0.5748 - val_acc: 0.7500
Epoch 170/1000
 - 0s - loss: 0.6249 - acc: 0.6450 - val_loss: 0.5746 - val_acc: 0.7500
Epoch 171/1000
 - 0s - loss: 0.6247 - acc: 0.6450 - val_loss: 0.5745 - val_acc: 0.7500
Epoch 172/1000
 - 0s - loss: 0.6246 - acc: 0.6450 - val_loss: 0.5743 - val_acc: 0.7500
Epoch 173/1000
 - 0s - loss: 0.6245 - acc: 0.6450 - val_loss: 0.5742 - val_acc: 0.7500
Epoch 174/1000
 - 0s - loss: 0.6244 - acc: 0.6450 - val_loss: 0.5741 - val_acc: 0.7500
Epoch 175/1000
 - 0s - loss: 0.6243 - acc: 0.6450 - val_loss: 0.5739 - val_acc: 0.7500
Epoch 176/1000
 - 0s - loss: 0.6242 - acc: 0.6450 - val_loss: 0.5738 - val_acc: 0.7500
Epoch 177/1000
 - 0s - loss: 0.6241 - acc: 0.6450 - val_loss: 0.5736 - val_acc: 0.7500
Epoch 178/1000
 - 0s - loss: 0.6239 - acc: 0.6450 - val_loss: 0.5735 - val_acc: 0.7500
Epoch 179/1000
 - 0s - loss: 0.6238 - acc: 0.6450 - val_loss: 0.5734 - val_acc: 0.7500
Epoch 180/1000
 - 0s - loss: 0.6237 - acc: 0.6450 - val_loss: 0.5732 - val_acc: 0.7500
Epoch 181/1000
 - 0s - loss: 0.6236 - acc: 0.6450 - val_loss: 0.5731 - val_acc: 0.7500
Epoch 182/1000
 - 0s - loss: 0.6235 - acc: 0.6450 - val_loss: 0.5730 - val_acc: 0.7500
Epoch 183/1000
 - 0s - loss: 0.6234 - acc: 0.6450 - val_loss: 0.5728 - val_acc: 0.7500
Epoch 184/1000
 - 0s - loss: 0.6233 - acc: 0.6450 - val_loss: 0.5727 - val_acc: 0.7500
Epoch 185/1000
 - 0s - loss: 0.6232 - acc: 0.6450 - val_loss: 0.5726 - val_acc: 0.7500
Epoch 186/1000
 - 0s - loss: 0.6231 - acc: 0.6450 - val_loss: 0.5725 - val_acc: 0.7500
Epoch 187/1000
```

```
 - 0s - loss: 0.6229 - acc: 0.6450 - val_loss: 0.5723 - val_acc: 0.7500
Epoch 188/1000
 - 0s - loss: 0.6228 - acc: 0.6450 - val_loss: 0.5722 - val_acc: 0.7500
Epoch 189/1000
 - 0s - loss: 0.6227 - acc: 0.6450 - val_loss: 0.5721 - val_acc: 0.7500
Epoch 190/1000
 - 0s - loss: 0.6226 - acc: 0.6450 - val_loss: 0.5720 - val_acc: 0.7500
Epoch 191/1000
 - 0s - loss: 0.6225 - acc: 0.6450 - val_loss: 0.5718 - val_acc: 0.7500
Epoch 192/1000
 - 0s - loss: 0.6224 - acc: 0.6450 - val_loss: 0.5717 - val_acc: 0.7500
Epoch 193/1000
 - 0s - loss: 0.6223 - acc: 0.6450 - val_loss: 0.5716 - val_acc: 0.7500
Epoch 194/1000
 - 0s - loss: 0.6222 - acc: 0.6450 - val_loss: 0.5715 - val_acc: 0.7500
Epoch 195/1000
 - 0s - loss: 0.6221 - acc: 0.6450 - val_loss: 0.5713 - val_acc: 0.7500
Epoch 196/1000
 - 0s - loss: 0.6220 - acc: 0.6450 - val_loss: 0.5712 - val_acc: 0.7500
Epoch 197/1000
 - 0s - loss: 0.6219 - acc: 0.6450 - val_loss: 0.5711 - val_acc: 0.7500
Epoch 198/1000
 - 0s - loss: 0.6218 - acc: 0.6450 - val_loss: 0.5710 - val_acc: 0.7500
Epoch 199/1000
 - 0s - loss: 0.6217 - acc: 0.6450 - val_loss: 0.5709 - val_acc: 0.7500
Epoch 200/1000
 - 0s - loss: 0.6216 - acc: 0.6450 - val_loss: 0.5708 - val_acc: 0.7500
Epoch 201/1000
 - 0s - loss: 0.6215 - acc: 0.6450 - val_loss: 0.5707 - val_acc: 0.7500
Epoch 202/1000
 - 0s - loss: 0.6214 - acc: 0.6450 - val_loss: 0.5705 - val_acc: 0.7500
Epoch 203/1000
 - 0s - loss: 0.6213 - acc: 0.6450 - val_loss: 0.5704 - val_acc: 0.7500
Epoch 204/1000
 - 0s - loss: 0.6212 - acc: 0.6450 - val_loss: 0.5703 - val_acc: 0.7500
Epoch 205/1000
 - 0s - loss: 0.6211 - acc: 0.6400 - val_loss: 0.5702 - val_acc: 0.7500
Epoch 206/1000
 - 0s - loss: 0.6210 - acc: 0.6400 - val_loss: 0.5701 - val_acc: 0.7500
Epoch 207/1000
 - 0s - loss: 0.6209 - acc: 0.6400 - val_loss: 0.5700 - val_acc: 0.7500
Epoch 208/1000
 - 0s - loss: 0.6208 - acc: 0.6400 - val_loss: 0.5699 - val_acc: 0.7500
Epoch 209/1000
 - 0s - loss: 0.6207 - acc: 0.6400 - val_loss: 0.5698 - val_acc: 0.7500
Epoch 210/1000
 - 0s - loss: 0.6206 - acc: 0.6400 - val_loss: 0.5697 - val_acc: 0.7500
Epoch 211/1000
```

```
 - 0s - loss: 0.6205 - acc: 0.6400 - val_loss: 0.5696 - val_acc: 0.7500
Epoch 212/1000
 - 0s - loss: 0.6204 - acc: 0.6400 - val_loss: 0.5695 - val_acc: 0.7500
Epoch 213/1000
 - 0s - loss: 0.6203 - acc: 0.6400 - val_loss: 0.5694 - val_acc: 0.7500
Epoch 214/1000
 - 0s - loss: 0.6202 - acc: 0.6400 - val_loss: 0.5693 - val_acc: 0.7500
Epoch 215/1000
 - 0s - loss: 0.6201 - acc: 0.6400 - val_loss: 0.5692 - val_acc: 0.7500
Epoch 216/1000
 - 0s - loss: 0.6200 - acc: 0.6400 - val_loss: 0.5691 - val_acc: 0.7500
Epoch 217/1000
 - 0s - loss: 0.6199 - acc: 0.6400 - val_loss: 0.5690 - val_acc: 0.7500
Epoch 218/1000
 - 0s - loss: 0.6198 - acc: 0.6400 - val_loss: 0.5689 - val_acc: 0.7500
Epoch 219/1000
 - 0s - loss: 0.6198 - acc: 0.6400 - val_loss: 0.5688 - val_acc: 0.7500
Epoch 220/1000
 - 0s - loss: 0.6197 - acc: 0.6400 - val_loss: 0.5687 - val_acc: 0.7500
Epoch 221/1000
 - 0s - loss: 0.6196 - acc: 0.6400 - val_loss: 0.5686 - val_acc: 0.7500
Epoch 222/1000
 - 0s - loss: 0.6195 - acc: 0.6400 - val_loss: 0.5685 - val_acc: 0.7500
Epoch 223/1000
 - 0s - loss: 0.6194 - acc: 0.6400 - val_loss: 0.5684 - val_acc: 0.7500
Epoch 224/1000
 - 0s - loss: 0.6193 - acc: 0.6400 - val_loss: 0.5683 - val_acc: 0.7500
Epoch 225/1000
 - 0s - loss: 0.6192 - acc: 0.6400 - val_loss: 0.5682 - val_acc: 0.7500
Epoch 226/1000
 - 0s - loss: 0.6191 - acc: 0.6400 - val_loss: 0.5681 - val_acc: 0.7500
Epoch 227/1000
 - 0s - loss: 0.6190 - acc: 0.6400 - val_loss: 0.5680 - val_acc: 0.7500
Epoch 228/1000
 - 0s - loss: 0.6189 - acc: 0.6400 - val_loss: 0.5680 - val_acc: 0.7500
Epoch 229/1000
 - 0s - loss: 0.6189 - acc: 0.6400 - val_loss: 0.5679 - val_acc: 0.7500
Epoch 230/1000
 - 0s - loss: 0.6188 - acc: 0.6400 - val_loss: 0.5678 - val_acc: 0.7500
Epoch 231/1000
 - 0s - loss: 0.6187 - acc: 0.6400 - val_loss: 0.5677 - val_acc: 0.7500
Epoch 232/1000
 - 0s - loss: 0.6186 - acc: 0.6400 - val_loss: 0.5676 - val_acc: 0.7500
Epoch 233/1000
 - 0s - loss: 0.6185 - acc: 0.6400 - val_loss: 0.5675 - val_acc: 0.7500
Epoch 234/1000
 - 0s - loss: 0.6184 - acc: 0.6400 - val_loss: 0.5674 - val_acc: 0.7500
Epoch 235/1000
```

```
 - 0s - loss: 0.6183 - acc: 0.6400 - val_loss: 0.5673 - val_acc: 0.7500
Epoch 236/1000
 - 0s - loss: 0.6182 - acc: 0.6400 - val_loss: 0.5673 - val_acc: 0.7500
Epoch 237/1000
 - 0s - loss: 0.6182 - acc: 0.6400 - val_loss: 0.5672 - val_acc: 0.7500
Epoch 238/1000
 - 0s - loss: 0.6181 - acc: 0.6400 - val_loss: 0.5671 - val_acc: 0.7500
Epoch 239/1000
 - 0s - loss: 0.6180 - acc: 0.6400 - val_loss: 0.5670 - val_acc: 0.7500
Epoch 240/1000
 - 0s - loss: 0.6179 - acc: 0.6400 - val_loss: 0.5669 - val_acc: 0.7500
Epoch 241/1000
 - 0s - loss: 0.6178 - acc: 0.6400 - val_loss: 0.5669 - val_acc: 0.7500
Epoch 242/1000
 - 0s - loss: 0.6177 - acc: 0.6400 - val_loss: 0.5668 - val_acc: 0.7500
Epoch 243/1000
 - 0s - loss: 0.6176 - acc: 0.6450 - val_loss: 0.5667 - val_acc: 0.7500
Epoch 244/1000
 - 0s - loss: 0.6176 - acc: 0.6450 - val_loss: 0.5666 - val_acc: 0.7500
Epoch 245/1000
 - 0s - loss: 0.6175 - acc: 0.6450 - val_loss: 0.5665 - val_acc: 0.7500
Epoch 246/1000
 - 0s - loss: 0.6174 - acc: 0.6500 - val_loss: 0.5665 - val_acc: 0.7500
Epoch 247/1000
 - 0s - loss: 0.6173 - acc: 0.6500 - val_loss: 0.5664 - val_acc: 0.7500
Epoch 248/1000
 - 0s - loss: 0.6172 - acc: 0.6500 - val_loss: 0.5663 - val_acc: 0.7500
Epoch 249/1000
 - 0s - loss: 0.6171 - acc: 0.6500 - val_loss: 0.5662 - val_acc: 0.7500
Epoch 250/1000
 - 0s - loss: 0.6170 - acc: 0.6500 - val_loss: 0.5662 - val_acc: 0.7500
Epoch 251/1000
 - 0s - loss: 0.6170 - acc: 0.6500 - val_loss: 0.5661 - val_acc: 0.7500
Epoch 252/1000
 - 0s - loss: 0.6169 - acc: 0.6500 - val_loss: 0.5660 - val_acc: 0.7500
Epoch 253/1000
 - 0s - loss: 0.6168 - acc: 0.6500 - val_loss: 0.5659 - val_acc: 0.7500
Epoch 254/1000
 - 0s - loss: 0.6167 - acc: 0.6500 - val_loss: 0.5659 - val_acc: 0.7500
Epoch 255/1000
 - 0s - loss: 0.6166 - acc: 0.6500 - val_loss: 0.5658 - val_acc: 0.7500
Epoch 256/1000
 - 0s - loss: 0.6165 - acc: 0.6500 - val_loss: 0.5657 - val_acc: 0.7500
Epoch 257/1000
 - 0s - loss: 0.6165 - acc: 0.6500 - val_loss: 0.5657 - val_acc: 0.7500
Epoch 258/1000
 - 0s - loss: 0.6164 - acc: 0.6500 - val_loss: 0.5656 - val_acc: 0.7500
Epoch 259/1000
```

```
 - 0s - loss: 0.6163 - acc: 0.6500 - val_loss: 0.5655 - val_acc: 0.7500
Epoch 260/1000
 - 0s - loss: 0.6162 - acc: 0.6500 - val_loss: 0.5655 - val_acc: 0.7500
Epoch 261/1000
 - 0s - loss: 0.6161 - acc: 0.6500 - val_loss: 0.5654 - val_acc: 0.7400
Epoch 262/1000
 - 0s - loss: 0.6161 - acc: 0.6500 - val_loss: 0.5653 - val_acc: 0.7400
Epoch 263/1000
 - 0s - loss: 0.6160 - acc: 0.6500 - val_loss: 0.5653 - val_acc: 0.7400
Epoch 264/1000
 - 0s - loss: 0.6159 - acc: 0.6500 - val_loss: 0.5652 - val_acc: 0.7400
Epoch 265/1000
 - 0s - loss: 0.6158 - acc: 0.6500 - val_loss: 0.5651 - val_acc: 0.7400
Epoch 266/1000
 - 0s - loss: 0.6157 - acc: 0.6500 - val_loss: 0.5651 - val_acc: 0.7400
Epoch 267/1000
 - 0s - loss: 0.6156 - acc: 0.6500 - val_loss: 0.5650 - val_acc: 0.7400
Epoch 268/1000
 - 0s - loss: 0.6156 - acc: 0.6500 - val_loss: 0.5649 - val_acc: 0.7400
Epoch 269/1000
 - 0s - loss: 0.6155 - acc: 0.6500 - val_loss: 0.5649 - val_acc: 0.7400
Epoch 270/1000
 - 0s - loss: 0.6154 - acc: 0.6500 - val_loss: 0.5648 - val_acc: 0.7400
Epoch 271/1000
 - 0s - loss: 0.6153 - acc: 0.6500 - val_loss: 0.5647 - val_acc: 0.7400
Epoch 272/1000
 - 0s - loss: 0.6153 - acc: 0.6500 - val_loss: 0.5646 - val_acc: 0.7400
Epoch 273/1000
 - 0s - loss: 0.6152 - acc: 0.6500 - val_loss: 0.5646 - val_acc: 0.7400
Epoch 274/1000
 - 0s - loss: 0.6151 - acc: 0.6500 - val_loss: 0.5645 - val_acc: 0.7400
Epoch 275/1000
 - 0s - loss: 0.6150 - acc: 0.6500 - val_loss: 0.5645 - val_acc: 0.7400
Epoch 276/1000
 - 0s - loss: 0.6149 - acc: 0.6500 - val_loss: 0.5644 - val_acc: 0.7400
Epoch 277/1000
 - 0s - loss: 0.6149 - acc: 0.6500 - val_loss: 0.5643 - val_acc: 0.7400
Epoch 278/1000
 - 0s - loss: 0.6148 - acc: 0.6500 - val_loss: 0.5643 - val_acc: 0.7400
Epoch 279/1000
 - 0s - loss: 0.6147 - acc: 0.6500 - val_loss: 0.5642 - val_acc: 0.7400
Epoch 280/1000
 - 0s - loss: 0.6146 - acc: 0.6500 - val_loss: 0.5641 - val_acc: 0.7400
Epoch 281/1000
 - 0s - loss: 0.6146 - acc: 0.6500 - val_loss: 0.5641 - val_acc: 0.7400
Epoch 282/1000
 - 0s - loss: 0.6145 - acc: 0.6500 - val_loss: 0.5640 - val_acc: 0.7400
Epoch 283/1000
```

```
 - 0s - loss: 0.6144 - acc: 0.6500 - val_loss: 0.5640 - val_acc: 0.7400
Epoch 284/1000
 - 0s - loss: 0.6143 - acc: 0.6500 - val_loss: 0.5639 - val_acc: 0.7400
Epoch 285/1000
 - 0s - loss: 0.6143 - acc: 0.6500 - val_loss: 0.5638 - val_acc: 0.7400
Epoch 286/1000
 - 0s - loss: 0.6142 - acc: 0.6500 - val_loss: 0.5638 - val_acc: 0.7400
Epoch 287/1000
 - 0s - loss: 0.6141 - acc: 0.6500 - val_loss: 0.5637 - val_acc: 0.7400
Epoch 288/1000
 - 0s - loss: 0.6140 - acc: 0.6500 - val_loss: 0.5637 - val_acc: 0.7400
Epoch 289/1000
 - 0s - loss: 0.6140 - acc: 0.6500 - val_loss: 0.5636 - val_acc: 0.7400
Epoch 290/1000
 - 0s - loss: 0.6139 - acc: 0.6500 - val_loss: 0.5635 - val_acc: 0.7400
Epoch 291/1000
 - 0s - loss: 0.6138 - acc: 0.6500 - val_loss: 0.5635 - val_acc: 0.7400
Epoch 292/1000
 - 0s - loss: 0.6137 - acc: 0.6500 - val_loss: 0.5634 - val_acc: 0.7400
Epoch 293/1000
 - 0s - loss: 0.6137 - acc: 0.6500 - val_loss: 0.5634 - val_acc: 0.7400
Epoch 294/1000
 - 0s - loss: 0.6136 - acc: 0.6500 - val_loss: 0.5633 - val_acc: 0.7400
Epoch 295/1000
 - 0s - loss: 0.6135 - acc: 0.6500 - val_loss: 0.5632 - val_acc: 0.7400
Epoch 296/1000
 - 0s - loss: 0.6134 - acc: 0.6500 - val_loss: 0.5632 - val_acc: 0.7400
Epoch 297/1000
 - 0s - loss: 0.6134 - acc: 0.6500 - val_loss: 0.5631 - val_acc: 0.7400
Epoch 298/1000
 - 0s - loss: 0.6133 - acc: 0.6500 - val_loss: 0.5631 - val_acc: 0.7400
Epoch 299/1000
 - 0s - loss: 0.6132 - acc: 0.6500 - val_loss: 0.5630 - val_acc: 0.7400
Epoch 300/1000
 - 0s - loss: 0.6131 - acc: 0.6450 - val_loss: 0.5630 - val_acc: 0.7400
Epoch 301/1000
 - 0s - loss: 0.6131 - acc: 0.6450 - val_loss: 0.5629 - val_acc: 0.7400
Epoch 302/1000
 - 0s - loss: 0.6130 - acc: 0.6450 - val_loss: 0.5628 - val_acc: 0.7400
Epoch 303/1000
 - 0s - loss: 0.6129 - acc: 0.6450 - val_loss: 0.5628 - val_acc: 0.7400
Epoch 304/1000
 - 0s - loss: 0.6129 - acc: 0.6450 - val_loss: 0.5627 - val_acc: 0.7400
Epoch 305/1000
 - 0s - loss: 0.6128 - acc: 0.6450 - val_loss: 0.5627 - val_acc: 0.7400
Epoch 306/1000
 - 0s - loss: 0.6127 - acc: 0.6450 - val_loss: 0.5626 - val_acc: 0.7400
Epoch 307/1000
```

```
 - 0s - loss: 0.6127 - acc: 0.6450 - val_loss: 0.5626 - val_acc: 0.7400
Epoch 308/1000
 - 0s - loss: 0.6126 - acc: 0.6450 - val_loss: 0.5625 - val_acc: 0.7400
Epoch 309/1000
 - 0s - loss: 0.6125 - acc: 0.6450 - val_loss: 0.5624 - val_acc: 0.7400
Epoch 310/1000
 - 0s - loss: 0.6124 - acc: 0.6450 - val_loss: 0.5624 - val_acc: 0.7400
Epoch 311/1000
 - 0s - loss: 0.6124 - acc: 0.6450 - val_loss: 0.5623 - val_acc: 0.7400
Epoch 312/1000
 - 0s - loss: 0.6123 - acc: 0.6450 - val_loss: 0.5623 - val_acc: 0.7400
Epoch 313/1000
 - 0s - loss: 0.6122 - acc: 0.6450 - val_loss: 0.5622 - val_acc: 0.7400
Epoch 314/1000
 - 0s - loss: 0.6121 - acc: 0.6450 - val_loss: 0.5622 - val_acc: 0.7400
Epoch 315/1000
 - 0s - loss: 0.6121 - acc: 0.6450 - val_loss: 0.5621 - val_acc: 0.7400
Epoch 316/1000
 - 0s - loss: 0.6120 - acc: 0.6500 - val_loss: 0.5621 - val_acc: 0.7400
Epoch 317/1000
 - 0s - loss: 0.6119 - acc: 0.6500 - val_loss: 0.5620 - val_acc: 0.7400
Epoch 318/1000
 - 0s - loss: 0.6119 - acc: 0.6500 - val_loss: 0.5620 - val_acc: 0.7400
Epoch 319/1000
 - 0s - loss: 0.6118 - acc: 0.6500 - val_loss: 0.5619 - val_acc: 0.7400
Epoch 320/1000
 - 0s - loss: 0.6117 - acc: 0.6500 - val_loss: 0.5619 - val_acc: 0.7400
Epoch 321/1000
 - 0s - loss: 0.6116 - acc: 0.6500 - val_loss: 0.5618 - val_acc: 0.7400
Epoch 322/1000
 - 0s - loss: 0.6116 - acc: 0.6500 - val_loss: 0.5618 - val_acc: 0.7400
Epoch 323/1000
 - 0s - loss: 0.6115 - acc: 0.6500 - val_loss: 0.5617 - val_acc: 0.7400
Epoch 324/1000
 - 0s - loss: 0.6114 - acc: 0.6500 - val_loss: 0.5617 - val_acc: 0.7400
Epoch 325/1000
 - 0s - loss: 0.6114 - acc: 0.6500 - val_loss: 0.5616 - val_acc: 0.7400
Epoch 326/1000
 - 0s - loss: 0.6113 - acc: 0.6500 - val_loss: 0.5616 - val_acc: 0.7400
Epoch 327/1000
 - 0s - loss: 0.6112 - acc: 0.6500 - val_loss: 0.5615 - val_acc: 0.7400
Epoch 328/1000
 - 0s - loss: 0.6112 - acc: 0.6500 - val_loss: 0.5615 - val_acc: 0.7400
Epoch 329/1000
 - 0s - loss: 0.6111 - acc: 0.6500 - val_loss: 0.5614 - val_acc: 0.7400
Epoch 330/1000
 - 0s - loss: 0.6110 - acc: 0.6500 - val_loss: 0.5614 - val_acc: 0.7400
Epoch 331/1000
```

```
 - 0s - loss: 0.6110 - acc: 0.6500 - val_loss: 0.5613 - val_acc: 0.7500
Epoch 332/1000
 - 0s - loss: 0.6109 - acc: 0.6500 - val_loss: 0.5613 - val_acc: 0.7500
Epoch 333/1000
 - 0s - loss: 0.6108 - acc: 0.6500 - val_loss: 0.5612 - val_acc: 0.7500
Epoch 334/1000
 - 0s - loss: 0.6107 - acc: 0.6500 - val_loss: 0.5612 - val_acc: 0.7500
Epoch 335/1000
 - 0s - loss: 0.6107 - acc: 0.6500 - val_loss: 0.5611 - val_acc: 0.7500
Epoch 336/1000
 - 0s - loss: 0.6106 - acc: 0.6500 - val_loss: 0.5611 - val_acc: 0.7500
Epoch 337/1000
 - 0s - loss: 0.6105 - acc: 0.6500 - val_loss: 0.5611 - val_acc: 0.7500
Epoch 338/1000
 - 0s - loss: 0.6105 - acc: 0.6500 - val_loss: 0.5610 - val_acc: 0.7500
Epoch 339/1000
 - 0s - loss: 0.6104 - acc: 0.6500 - val_loss: 0.5610 - val_acc: 0.7500
Epoch 340/1000
 - 0s - loss: 0.6103 - acc: 0.6500 - val_loss: 0.5609 - val_acc: 0.7500
Epoch 341/1000
 - 0s - loss: 0.6103 - acc: 0.6500 - val_loss: 0.5609 - val_acc: 0.7500
Epoch 342/1000
 - 0s - loss: 0.6102 - acc: 0.6500 - val_loss: 0.5608 - val_acc: 0.7500
Epoch 343/1000
 - 0s - loss: 0.6101 - acc: 0.6500 - val_loss: 0.5608 - val_acc: 0.7400
Epoch 344/1000
 - 0s - loss: 0.6101 - acc: 0.6500 - val_loss: 0.5608 - val_acc: 0.7400
Epoch 345/1000
 - 0s - loss: 0.6100 - acc: 0.6500 - val_loss: 0.5607 - val_acc: 0.7400
Epoch 346/1000
 - 0s - loss: 0.6099 - acc: 0.6550 - val_loss: 0.5607 - val_acc: 0.7400
Epoch 347/1000
 - 0s - loss: 0.6099 - acc: 0.6550 - val_loss: 0.5606 - val_acc: 0.7400
Epoch 348/1000
 - 0s - loss: 0.6098 - acc: 0.6550 - val_loss: 0.5606 - val_acc: 0.7400
Epoch 349/1000
 - 0s - loss: 0.6097 - acc: 0.6550 - val_loss: 0.5605 - val_acc: 0.7400
Epoch 350/1000
 - 0s - loss: 0.6097 - acc: 0.6550 - val_loss: 0.5605 - val_acc: 0.7400
Epoch 351/1000
 - 0s - loss: 0.6096 - acc: 0.6550 - val_loss: 0.5604 - val_acc: 0.7400
Epoch 352/1000
 - 0s - loss: 0.6095 - acc: 0.6550 - val_loss: 0.5604 - val_acc: 0.7400
Epoch 353/1000
 - 0s - loss: 0.6095 - acc: 0.6550 - val_loss: 0.5604 - val_acc: 0.7400
Epoch 354/1000
 - 0s - loss: 0.6094 - acc: 0.6550 - val_loss: 0.5603 - val_acc: 0.7400
Epoch 355/1000
```

```
 - 0s - loss: 0.6093 - acc: 0.6550 - val_loss: 0.5603 - val_acc: 0.7400
Epoch 356/1000
 - 0s - loss: 0.6093 - acc: 0.6550 - val_loss: 0.5602 - val_acc: 0.7400
Epoch 357/1000
 - 0s - loss: 0.6092 - acc: 0.6550 - val_loss: 0.5602 - val_acc: 0.7400
Epoch 358/1000
 - 0s - loss: 0.6091 - acc: 0.6550 - val_loss: 0.5601 - val_acc: 0.7400
Epoch 359/1000
 - 0s - loss: 0.6091 - acc: 0.6550 - val_loss: 0.5601 - val_acc: 0.7400
Epoch 360/1000
 - 0s - loss: 0.6090 - acc: 0.6550 - val_loss: 0.5601 - val_acc: 0.7400
Epoch 361/1000
 - 0s - loss: 0.6089 - acc: 0.6600 - val_loss: 0.5600 - val_acc: 0.7400
Epoch 362/1000
 - 0s - loss: 0.6089 - acc: 0.6600 - val_loss: 0.5600 - val_acc: 0.7500
Epoch 363/1000
 - 0s - loss: 0.6088 - acc: 0.6600 - val_loss: 0.5599 - val_acc: 0.7500
Epoch 364/1000
 - 0s - loss: 0.6088 - acc: 0.6600 - val_loss: 0.5599 - val_acc: 0.7500
Epoch 365/1000
 - 0s - loss: 0.6087 - acc: 0.6600 - val_loss: 0.5598 - val_acc: 0.7500
Epoch 366/1000
 - 0s - loss: 0.6086 - acc: 0.6600 - val_loss: 0.5598 - val_acc: 0.7500
Epoch 367/1000
 - 0s - loss: 0.6086 - acc: 0.6650 - val_loss: 0.5598 - val_acc: 0.7500
Epoch 368/1000
 - 0s - loss: 0.6085 - acc: 0.6650 - val_loss: 0.5597 - val_acc: 0.7500
Epoch 369/1000
 - 0s - loss: 0.6084 - acc: 0.6650 - val_loss: 0.5597 - val_acc: 0.7500
Epoch 370/1000
 - 0s - loss: 0.6084 - acc: 0.6650 - val_loss: 0.5596 - val_acc: 0.7500
Epoch 371/1000
 - 0s - loss: 0.6083 - acc: 0.6650 - val_loss: 0.5596 - val_acc: 0.7500
Epoch 372/1000
 - 0s - loss: 0.6082 - acc: 0.6650 - val_loss: 0.5596 - val_acc: 0.7500
Epoch 373/1000
 - 0s - loss: 0.6082 - acc: 0.6650 - val_loss: 0.5595 - val_acc: 0.7600
Epoch 374/1000
 - 0s - loss: 0.6081 - acc: 0.6650 - val_loss: 0.5595 - val_acc: 0.7600
Epoch 375/1000
 - 0s - loss: 0.6080 - acc: 0.6650 - val_loss: 0.5594 - val_acc: 0.7600
Epoch 376/1000
 - 0s - loss: 0.6080 - acc: 0.6650 - val_loss: 0.5594 - val_acc: 0.7600
Epoch 377/1000
 - 0s - loss: 0.6079 - acc: 0.6650 - val_loss: 0.5594 - val_acc: 0.7600
Epoch 378/1000
 - 0s - loss: 0.6078 - acc: 0.6650 - val_loss: 0.5593 - val_acc: 0.7600
Epoch 379/1000
```

```
 - 0s - loss: 0.6078 - acc: 0.6650 - val_loss: 0.5593 - val_acc: 0.7600
Epoch 380/1000
 - 0s - loss: 0.6077 - acc: 0.6650 - val_loss: 0.5593 - val_acc: 0.7600
Epoch 381/1000
 - 0s - loss: 0.6077 - acc: 0.6650 - val_loss: 0.5592 - val_acc: 0.7600
Epoch 382/1000
 - 0s - loss: 0.6076 - acc: 0.6650 - val_loss: 0.5592 - val_acc: 0.7600
Epoch 383/1000
 - 0s - loss: 0.6075 - acc: 0.6650 - val_loss: 0.5591 - val_acc: 0.7700
Epoch 384/1000
 - 0s - loss: 0.6075 - acc: 0.6650 - val_loss: 0.5591 - val_acc: 0.7700
Epoch 385/1000
 - 0s - loss: 0.6074 - acc: 0.6650 - val_loss: 0.5591 - val_acc: 0.7700
Epoch 386/1000
 - 0s - loss: 0.6073 - acc: 0.6650 - val_loss: 0.5590 - val_acc: 0.7700
Epoch 387/1000
 - 0s - loss: 0.6073 - acc: 0.6650 - val_loss: 0.5590 - val_acc: 0.7700
Epoch 388/1000
 - 0s - loss: 0.6072 - acc: 0.6650 - val_loss: 0.5590 - val_acc: 0.7700
Epoch 389/1000
 - 0s - loss: 0.6072 - acc: 0.6650 - val_loss: 0.5589 - val_acc: 0.7700
Epoch 390/1000
 - 0s - loss: 0.6071 - acc: 0.6650 - val_loss: 0.5589 - val_acc: 0.7700
Epoch 391/1000
 - 0s - loss: 0.6070 - acc: 0.6650 - val_loss: 0.5589 - val_acc: 0.7700
Epoch 392/1000
 - 0s - loss: 0.6070 - acc: 0.6650 - val_loss: 0.5588 - val_acc: 0.7700
Epoch 393/1000
 - 0s - loss: 0.6069 - acc: 0.6650 - val_loss: 0.5588 - val_acc: 0.7700
Epoch 394/1000
 - 0s - loss: 0.6068 - acc: 0.6600 - val_loss: 0.5587 - val_acc: 0.7700
Epoch 395/1000
 - 0s - loss: 0.6068 - acc: 0.6600 - val_loss: 0.5587 - val_acc: 0.7700
Epoch 396/1000
 - 0s - loss: 0.6067 - acc: 0.6600 - val_loss: 0.5587 - val_acc: 0.7700
Epoch 397/1000
 - 0s - loss: 0.6067 - acc: 0.6600 - val_loss: 0.5586 - val_acc: 0.7700
Epoch 398/1000
 - 0s - loss: 0.6066 - acc: 0.6600 - val_loss: 0.5586 - val_acc: 0.7700
Epoch 399/1000
 - 0s - loss: 0.6065 - acc: 0.6600 - val_loss: 0.5586 - val_acc: 0.7700
Epoch 400/1000
 - 0s - loss: 0.6065 - acc: 0.6600 - val_loss: 0.5585 - val_acc: 0.7700
Epoch 401/1000
 - 0s - loss: 0.6064 - acc: 0.6600 - val_loss: 0.5585 - val_acc: 0.7700
Epoch 402/1000
 - 0s - loss: 0.6063 - acc: 0.6600 - val_loss: 0.5584 - val_acc: 0.7700
Epoch 403/1000
```

```
 - 0s - loss: 0.6063 - acc: 0.6600 - val_loss: 0.5584 - val_acc: 0.7700
Epoch 404/1000
 - 0s - loss: 0.6062 - acc: 0.6600 - val_loss: 0.5584 - val_acc: 0.7600
Epoch 405/1000
 - 0s - loss: 0.6062 - acc: 0.6600 - val_loss: 0.5583 - val_acc: 0.7600
Epoch 406/1000
 - 0s - loss: 0.6061 - acc: 0.6600 - val_loss: 0.5583 - val_acc: 0.7600
Epoch 407/1000
 - 0s - loss: 0.6060 - acc: 0.6600 - val_loss: 0.5583 - val_acc: 0.7600
Epoch 408/1000
 - 0s - loss: 0.6060 - acc: 0.6600 - val_loss: 0.5582 - val_acc: 0.7600
Epoch 409/1000
 - 0s - loss: 0.6059 - acc: 0.6600 - val_loss: 0.5582 - val_acc: 0.7600
Epoch 410/1000
 - 0s - loss: 0.6059 - acc: 0.6600 - val_loss: 0.5582 - val_acc: 0.7600
Epoch 411/1000
 - 0s - loss: 0.6058 - acc: 0.6600 - val_loss: 0.5581 - val_acc: 0.7600
Epoch 412/1000
 - 0s - loss: 0.6057 - acc: 0.6600 - val_loss: 0.5581 - val_acc: 0.7600
Epoch 413/1000
 - 0s - loss: 0.6057 - acc: 0.6600 - val_loss: 0.5581 - val_acc: 0.7600
Epoch 414/1000
 - 0s - loss: 0.6056 - acc: 0.6600 - val_loss: 0.5580 - val_acc: 0.7600
Epoch 415/1000
 - 0s - loss: 0.6056 - acc: 0.6600 - val_loss: 0.5580 - val_acc: 0.7600
Epoch 416/1000
 - 0s - loss: 0.6055 - acc: 0.6600 - val_loss: 0.5579 - val_acc: 0.7600
Epoch 417/1000
 - 0s - loss: 0.6055 - acc: 0.6600 - val_loss: 0.5579 - val_acc: 0.7600
Epoch 418/1000
 - 0s - loss: 0.6054 - acc: 0.6600 - val_loss: 0.5579 - val_acc: 0.7600
Epoch 419/1000
 - 0s - loss: 0.6053 - acc: 0.6600 - val_loss: 0.5578 - val_acc: 0.7600
Epoch 420/1000
 - 0s - loss: 0.6053 - acc: 0.6600 - val_loss: 0.5578 - val_acc: 0.7600
Epoch 421/1000
 - 0s - loss: 0.6052 - acc: 0.6600 - val_loss: 0.5578 - val_acc: 0.7600
Epoch 422/1000
 - 0s - loss: 0.6052 - acc: 0.6600 - val_loss: 0.5577 - val_acc: 0.7600
Epoch 423/1000
 - 0s - loss: 0.6051 - acc: 0.6600 - val_loss: 0.5577 - val_acc: 0.7600
Epoch 424/1000
 - 0s - loss: 0.6050 - acc: 0.6600 - val_loss: 0.5577 - val_acc: 0.7600
Epoch 425/1000
 - 0s - loss: 0.6050 - acc: 0.6600 - val_loss: 0.5576 - val_acc: 0.7600
Epoch 426/1000
 - 0s - loss: 0.6049 - acc: 0.6600 - val_loss: 0.5576 - val_acc: 0.7600
Epoch 427/1000
```

```
 - 0s - loss: 0.6049 - acc: 0.6600 - val_loss: 0.5576 - val_acc: 0.7600
Epoch 428/1000
 - 0s - loss: 0.6048 - acc: 0.6600 - val_loss: 0.5575 - val_acc: 0.7600
Epoch 429/1000
 - 0s - loss: 0.6048 - acc: 0.6600 - val_loss: 0.5575 - val_acc: 0.7600
Epoch 430/1000
 - 0s - loss: 0.6047 - acc: 0.6600 - val_loss: 0.5575 - val_acc: 0.7600
Epoch 431/1000
 - 0s - loss: 0.6046 - acc: 0.6600 - val_loss: 0.5574 - val_acc: 0.7600
Epoch 432/1000
 - 0s - loss: 0.6046 - acc: 0.6600 - val_loss: 0.5574 - val_acc: 0.7700
Epoch 433/1000
 - 0s - loss: 0.6045 - acc: 0.6600 - val_loss: 0.5574 - val_acc: 0.7700
Epoch 434/1000
 - 0s - loss: 0.6045 - acc: 0.6600 - val_loss: 0.5573 - val_acc: 0.7700
Epoch 435/1000
 - 0s - loss: 0.6044 - acc: 0.6600 - val_loss: 0.5573 - val_acc: 0.7700
Epoch 436/1000
 - 0s - loss: 0.6044 - acc: 0.6600 - val_loss: 0.5573 - val_acc: 0.7700
Epoch 437/1000
 - 0s - loss: 0.6043 - acc: 0.6600 - val_loss: 0.5572 - val_acc: 0.7700
Epoch 438/1000
 - 0s - loss: 0.6043 - acc: 0.6600 - val_loss: 0.5572 - val_acc: 0.7700
Epoch 439/1000
 - 0s - loss: 0.6042 - acc: 0.6600 - val_loss: 0.5572 - val_acc: 0.7700
Epoch 440/1000
 - 0s - loss: 0.6041 - acc: 0.6600 - val_loss: 0.5571 - val_acc: 0.7700
Epoch 441/1000
 - 0s - loss: 0.6041 - acc: 0.6600 - val_loss: 0.5571 - val_acc: 0.7700
Epoch 442/1000
 - 0s - loss: 0.6040 - acc: 0.6600 - val_loss: 0.5571 - val_acc: 0.7700
Epoch 443/1000
 - 0s - loss: 0.6040 - acc: 0.6600 - val_loss: 0.5570 - val_acc: 0.7700
Epoch 444/1000
 - 0s - loss: 0.6039 - acc: 0.6600 - val_loss: 0.5570 - val_acc: 0.7700
Epoch 445/1000
 - 0s - loss: 0.6039 - acc: 0.6600 - val_loss: 0.5570 - val_acc: 0.7700
Epoch 446/1000
 - 0s - loss: 0.6038 - acc: 0.6600 - val_loss: 0.5569 - val_acc: 0.7700
Epoch 447/1000
 - 0s - loss: 0.6038 - acc: 0.6600 - val_loss: 0.5569 - val_acc: 0.7700
Epoch 448/1000
 - 0s - loss: 0.6037 - acc: 0.6600 - val_loss: 0.5569 - val_acc: 0.7700
Epoch 449/1000
 - 0s - loss: 0.6037 - acc: 0.6600 - val_loss: 0.5568 - val_acc: 0.7700
Epoch 450/1000
 - 0s - loss: 0.6036 - acc: 0.6600 - val_loss: 0.5568 - val_acc: 0.7700
Epoch 451/1000
```

```
 - 0s - loss: 0.6036 - acc: 0.6600 - val_loss: 0.5568 - val_acc: 0.7700
Epoch 452/1000
 - 0s - loss: 0.6035 - acc: 0.6600 - val_loss: 0.5567 - val_acc: 0.7700
Epoch 453/1000
 - 0s - loss: 0.6035 - acc: 0.6600 - val_loss: 0.5567 - val_acc: 0.7700
Epoch 454/1000
 - 0s - loss: 0.6034 - acc: 0.6600 - val_loss: 0.5567 - val_acc: 0.7700
Epoch 455/1000
 - 0s - loss: 0.6034 - acc: 0.6600 - val_loss: 0.5566 - val_acc: 0.7700
Epoch 456/1000
 - 0s - loss: 0.6033 - acc: 0.6600 - val_loss: 0.5566 - val_acc: 0.7700
Epoch 457/1000
 - 0s - loss: 0.6033 - acc: 0.6600 - val_loss: 0.5566 - val_acc: 0.7700
Epoch 458/1000
 - 0s - loss: 0.6032 - acc: 0.6600 - val_loss: 0.5565 - val_acc: 0.7700
Epoch 459/1000
 - 0s - loss: 0.6032 - acc: 0.6600 - val_loss: 0.5565 - val_acc: 0.7700
Epoch 460/1000
 - 0s - loss: 0.6031 - acc: 0.6650 - val_loss: 0.5565 - val_acc: 0.7700
Epoch 461/1000
 - 0s - loss: 0.6031 - acc: 0.6650 - val_loss: 0.5564 - val_acc: 0.7700
Epoch 462/1000
 - 0s - loss: 0.6030 - acc: 0.6650 - val_loss: 0.5564 - val_acc: 0.7700
Epoch 463/1000
 - 0s - loss: 0.6030 - acc: 0.6650 - val_loss: 0.5564 - val_acc: 0.7700
Epoch 464/1000
 - 0s - loss: 0.6029 - acc: 0.6650 - val_loss: 0.5563 - val_acc: 0.7700
Epoch 465/1000
 - 0s - loss: 0.6029 - acc: 0.6650 - val_loss: 0.5563 - val_acc: 0.7700
Epoch 466/1000
 - 0s - loss: 0.6028 - acc: 0.6650 - val_loss: 0.5563 - val_acc: 0.7700
Epoch 467/1000
 - 0s - loss: 0.6028 - acc: 0.6650 - val_loss: 0.5562 - val_acc: 0.7700
Epoch 468/1000
 - 0s - loss: 0.6027 - acc: 0.6650 - val_loss: 0.5562 - val_acc: 0.7700
Epoch 469/1000
 - 0s - loss: 0.6027 - acc: 0.6650 - val_loss: 0.5562 - val_acc: 0.7700
Epoch 470/1000
 - 0s - loss: 0.6026 - acc: 0.6650 - val_loss: 0.5561 - val_acc: 0.7700
Epoch 471/1000
 - 0s - loss: 0.6026 - acc: 0.6650 - val_loss: 0.5561 - val_acc: 0.7700
Epoch 472/1000
 - 0s - loss: 0.6025 - acc: 0.6650 - val_loss: 0.5561 - val_acc: 0.7700
Epoch 473/1000
 - 0s - loss: 0.6024 - acc: 0.6650 - val_loss: 0.5560 - val_acc: 0.7700
Epoch 474/1000
 - 0s - loss: 0.6024 - acc: 0.6700 - val_loss: 0.5560 - val_acc: 0.7700
Epoch 475/1000
```

```
 - 0s - loss: 0.6023 - acc: 0.6700 - val_loss: 0.5560 - val_acc: 0.7700
Epoch 476/1000
 - 0s - loss: 0.6023 - acc: 0.6700 - val_loss: 0.5560 - val_acc: 0.7700
Epoch 477/1000
 - 0s - loss: 0.6022 - acc: 0.6750 - val_loss: 0.5559 - val_acc: 0.7700
Epoch 478/1000
 - 0s - loss: 0.6022 - acc: 0.6750 - val_loss: 0.5559 - val_acc: 0.7700
Epoch 479/1000
 - 0s - loss: 0.6021 - acc: 0.6750 - val_loss: 0.5559 - val_acc: 0.7700
Epoch 480/1000
 - 0s - loss: 0.6021 - acc: 0.6750 - val_loss: 0.5558 - val_acc: 0.7700
Epoch 481/1000
 - 0s - loss: 0.6020 - acc: 0.6750 - val_loss: 0.5558 - val_acc: 0.7700
Epoch 482/1000
 - 0s - loss: 0.6020 - acc: 0.6700 - val_loss: 0.5558 - val_acc: 0.7700
Epoch 483/1000
 - 0s - loss: 0.6019 - acc: 0.6700 - val_loss: 0.5557 - val_acc: 0.7700
Epoch 484/1000
 - 0s - loss: 0.6019 - acc: 0.6700 - val_loss: 0.5557 - val_acc: 0.7800
Epoch 485/1000
 - 0s - loss: 0.6018 - acc: 0.6700 - val_loss: 0.5557 - val_acc: 0.7800
Epoch 486/1000
 - 0s - loss: 0.6018 - acc: 0.6700 - val_loss: 0.5556 - val_acc: 0.7800
Epoch 487/1000
 - 0s - loss: 0.6018 - acc: 0.6700 - val_loss: 0.5556 - val_acc: 0.7800
Epoch 488/1000
 - 0s - loss: 0.6017 - acc: 0.6700 - val_loss: 0.5556 - val_acc: 0.7800
Epoch 489/1000
 - 0s - loss: 0.6017 - acc: 0.6700 - val_loss: 0.5556 - val_acc: 0.7800
Epoch 490/1000
 - 0s - loss: 0.6016 - acc: 0.6700 - val_loss: 0.5555 - val_acc: 0.7800
Epoch 491/1000
 - 0s - loss: 0.6016 - acc: 0.6700 - val_loss: 0.5555 - val_acc: 0.7800
Epoch 492/1000
 - 0s - loss: 0.6015 - acc: 0.6700 - val_loss: 0.5555 - val_acc: 0.7800
Epoch 493/1000
 - 0s - loss: 0.6015 - acc: 0.6700 - val_loss: 0.5554 - val_acc: 0.7800
Epoch 494/1000
 - 0s - loss: 0.6014 - acc: 0.6700 - val_loss: 0.5554 - val_acc: 0.7800
Epoch 495/1000
 - 0s - loss: 0.6014 - acc: 0.6700 - val_loss: 0.5554 - val_acc: 0.7800
Epoch 496/1000
 - 0s - loss: 0.6013 - acc: 0.6700 - val_loss: 0.5553 - val_acc: 0.7800
Epoch 497/1000
 - 0s - loss: 0.6013 - acc: 0.6700 - val_loss: 0.5553 - val_acc: 0.7800
Epoch 498/1000
 - 0s - loss: 0.6012 - acc: 0.6700 - val_loss: 0.5553 - val_acc: 0.7800
Epoch 499/1000
```

```
 - 0s - loss: 0.6012 - acc: 0.6700 - val_loss: 0.5552 - val_acc: 0.7800
Epoch 500/1000
 - 0s - loss: 0.6011 - acc: 0.6700 - val_loss: 0.5552 - val_acc: 0.7800
Epoch 501/1000
 - 0s - loss: 0.6011 - acc: 0.6700 - val_loss: 0.5552 - val_acc: 0.7800
Epoch 502/1000
 - 0s - loss: 0.6010 - acc: 0.6700 - val_loss: 0.5552 - val_acc: 0.7800
Epoch 503/1000
 - 0s - loss: 0.6010 - acc: 0.6700 - val_loss: 0.5551 - val_acc: 0.7800
Epoch 504/1000
 - 0s - loss: 0.6009 - acc: 0.6700 - val_loss: 0.5551 - val_acc: 0.7800
Epoch 505/1000
 - 0s - loss: 0.6009 - acc: 0.6700 - val_loss: 0.5551 - val_acc: 0.7800
Epoch 506/1000
 - 0s - loss: 0.6008 - acc: 0.6700 - val_loss: 0.5550 - val_acc: 0.7800
Epoch 507/1000
 - 0s - loss: 0.6008 - acc: 0.6700 - val_loss: 0.5550 - val_acc: 0.7800
Epoch 508/1000
 - 0s - loss: 0.6007 - acc: 0.6700 - val_loss: 0.5550 - val_acc: 0.7800
Epoch 509/1000
 - 0s - loss: 0.6007 - acc: 0.6700 - val_loss: 0.5549 - val_acc: 0.7800
Epoch 510/1000
 - 0s - loss: 0.6006 - acc: 0.6700 - val_loss: 0.5549 - val_acc: 0.7800
Epoch 511/1000
 - 0s - loss: 0.6006 - acc: 0.6700 - val_loss: 0.5549 - val_acc: 0.7800
Epoch 512/1000
 - 0s - loss: 0.6005 - acc: 0.6700 - val_loss: 0.5549 - val_acc: 0.7800
Epoch 513/1000
 - 0s - loss: 0.6005 - acc: 0.6700 - val_loss: 0.5548 - val_acc: 0.7800
Epoch 514/1000
 - 0s - loss: 0.6004 - acc: 0.6700 - val_loss: 0.5548 - val_acc: 0.7900
Epoch 515/1000
 - 0s - loss: 0.6004 - acc: 0.6700 - val_loss: 0.5548 - val_acc: 0.7900
Epoch 516/1000
 - 0s - loss: 0.6003 - acc: 0.6700 - val_loss: 0.5547 - val_acc: 0.7900
Epoch 517/1000
 - 0s - loss: 0.6003 - acc: 0.6700 - val_loss: 0.5547 - val_acc: 0.7900
Epoch 518/1000
 - 0s - loss: 0.6002 - acc: 0.6700 - val_loss: 0.5547 - val_acc: 0.7900
Epoch 519/1000
 - 0s - loss: 0.6002 - acc: 0.6700 - val_loss: 0.5546 - val_acc: 0.7900
Epoch 520/1000
 - 0s - loss: 0.6001 - acc: 0.6700 - val_loss: 0.5546 - val_acc: 0.7900
Epoch 521/1000
 - 0s - loss: 0.6001 - acc: 0.6700 - val_loss: 0.5546 - val_acc: 0.7900
Epoch 522/1000
 - 0s - loss: 0.6000 - acc: 0.6700 - val_loss: 0.5545 - val_acc: 0.7900
Epoch 523/1000
```

```
 - 0s - loss: 0.6000 - acc: 0.6700 - val_loss: 0.5545 - val_acc: 0.7900
Epoch 524/1000
 - 0s - loss: 0.6000 - acc: 0.6700 - val_loss: 0.5545 - val_acc: 0.7900
Epoch 525/1000
 - 0s - loss: 0.5999 - acc: 0.6700 - val_loss: 0.5545 - val_acc: 0.7900
Epoch 526/1000
 - 0s - loss: 0.5999 - acc: 0.6700 - val_loss: 0.5544 - val_acc: 0.7900
Epoch 527/1000
 - 0s - loss: 0.5998 - acc: 0.6700 - val_loss: 0.5544 - val_acc: 0.7900
Epoch 528/1000
 - 0s - loss: 0.5998 - acc: 0.6700 - val_loss: 0.5544 - val_acc: 0.7900
Epoch 529/1000
 - 0s - loss: 0.5997 - acc: 0.6700 - val_loss: 0.5543 - val_acc: 0.7900
Epoch 530/1000
 - 0s - loss: 0.5997 - acc: 0.6700 - val_loss: 0.5543 - val_acc: 0.7900
Epoch 531/1000
 - 0s - loss: 0.5996 - acc: 0.6700 - val_loss: 0.5543 - val_acc: 0.7900
Epoch 532/1000
 - 0s - loss: 0.5996 - acc: 0.6700 - val_loss: 0.5543 - val_acc: 0.7900
Epoch 533/1000
 - 0s - loss: 0.5995 - acc: 0.6700 - val_loss: 0.5542 - val_acc: 0.7900
Epoch 534/1000
 - 0s - loss: 0.5995 - acc: 0.6700 - val_loss: 0.5542 - val_acc: 0.7900
Epoch 535/1000
 - 0s - loss: 0.5994 - acc: 0.6700 - val_loss: 0.5542 - val_acc: 0.7900
Epoch 536/1000
 - 0s - loss: 0.5994 - acc: 0.6700 - val_loss: 0.5541 - val_acc: 0.7900
Epoch 537/1000
 - 0s - loss: 0.5993 - acc: 0.6700 - val_loss: 0.5541 - val_acc: 0.7900
Epoch 538/1000
 - 0s - loss: 0.5993 - acc: 0.6700 - val_loss: 0.5541 - val_acc: 0.7900
Epoch 539/1000
 - 0s - loss: 0.5992 - acc: 0.6700 - val_loss: 0.5540 - val_acc: 0.7900
Epoch 540/1000
 - 0s - loss: 0.5992 - acc: 0.6700 - val_loss: 0.5540 - val_acc: 0.7900
Epoch 541/1000
 - 0s - loss: 0.5991 - acc: 0.6700 - val_loss: 0.5540 - val_acc: 0.7900
Epoch 542/1000
 - 0s - loss: 0.5991 - acc: 0.6700 - val_loss: 0.5540 - val_acc: 0.7900
Epoch 543/1000
 - 0s - loss: 0.5991 - acc: 0.6700 - val_loss: 0.5539 - val_acc: 0.7900
Epoch 544/1000
 - 0s - loss: 0.5990 - acc: 0.6700 - val_loss: 0.5539 - val_acc: 0.7900
Epoch 545/1000
 - 0s - loss: 0.5990 - acc: 0.6700 - val_loss: 0.5539 - val_acc: 0.7900
Epoch 546/1000
 - 0s - loss: 0.5989 - acc: 0.6700 - val_loss: 0.5538 - val_acc: 0.7900
Epoch 547/1000
```

```
 - 0s - loss: 0.5989 - acc: 0.6700 - val_loss: 0.5538 - val_acc: 0.7900
Epoch 548/1000
 - 0s - loss: 0.5988 - acc: 0.6700 - val_loss: 0.5538 - val_acc: 0.7900
Epoch 549/1000
 - 0s - loss: 0.5988 - acc: 0.6700 - val_loss: 0.5537 - val_acc: 0.7900
Epoch 550/1000
 - 0s - loss: 0.5987 - acc: 0.6700 - val_loss: 0.5537 - val_acc: 0.7900
Epoch 551/1000
 - 0s - loss: 0.5987 - acc: 0.6700 - val_loss: 0.5537 - val_acc: 0.7900
Epoch 552/1000
 - 0s - loss: 0.5986 - acc: 0.6700 - val_loss: 0.5536 - val_acc: 0.7900
Epoch 553/1000
 - 0s - loss: 0.5986 - acc: 0.6700 - val_loss: 0.5536 - val_acc: 0.7900
Epoch 554/1000
 - 0s - loss: 0.5985 - acc: 0.6700 - val_loss: 0.5536 - val_acc: 0.7900
Epoch 555/1000
 - 0s - loss: 0.5985 - acc: 0.6700 - val_loss: 0.5536 - val_acc: 0.7900
Epoch 556/1000
 - 0s - loss: 0.5984 - acc: 0.6700 - val_loss: 0.5535 - val_acc: 0.7900
Epoch 557/1000
 - 0s - loss: 0.5984 - acc: 0.6700 - val_loss: 0.5535 - val_acc: 0.7900
Epoch 558/1000
 - 0s - loss: 0.5984 - acc: 0.6700 - val_loss: 0.5535 - val_acc: 0.7900
Epoch 559/1000
 - 0s - loss: 0.5983 - acc: 0.6700 - val_loss: 0.5534 - val_acc: 0.7900
Epoch 560/1000
 - 0s - loss: 0.5983 - acc: 0.6700 - val_loss: 0.5534 - val_acc: 0.7900
Epoch 561/1000
 - 0s - loss: 0.5982 - acc: 0.6700 - val_loss: 0.5534 - val_acc: 0.7900
Epoch 562/1000
 - 0s - loss: 0.5982 - acc: 0.6700 - val_loss: 0.5533 - val_acc: 0.7900
Epoch 563/1000
 - 0s - loss: 0.5981 - acc: 0.6700 - val_loss: 0.5533 - val_acc: 0.7900
Epoch 564/1000
 - 0s - loss: 0.5981 - acc: 0.6700 - val_loss: 0.5533 - val_acc: 0.7900
Epoch 565/1000
 - 0s - loss: 0.5980 - acc: 0.6700 - val_loss: 0.5533 - val_acc: 0.7900
Epoch 566/1000
 - 0s - loss: 0.5980 - acc: 0.6700 - val_loss: 0.5532 - val_acc: 0.7900
Epoch 567/1000
 - 0s - loss: 0.5979 - acc: 0.6700 - val_loss: 0.5532 - val_acc: 0.7900
Epoch 568/1000
 - 0s - loss: 0.5979 - acc: 0.6700 - val_loss: 0.5532 - val_acc: 0.7900
Epoch 569/1000
 - 0s - loss: 0.5979 - acc: 0.6700 - val_loss: 0.5531 - val_acc: 0.7900
Epoch 570/1000
 - 0s - loss: 0.5978 - acc: 0.6750 - val_loss: 0.5531 - val_acc: 0.7900
Epoch 571/1000
```

```
 - 0s - loss: 0.5978 - acc: 0.6750 - val_loss: 0.5531 - val_acc: 0.7900
Epoch 572/1000
 - 0s - loss: 0.5977 - acc: 0.6750 - val_loss: 0.5531 - val_acc: 0.7900
Epoch 573/1000
 - 0s - loss: 0.5977 - acc: 0.6750 - val_loss: 0.5530 - val_acc: 0.7900
Epoch 574/1000
 - 0s - loss: 0.5976 - acc: 0.6750 - val_loss: 0.5530 - val_acc: 0.7900
Epoch 575/1000
 - 0s - loss: 0.5976 - acc: 0.6750 - val_loss: 0.5530 - val_acc: 0.7900
Epoch 576/1000
 - 0s - loss: 0.5975 - acc: 0.6750 - val_loss: 0.5530 - val_acc: 0.7900
Epoch 577/1000
 - 0s - loss: 0.5975 - acc: 0.6750 - val_loss: 0.5529 - val_acc: 0.7900
Epoch 578/1000
 - 0s - loss: 0.5974 - acc: 0.6750 - val_loss: 0.5529 - val_acc: 0.7900
Epoch 579/1000
 - 0s - loss: 0.5974 - acc: 0.6750 - val_loss: 0.5529 - val_acc: 0.7900
Epoch 580/1000
 - 0s - loss: 0.5974 - acc: 0.6750 - val_loss: 0.5528 - val_acc: 0.7900
Epoch 581/1000
 - 0s - loss: 0.5973 - acc: 0.6750 - val_loss: 0.5528 - val_acc: 0.7900
Epoch 582/1000
 - 0s - loss: 0.5973 - acc: 0.6750 - val_loss: 0.5528 - val_acc: 0.7900
Epoch 583/1000
 - 0s - loss: 0.5972 - acc: 0.6750 - val_loss: 0.5528 - val_acc: 0.7900
Epoch 584/1000
 - 0s - loss: 0.5972 - acc: 0.6750 - val_loss: 0.5527 - val_acc: 0.7900
Epoch 585/1000
 - 0s - loss: 0.5971 - acc: 0.6750 - val_loss: 0.5527 - val_acc: 0.7900
Epoch 586/1000
 - 0s - loss: 0.5971 - acc: 0.6750 - val_loss: 0.5527 - val_acc: 0.7900
Epoch 587/1000
 - 0s - loss: 0.5970 - acc: 0.6750 - val_loss: 0.5527 - val_acc: 0.7900
Epoch 588/1000
 - 0s - loss: 0.5970 - acc: 0.6750 - val_loss: 0.5526 - val_acc: 0.7900
Epoch 589/1000
 - 0s - loss: 0.5970 - acc: 0.6750 - val_loss: 0.5526 - val_acc: 0.7900
Epoch 590/1000
 - 0s - loss: 0.5969 - acc: 0.6750 - val_loss: 0.5526 - val_acc: 0.7900
Epoch 591/1000
 - 0s - loss: 0.5969 - acc: 0.6750 - val_loss: 0.5526 - val_acc: 0.7900
Epoch 592/1000
 - 0s - loss: 0.5968 - acc: 0.6750 - val_loss: 0.5525 - val_acc: 0.7900
Epoch 593/1000
 - 0s - loss: 0.5968 - acc: 0.6750 - val_loss: 0.5525 - val_acc: 0.7900
Epoch 594/1000
 - 0s - loss: 0.5967 - acc: 0.6750 - val_loss: 0.5525 - val_acc: 0.7900
Epoch 595/1000
```

```
 - 0s - loss: 0.5967 - acc: 0.6750 - val_loss: 0.5525 - val_acc: 0.7900
Epoch 596/1000
 - 0s - loss: 0.5966 - acc: 0.6750 - val_loss: 0.5524 - val_acc: 0.7900
Epoch 597/1000
 - 0s - loss: 0.5966 - acc: 0.6750 - val_loss: 0.5524 - val_acc: 0.7900
Epoch 598/1000
 - 0s - loss: 0.5966 - acc: 0.6750 - val_loss: 0.5524 - val_acc: 0.7900
Epoch 599/1000
 - 0s - loss: 0.5965 - acc: 0.6750 - val_loss: 0.5524 - val_acc: 0.7900
Epoch 600/1000
 - 0s - loss: 0.5965 - acc: 0.6750 - val_loss: 0.5524 - val_acc: 0.7900
Epoch 601/1000
 - 0s - loss: 0.5964 - acc: 0.6750 - val_loss: 0.5523 - val_acc: 0.7900
Epoch 602/1000
 - 0s - loss: 0.5964 - acc: 0.6750 - val_loss: 0.5523 - val_acc: 0.7900
Epoch 603/1000
 - 0s - loss: 0.5963 - acc: 0.6750 - val_loss: 0.5523 - val_acc: 0.7900
Epoch 604/1000
 - 0s - loss: 0.5963 - acc: 0.6750 - val_loss: 0.5523 - val_acc: 0.7900
Epoch 605/1000
 - 0s - loss: 0.5963 - acc: 0.6750 - val_loss: 0.5522 - val_acc: 0.7900
Epoch 606/1000
 - 0s - loss: 0.5962 - acc: 0.6750 - val_loss: 0.5522 - val_acc: 0.7900
Epoch 607/1000
 - 0s - loss: 0.5962 - acc: 0.6750 - val_loss: 0.5522 - val_acc: 0.7900
Epoch 608/1000
 - 0s - loss: 0.5961 - acc: 0.6750 - val_loss: 0.5522 - val_acc: 0.7900
Epoch 609/1000
 - 0s - loss: 0.5961 - acc: 0.6750 - val_loss: 0.5522 - val_acc: 0.7900
Epoch 610/1000
 - 0s - loss: 0.5960 - acc: 0.6750 - val_loss: 0.5521 - val_acc: 0.7900
Epoch 611/1000
 - 0s - loss: 0.5960 - acc: 0.6750 - val_loss: 0.5521 - val_acc: 0.7900
Epoch 612/1000
 - 0s - loss: 0.5960 - acc: 0.6750 - val_loss: 0.5521 - val_acc: 0.7900
Epoch 613/1000
 - 0s - loss: 0.5959 - acc: 0.6700 - val_loss: 0.5521 - val_acc: 0.7900
Epoch 614/1000
 - 0s - loss: 0.5959 - acc: 0.6700 - val_loss: 0.5521 - val_acc: 0.7900
Epoch 615/1000
 - 0s - loss: 0.5958 - acc: 0.6700 - val_loss: 0.5520 - val_acc: 0.7900
Epoch 616/1000
 - 0s - loss: 0.5958 - acc: 0.6700 - val_loss: 0.5520 - val_acc: 0.7900
Epoch 617/1000
 - 0s - loss: 0.5957 - acc: 0.6700 - val_loss: 0.5520 - val_acc: 0.7900
Epoch 618/1000
 - 0s - loss: 0.5957 - acc: 0.6750 - val_loss: 0.5520 - val_acc: 0.7900
Epoch 619/1000
```

```
 - 0s - loss: 0.5957 - acc: 0.6750 - val_loss: 0.5520 - val_acc: 0.7900
Epoch 620/1000
 - 0s - loss: 0.5956 - acc: 0.6750 - val_loss: 0.5519 - val_acc: 0.7900
Epoch 621/1000
 - 0s - loss: 0.5956 - acc: 0.6750 - val_loss: 0.5519 - val_acc: 0.7900
Epoch 622/1000
 - 0s - loss: 0.5955 - acc: 0.6750 - val_loss: 0.5519 - val_acc: 0.7900
Epoch 623/1000
 - 0s - loss: 0.5955 - acc: 0.6750 - val_loss: 0.5519 - val_acc: 0.7900
Epoch 624/1000
 - 0s - loss: 0.5955 - acc: 0.6750 - val_loss: 0.5519 - val_acc: 0.7900
Epoch 625/1000
 - 0s - loss: 0.5954 - acc: 0.6750 - val_loss: 0.5519 - val_acc: 0.7900
Epoch 626/1000
 - 0s - loss: 0.5954 - acc: 0.6750 - val_loss: 0.5518 - val_acc: 0.7900
Epoch 627/1000
 - 0s - loss: 0.5953 - acc: 0.6750 - val_loss: 0.5518 - val_acc: 0.7900
Epoch 628/1000
 - 0s - loss: 0.5953 - acc: 0.6750 - val_loss: 0.5518 - val_acc: 0.7900
Epoch 629/1000
 - 0s - loss: 0.5952 - acc: 0.6750 - val_loss: 0.5518 - val_acc: 0.7900
Epoch 630/1000
 - 0s - loss: 0.5952 - acc: 0.6750 - val_loss: 0.5518 - val_acc: 0.7900
Epoch 631/1000
 - 0s - loss: 0.5952 - acc: 0.6750 - val_loss: 0.5517 - val_acc: 0.7900
Epoch 632/1000
 - 0s - loss: 0.5951 - acc: 0.6750 - val_loss: 0.5517 - val_acc: 0.7900
Epoch 633/1000
 - 0s - loss: 0.5951 - acc: 0.6750 - val_loss: 0.5517 - val_acc: 0.7900
Epoch 634/1000
 - 0s - loss: 0.5950 - acc: 0.6750 - val_loss: 0.5517 - val_acc: 0.7900
Epoch 635/1000
 - 0s - loss: 0.5950 - acc: 0.6750 - val_loss: 0.5517 - val_acc: 0.7900
Epoch 636/1000
 - 0s - loss: 0.5950 - acc: 0.6750 - val_loss: 0.5516 - val_acc: 0.7900
Epoch 637/1000
 - 0s - loss: 0.5949 - acc: 0.6750 - val_loss: 0.5516 - val_acc: 0.7900
Epoch 638/1000
 - 0s - loss: 0.5949 - acc: 0.6750 - val_loss: 0.5516 - val_acc: 0.7900
Epoch 639/1000
 - 0s - loss: 0.5948 - acc: 0.6750 - val_loss: 0.5516 - val_acc: 0.7900
Epoch 640/1000
 - 0s - loss: 0.5948 - acc: 0.6750 - val_loss: 0.5516 - val_acc: 0.7900
Epoch 641/1000
 - 0s - loss: 0.5947 - acc: 0.6750 - val_loss: 0.5516 - val_acc: 0.7900
Epoch 642/1000
 - 0s - loss: 0.5947 - acc: 0.6750 - val_loss: 0.5515 - val_acc: 0.7900
Epoch 643/1000
```

```
 - 0s - loss: 0.5947 - acc: 0.6750 - val_loss: 0.5515 - val_acc: 0.7900
Epoch 644/1000
 - 0s - loss: 0.5946 - acc: 0.6750 - val_loss: 0.5515 - val_acc: 0.7900
Epoch 645/1000
 - 0s - loss: 0.5946 - acc: 0.6750 - val_loss: 0.5515 - val_acc: 0.7900
Epoch 646/1000
 - 0s - loss: 0.5945 - acc: 0.6750 - val_loss: 0.5515 - val_acc: 0.7900
Epoch 647/1000
 - 0s - loss: 0.5945 - acc: 0.6750 - val_loss: 0.5514 - val_acc: 0.7900
Epoch 648/1000
 - 0s - loss: 0.5945 - acc: 0.6750 - val_loss: 0.5514 - val_acc: 0.7900
Epoch 649/1000
 - 0s - loss: 0.5944 - acc: 0.6750 - val_loss: 0.5514 - val_acc: 0.7900
Epoch 650/1000
 - 0s - loss: 0.5944 - acc: 0.6750 - val_loss: 0.5514 - val_acc: 0.7900
Epoch 651/1000
 - 0s - loss: 0.5943 - acc: 0.6750 - val_loss: 0.5514 - val_acc: 0.7900
Epoch 652/1000
 - 0s - loss: 0.5943 - acc: 0.6750 - val_loss: 0.5514 - val_acc: 0.7900
Epoch 653/1000
 - 0s - loss: 0.5943 - acc: 0.6750 - val_loss: 0.5513 - val_acc: 0.7900
Epoch 654/1000
 - 0s - loss: 0.5942 - acc: 0.6750 - val_loss: 0.5513 - val_acc: 0.7900
Epoch 655/1000
 - 0s - loss: 0.5942 - acc: 0.6750 - val_loss: 0.5513 - val_acc: 0.7900
Epoch 656/1000
 - 0s - loss: 0.5941 - acc: 0.6750 - val_loss: 0.5513 - val_acc: 0.7900
Epoch 657/1000
 - 0s - loss: 0.5941 - acc: 0.6750 - val_loss: 0.5513 - val_acc: 0.7900
Epoch 658/1000
 - 0s - loss: 0.5940 - acc: 0.6750 - val_loss: 0.5513 - val_acc: 0.7900
Epoch 659/1000
 - 0s - loss: 0.5940 - acc: 0.6750 - val_loss: 0.5512 - val_acc: 0.7900
Epoch 660/1000
 - 0s - loss: 0.5940 - acc: 0.6750 - val_loss: 0.5512 - val_acc: 0.7900
Epoch 661/1000
 - 0s - loss: 0.5939 - acc: 0.6750 - val_loss: 0.5512 - val_acc: 0.7900
Epoch 662/1000
 - 0s - loss: 0.5939 - acc: 0.6750 - val_loss: 0.5512 - val_acc: 0.7900
Epoch 663/1000
 - 0s - loss: 0.5938 - acc: 0.6750 - val_loss: 0.5512 - val_acc: 0.7900
Epoch 664/1000
 - 0s - loss: 0.5938 - acc: 0.6750 - val_loss: 0.5511 - val_acc: 0.7900
Epoch 665/1000
 - 0s - loss: 0.5938 - acc: 0.6750 - val_loss: 0.5511 - val_acc: 0.7900
Epoch 666/1000
 - 0s - loss: 0.5937 - acc: 0.6800 - val_loss: 0.5511 - val_acc: 0.7900
Epoch 667/1000
```

```
 - 0s - loss: 0.5937 - acc: 0.6800 - val_loss: 0.5511 - val_acc: 0.7900
Epoch 668/1000
 - 0s - loss: 0.5936 - acc: 0.6800 - val_loss: 0.5511 - val_acc: 0.7900
Epoch 669/1000
 - 0s - loss: 0.5936 - acc: 0.6800 - val_loss: 0.5511 - val_acc: 0.7900
Epoch 670/1000
 - 0s - loss: 0.5936 - acc: 0.6800 - val_loss: 0.5510 - val_acc: 0.7900
Epoch 671/1000
 - 0s - loss: 0.5935 - acc: 0.6800 - val_loss: 0.5510 - val_acc: 0.7900
Epoch 672/1000
 - 0s - loss: 0.5935 - acc: 0.6800 - val_loss: 0.5510 - val_acc: 0.7900
Epoch 673/1000
 - 0s - loss: 0.5934 - acc: 0.6800 - val_loss: 0.5510 - val_acc: 0.7900
Epoch 674/1000
 - 0s - loss: 0.5934 - acc: 0.6800 - val_loss: 0.5510 - val_acc: 0.7900
Epoch 675/1000
 - 0s - loss: 0.5934 - acc: 0.6800 - val_loss: 0.5510 - val_acc: 0.7900
Epoch 676/1000
 - 0s - loss: 0.5933 - acc: 0.6800 - val_loss: 0.5509 - val_acc: 0.7900
Epoch 677/1000
 - 0s - loss: 0.5933 - acc: 0.6800 - val_loss: 0.5509 - val_acc: 0.7900
Epoch 678/1000
 - 0s - loss: 0.5932 - acc: 0.6800 - val_loss: 0.5509 - val_acc: 0.7900
Epoch 679/1000
 - 0s - loss: 0.5932 - acc: 0.6800 - val_loss: 0.5509 - val_acc: 0.7900
Epoch 680/1000
 - 0s - loss: 0.5932 - acc: 0.6800 - val_loss: 0.5509 - val_acc: 0.7900
Epoch 681/1000
 - 0s - loss: 0.5931 - acc: 0.6800 - val_loss: 0.5509 - val_acc: 0.7900
Epoch 682/1000
 - 0s - loss: 0.5931 - acc: 0.6800 - val_loss: 0.5508 - val_acc: 0.7900
Epoch 683/1000
 - 0s - loss: 0.5930 - acc: 0.6800 - val_loss: 0.5508 - val_acc: 0.7900
Epoch 684/1000
 - 0s - loss: 0.5930 - acc: 0.6800 - val_loss: 0.5508 - val_acc: 0.7900
Epoch 685/1000
 - 0s - loss: 0.5930 - acc: 0.6800 - val_loss: 0.5508 - val_acc: 0.7900
Epoch 686/1000
 - 0s - loss: 0.5929 - acc: 0.6800 - val_loss: 0.5508 - val_acc: 0.7900
Epoch 687/1000
 - 0s - loss: 0.5929 - acc: 0.6800 - val_loss: 0.5507 - val_acc: 0.7900
Epoch 688/1000
 - 0s - loss: 0.5928 - acc: 0.6800 - val_loss: 0.5507 - val_acc: 0.7900
Epoch 689/1000
 - 0s - loss: 0.5928 - acc: 0.6800 - val_loss: 0.5507 - val_acc: 0.7900
Epoch 690/1000
 - 0s - loss: 0.5928 - acc: 0.6800 - val_loss: 0.5507 - val_acc: 0.7900
Epoch 691/1000
```

```
 - 0s - loss: 0.5927 - acc: 0.6800 - val_loss: 0.5507 - val_acc: 0.7900
Epoch 692/1000
 - 0s - loss: 0.5927 - acc: 0.6800 - val_loss: 0.5507 - val_acc: 0.7900
Epoch 693/1000
 - 0s - loss: 0.5927 - acc: 0.6800 - val_loss: 0.5506 - val_acc: 0.7900
Epoch 694/1000
 - 0s - loss: 0.5926 - acc: 0.6800 - val_loss: 0.5506 - val_acc: 0.7900
Epoch 695/1000
 - 0s - loss: 0.5926 - acc: 0.6800 - val_loss: 0.5506 - val_acc: 0.7900
Epoch 696/1000
 - 0s - loss: 0.5925 - acc: 0.6800 - val_loss: 0.5506 - val_acc: 0.7900
Epoch 697/1000
 - 0s - loss: 0.5925 - acc: 0.6800 - val_loss: 0.5506 - val_acc: 0.7900
Epoch 698/1000
 - 0s - loss: 0.5925 - acc: 0.6800 - val_loss: 0.5505 - val_acc: 0.7900
Epoch 699/1000
 - 0s - loss: 0.5924 - acc: 0.6800 - val_loss: 0.5505 - val_acc: 0.7900
Epoch 700/1000
 - 0s - loss: 0.5924 - acc: 0.6800 - val_loss: 0.5505 - val_acc: 0.7900
Epoch 701/1000
 - 0s - loss: 0.5924 - acc: 0.6800 - val_loss: 0.5505 - val_acc: 0.7900
Epoch 702/1000
 - 0s - loss: 0.5923 - acc: 0.6800 - val_loss: 0.5505 - val_acc: 0.7900
Epoch 703/1000
 - 0s - loss: 0.5923 - acc: 0.6800 - val_loss: 0.5505 - val_acc: 0.7900
Epoch 704/1000
 - 0s - loss: 0.5922 - acc: 0.6800 - val_loss: 0.5504 - val_acc: 0.7900
Epoch 705/1000
 - 0s - loss: 0.5922 - acc: 0.6800 - val_loss: 0.5504 - val_acc: 0.7900
Epoch 706/1000
 - 0s - loss: 0.5922 - acc: 0.6800 - val_loss: 0.5504 - val_acc: 0.7900
Epoch 707/1000
 - 0s - loss: 0.5921 - acc: 0.6800 - val_loss: 0.5504 - val_acc: 0.7900
Epoch 708/1000
 - 0s - loss: 0.5921 - acc: 0.6800 - val_loss: 0.5504 - val_acc: 0.7900
Epoch 709/1000
 - 0s - loss: 0.5921 - acc: 0.6800 - val_loss: 0.5504 - val_acc: 0.7900
Epoch 710/1000
 - 0s - loss: 0.5920 - acc: 0.6800 - val_loss: 0.5503 - val_acc: 0.7900
Epoch 711/1000
 - 0s - loss: 0.5920 - acc: 0.6850 - val_loss: 0.5503 - val_acc: 0.7900
Epoch 712/1000
 - 0s - loss: 0.5919 - acc: 0.6850 - val_loss: 0.5503 - val_acc: 0.7900
Epoch 713/1000
 - 0s - loss: 0.5919 - acc: 0.6850 - val_loss: 0.5503 - val_acc: 0.7900
Epoch 714/1000
 - 0s - loss: 0.5919 - acc: 0.6850 - val_loss: 0.5503 - val_acc: 0.7900
Epoch 715/1000
```

```
 - 0s - loss: 0.5918 - acc: 0.6850 - val_loss: 0.5503 - val_acc: 0.7900
Epoch 716/1000
 - 0s - loss: 0.5918 - acc: 0.6850 - val_loss: 0.5502 - val_acc: 0.7900
Epoch 717/1000
 - 0s - loss: 0.5918 - acc: 0.6850 - val_loss: 0.5502 - val_acc: 0.7900
Epoch 718/1000
 - 0s - loss: 0.5917 - acc: 0.6850 - val_loss: 0.5502 - val_acc: 0.7900
Epoch 719/1000
 - 0s - loss: 0.5917 - acc: 0.6850 - val_loss: 0.5502 - val_acc: 0.7900
Epoch 720/1000
 - 0s - loss: 0.5916 - acc: 0.6850 - val_loss: 0.5502 - val_acc: 0.7900
Epoch 721/1000
 - 0s - loss: 0.5916 - acc: 0.6850 - val_loss: 0.5502 - val_acc: 0.7900
Epoch 722/1000
 - 0s - loss: 0.5916 - acc: 0.6850 - val_loss: 0.5502 - val_acc: 0.7900
Epoch 723/1000
 - 0s - loss: 0.5915 - acc: 0.6850 - val_loss: 0.5501 - val_acc: 0.7900
Epoch 724/1000
 - 0s - loss: 0.5915 - acc: 0.6850 - val_loss: 0.5501 - val_acc: 0.7900
Epoch 725/1000
 - 0s - loss: 0.5915 - acc: 0.6850 - val_loss: 0.5501 - val_acc: 0.7900
Epoch 726/1000
 - 0s - loss: 0.5914 - acc: 0.6850 - val_loss: 0.5501 - val_acc: 0.7900
Epoch 727/1000
 - 0s - loss: 0.5914 - acc: 0.6850 - val_loss: 0.5501 - val_acc: 0.7900
Epoch 728/1000
 - 0s - loss: 0.5914 - acc: 0.6850 - val_loss: 0.5501 - val_acc: 0.7900
Epoch 729/1000
 - 0s - loss: 0.5913 - acc: 0.6850 - val_loss: 0.5500 - val_acc: 0.7900
Epoch 730/1000
 - 0s - loss: 0.5913 - acc: 0.6850 - val_loss: 0.5500 - val_acc: 0.7900
Epoch 731/1000
 - 0s - loss: 0.5912 - acc: 0.6850 - val_loss: 0.5500 - val_acc: 0.7900
Epoch 732/1000
 - 0s - loss: 0.5912 - acc: 0.6850 - val_loss: 0.5500 - val_acc: 0.7900
Epoch 733/1000
 - 0s - loss: 0.5912 - acc: 0.6850 - val_loss: 0.5500 - val_acc: 0.7900
Epoch 734/1000
 - 0s - loss: 0.5911 - acc: 0.6850 - val_loss: 0.5500 - val_acc: 0.7900
Epoch 735/1000
 - 0s - loss: 0.5911 - acc: 0.6850 - val_loss: 0.5500 - val_acc: 0.7900
Epoch 736/1000
 - 0s - loss: 0.5911 - acc: 0.6850 - val_loss: 0.5499 - val_acc: 0.7800
Epoch 737/1000
 - 0s - loss: 0.5910 - acc: 0.6850 - val_loss: 0.5499 - val_acc: 0.7800
Epoch 738/1000
 - 0s - loss: 0.5910 - acc: 0.6850 - val_loss: 0.5499 - val_acc: 0.7800
Epoch 739/1000
```

```
 - 0s - loss: 0.5910 - acc: 0.6850 - val_loss: 0.5499 - val_acc: 0.7800
Epoch 740/1000
 - 0s - loss: 0.5909 - acc: 0.6850 - val_loss: 0.5499 - val_acc: 0.7800
Epoch 741/1000
 - 0s - loss: 0.5909 - acc: 0.6850 - val_loss: 0.5499 - val_acc: 0.7800
Epoch 742/1000
 - 0s - loss: 0.5908 - acc: 0.6850 - val_loss: 0.5498 - val_acc: 0.7800
Epoch 743/1000
 - 0s - loss: 0.5908 - acc: 0.6850 - val_loss: 0.5498 - val_acc: 0.7800
Epoch 744/1000
 - 0s - loss: 0.5908 - acc: 0.6850 - val_loss: 0.5498 - val_acc: 0.7800
Epoch 745/1000
 - 0s - loss: 0.5907 - acc: 0.6850 - val_loss: 0.5498 - val_acc: 0.7800
Epoch 746/1000
 - 0s - loss: 0.5907 - acc: 0.6850 - val_loss: 0.5498 - val_acc: 0.7800
Epoch 747/1000
 - 0s - loss: 0.5907 - acc: 0.6850 - val_loss: 0.5498 - val_acc: 0.7800
Epoch 748/1000
 - 0s - loss: 0.5906 - acc: 0.6850 - val_loss: 0.5497 - val_acc: 0.7800
Epoch 749/1000
 - 0s - loss: 0.5906 - acc: 0.6850 - val_loss: 0.5497 - val_acc: 0.7800
Epoch 750/1000
 - 0s - loss: 0.5906 - acc: 0.6850 - val_loss: 0.5497 - val_acc: 0.7800
Epoch 751/1000
 - 0s - loss: 0.5905 - acc: 0.6850 - val_loss: 0.5497 - val_acc: 0.7800
Epoch 752/1000
 - 0s - loss: 0.5905 - acc: 0.6850 - val_loss: 0.5497 - val_acc: 0.7800
Epoch 753/1000
 - 0s - loss: 0.5905 - acc: 0.6850 - val_loss: 0.5497 - val_acc: 0.7800
Epoch 754/1000
 - 0s - loss: 0.5904 - acc: 0.6850 - val_loss: 0.5497 - val_acc: 0.7800
Epoch 755/1000
 - 0s - loss: 0.5904 - acc: 0.6850 - val_loss: 0.5496 - val_acc: 0.7800
Epoch 756/1000
 - 0s - loss: 0.5903 - acc: 0.6850 - val_loss: 0.5496 - val_acc: 0.7800
Epoch 757/1000
 - 0s - loss: 0.5903 - acc: 0.6850 - val_loss: 0.5496 - val_acc: 0.7800
Epoch 758/1000
 - 0s - loss: 0.5903 - acc: 0.6850 - val_loss: 0.5496 - val_acc: 0.7800
Epoch 759/1000
 - 0s - loss: 0.5902 - acc: 0.6850 - val_loss: 0.5496 - val_acc: 0.7800
Epoch 760/1000
 - 0s - loss: 0.5902 - acc: 0.6850 - val_loss: 0.5496 - val_acc: 0.7800
Epoch 761/1000
 - 0s - loss: 0.5902 - acc: 0.6850 - val_loss: 0.5495 - val_acc: 0.7800
Epoch 762/1000
 - 0s - loss: 0.5901 - acc: 0.6850 - val_loss: 0.5495 - val_acc: 0.7800
Epoch 763/1000
```

```
 - 0s - loss: 0.5901 - acc: 0.6850 - val_loss: 0.5495 - val_acc: 0.7800
Epoch 764/1000
 - 0s - loss: 0.5901 - acc: 0.6850 - val_loss: 0.5495 - val_acc: 0.7800
Epoch 765/1000
 - 0s - loss: 0.5900 - acc: 0.6850 - val_loss: 0.5495 - val_acc: 0.7800
Epoch 766/1000
 - 0s - loss: 0.5900 - acc: 0.6850 - val_loss: 0.5495 - val_acc: 0.7800
Epoch 767/1000
 - 0s - loss: 0.5900 - acc: 0.6850 - val_loss: 0.5495 - val_acc: 0.7800
Epoch 768/1000
 - 0s - loss: 0.5899 - acc: 0.6850 - val_loss: 0.5494 - val_acc: 0.7800
Epoch 769/1000
 - 0s - loss: 0.5899 - acc: 0.6850 - val_loss: 0.5494 - val_acc: 0.7800
Epoch 770/1000
 - 0s - loss: 0.5898 - acc: 0.6850 - val_loss: 0.5494 - val_acc: 0.7800
Epoch 771/1000
 - 0s - loss: 0.5898 - acc: 0.6850 - val_loss: 0.5494 - val_acc: 0.7800
Epoch 772/1000
 - 0s - loss: 0.5898 - acc: 0.6850 - val_loss: 0.5494 - val_acc: 0.7700
Epoch 773/1000
 - 0s - loss: 0.5897 - acc: 0.6850 - val_loss: 0.5494 - val_acc: 0.7700
Epoch 774/1000
 - 0s - loss: 0.5897 - acc: 0.6850 - val_loss: 0.5494 - val_acc: 0.7700
Epoch 775/1000
 - 0s - loss: 0.5897 - acc: 0.6850 - val_loss: 0.5494 - val_acc: 0.7700
Epoch 776/1000
 - 0s - loss: 0.5896 - acc: 0.6850 - val_loss: 0.5493 - val_acc: 0.7700
Epoch 777/1000
 - 0s - loss: 0.5896 - acc: 0.6850 - val_loss: 0.5493 - val_acc: 0.7700
Epoch 778/1000
 - 0s - loss: 0.5896 - acc: 0.6850 - val_loss: 0.5493 - val_acc: 0.7700
Epoch 779/1000
 - 0s - loss: 0.5895 - acc: 0.6850 - val_loss: 0.5493 - val_acc: 0.7700
Epoch 780/1000
 - 0s - loss: 0.5895 - acc: 0.6850 - val_loss: 0.5493 - val_acc: 0.7700
Epoch 781/1000
 - 0s - loss: 0.5895 - acc: 0.6850 - val_loss: 0.5493 - val_acc: 0.7700
Epoch 782/1000
 - 0s - loss: 0.5894 - acc: 0.6850 - val_loss: 0.5493 - val_acc: 0.7700
Epoch 783/1000
 - 0s - loss: 0.5894 - acc: 0.6850 - val_loss: 0.5492 - val_acc: 0.7700
Epoch 784/1000
 - 0s - loss: 0.5894 - acc: 0.6850 - val_loss: 0.5492 - val_acc: 0.7700
Epoch 785/1000
 - 0s - loss: 0.5893 - acc: 0.6850 - val_loss: 0.5492 - val_acc: 0.7700
Epoch 786/1000
 - 0s - loss: 0.5893 - acc: 0.6850 - val_loss: 0.5492 - val_acc: 0.7700
Epoch 787/1000
```

```
 - 0s - loss: 0.5893 - acc: 0.6850 - val_loss: 0.5492 - val_acc: 0.7700
Epoch 788/1000
 - 0s - loss: 0.5892 - acc: 0.6850 - val_loss: 0.5492 - val_acc: 0.7700
Epoch 789/1000
 - 0s - loss: 0.5892 - acc: 0.6850 - val_loss: 0.5492 - val_acc: 0.7700
Epoch 790/1000
 - 0s - loss: 0.5891 - acc: 0.6850 - val_loss: 0.5492 - val_acc: 0.7700
Epoch 791/1000
 - 0s - loss: 0.5891 - acc: 0.6850 - val_loss: 0.5491 - val_acc: 0.7700
Epoch 792/1000
 - 0s - loss: 0.5891 - acc: 0.6850 - val_loss: 0.5491 - val_acc: 0.7700
Epoch 793/1000
 - 0s - loss: 0.5890 - acc: 0.6850 - val_loss: 0.5491 - val_acc: 0.7700
Epoch 794/1000
 - 0s - loss: 0.5890 - acc: 0.6850 - val_loss: 0.5491 - val_acc: 0.7700
Epoch 795/1000
 - 0s - loss: 0.5890 - acc: 0.6850 - val_loss: 0.5491 - val_acc: 0.7700
Epoch 796/1000
 - 0s - loss: 0.5889 - acc: 0.6850 - val_loss: 0.5491 - val_acc: 0.7700
Epoch 797/1000
 - 0s - loss: 0.5889 - acc: 0.6850 - val_loss: 0.5491 - val_acc: 0.7700
Epoch 798/1000
 - 0s - loss: 0.5889 - acc: 0.6850 - val_loss: 0.5491 - val_acc: 0.7700
Epoch 799/1000
 - 0s - loss: 0.5888 - acc: 0.6850 - val_loss: 0.5490 - val_acc: 0.7700
Epoch 800/1000
 - 0s - loss: 0.5888 - acc: 0.6850 - val_loss: 0.5490 - val_acc: 0.7700
Epoch 801/1000
 - 0s - loss: 0.5888 - acc: 0.6850 - val_loss: 0.5490 - val_acc: 0.7700
Epoch 802/1000
 - 0s - loss: 0.5887 - acc: 0.6850 - val_loss: 0.5490 - val_acc: 0.7700
Epoch 803/1000
 - 0s - loss: 0.5887 - acc: 0.6850 - val_loss: 0.5490 - val_acc: 0.7700
Epoch 804/1000
 - 0s - loss: 0.5887 - acc: 0.6850 - val_loss: 0.5490 - val_acc: 0.7700
Epoch 805/1000
 - 0s - loss: 0.5886 - acc: 0.6850 - val_loss: 0.5490 - val_acc: 0.7700
Epoch 806/1000
 - 0s - loss: 0.5886 - acc: 0.6850 - val_loss: 0.5489 - val_acc: 0.7700
Epoch 807/1000
 - 0s - loss: 0.5886 - acc: 0.6850 - val_loss: 0.5489 - val_acc: 0.7700
Epoch 808/1000
 - 0s - loss: 0.5885 - acc: 0.6850 - val_loss: 0.5489 - val_acc: 0.7700
Epoch 809/1000
 - 0s - loss: 0.5885 - acc: 0.6900 - val_loss: 0.5489 - val_acc: 0.7700
Epoch 810/1000
 - 0s - loss: 0.5885 - acc: 0.6900 - val_loss: 0.5489 - val_acc: 0.7700
Epoch 811/1000
```

```
 - 0s - loss: 0.5884 - acc: 0.6900 - val_loss: 0.5489 - val_acc: 0.7700
Epoch 812/1000
 - 0s - loss: 0.5884 - acc: 0.6900 - val_loss: 0.5489 - val_acc: 0.7700
Epoch 813/1000
 - 0s - loss: 0.5884 - acc: 0.6900 - val_loss: 0.5489 - val_acc: 0.7700
Epoch 814/1000
 - 0s - loss: 0.5883 - acc: 0.6900 - val_loss: 0.5488 - val_acc: 0.7700
Epoch 815/1000
 - 0s - loss: 0.5883 - acc: 0.6900 - val_loss: 0.5488 - val_acc: 0.7700
Epoch 816/1000
 - 0s - loss: 0.5883 - acc: 0.6900 - val_loss: 0.5488 - val_acc: 0.7700
Epoch 817/1000
 - 0s - loss: 0.5882 - acc: 0.6900 - val_loss: 0.5488 - val_acc: 0.7700
Epoch 818/1000
 - 0s - loss: 0.5882 - acc: 0.6900 - val_loss: 0.5488 - val_acc: 0.7700
Epoch 819/1000
 - 0s - loss: 0.5882 - acc: 0.6900 - val_loss: 0.5488 - val_acc: 0.7700
Epoch 820/1000
 - 0s - loss: 0.5881 - acc: 0.6900 - val_loss: 0.5488 - val_acc: 0.7700
Epoch 821/1000
 - 0s - loss: 0.5881 - acc: 0.6900 - val_loss: 0.5488 - val_acc: 0.7700
Epoch 822/1000
 - 0s - loss: 0.5881 - acc: 0.6900 - val_loss: 0.5487 - val_acc: 0.7700
Epoch 823/1000
 - 0s - loss: 0.5880 - acc: 0.6900 - val_loss: 0.5487 - val_acc: 0.7700
Epoch 824/1000
 - 0s - loss: 0.5880 - acc: 0.6900 - val_loss: 0.5487 - val_acc: 0.7700
Epoch 825/1000
 - 0s - loss: 0.5880 - acc: 0.6900 - val_loss: 0.5487 - val_acc: 0.7700
Epoch 826/1000
 - 0s - loss: 0.5879 - acc: 0.6900 - val_loss: 0.5487 - val_acc: 0.7700
Epoch 827/1000
 - 0s - loss: 0.5879 - acc: 0.6900 - val_loss: 0.5487 - val_acc: 0.7700
Epoch 828/1000
 - 0s - loss: 0.5879 - acc: 0.6900 - val_loss: 0.5487 - val_acc: 0.7700
Epoch 829/1000
 - 0s - loss: 0.5878 - acc: 0.6950 - val_loss: 0.5487 - val_acc: 0.7700
Epoch 830/1000
 - 0s - loss: 0.5878 - acc: 0.6950 - val_loss: 0.5486 - val_acc: 0.7700
Epoch 831/1000
 - 0s - loss: 0.5878 - acc: 0.6950 - val_loss: 0.5486 - val_acc: 0.7700
Epoch 832/1000
 - 0s - loss: 0.5877 - acc: 0.6950 - val_loss: 0.5486 - val_acc: 0.7700
Epoch 833/1000
 - 0s - loss: 0.5877 - acc: 0.6950 - val_loss: 0.5486 - val_acc: 0.7700
Epoch 834/1000
 - 0s - loss: 0.5877 - acc: 0.6950 - val_loss: 0.5486 - val_acc: 0.7700
Epoch 835/1000
```

```
 - 0s - loss: 0.5877 - acc: 0.6950 - val_loss: 0.5486 - val_acc: 0.7700
Epoch 836/1000
 - 0s - loss: 0.5876 - acc: 0.6950 - val_loss: 0.5486 - val_acc: 0.7700
Epoch 837/1000
 - 0s - loss: 0.5876 - acc: 0.6950 - val_loss: 0.5486 - val_acc: 0.7700
Epoch 838/1000
 - 0s - loss: 0.5876 - acc: 0.6950 - val_loss: 0.5485 - val_acc: 0.7700
Epoch 839/1000
 - 0s - loss: 0.5875 - acc: 0.7000 - val_loss: 0.5485 - val_acc: 0.7700
Epoch 840/1000
 - 0s - loss: 0.5875 - acc: 0.7000 - val_loss: 0.5485 - val_acc: 0.7700
Epoch 841/1000
 - 0s - loss: 0.5875 - acc: 0.7000 - val_loss: 0.5485 - val_acc: 0.7700
Epoch 842/1000
 - 0s - loss: 0.5874 - acc: 0.7000 - val_loss: 0.5485 - val_acc: 0.7700
Epoch 843/1000
 - 0s - loss: 0.5874 - acc: 0.7000 - val_loss: 0.5485 - val_acc: 0.7700
Epoch 844/1000
 - 0s - loss: 0.5874 - acc: 0.7000 - val_loss: 0.5485 - val_acc: 0.7700
Epoch 845/1000
 - 0s - loss: 0.5873 - acc: 0.7000 - val_loss: 0.5485 - val_acc: 0.7700
Epoch 846/1000
 - 0s - loss: 0.5873 - acc: 0.7000 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 847/1000
 - 0s - loss: 0.5873 - acc: 0.7000 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 848/1000
 - 0s - loss: 0.5872 - acc: 0.7000 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 849/1000
 - 0s - loss: 0.5872 - acc: 0.7000 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 850/1000
 - 0s - loss: 0.5872 - acc: 0.7000 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 851/1000
 - 0s - loss: 0.5871 - acc: 0.7000 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 852/1000
 - 0s - loss: 0.5871 - acc: 0.7000 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 853/1000
 - 0s - loss: 0.5871 - acc: 0.6950 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 854/1000
 - 0s - loss: 0.5870 - acc: 0.6950 - val_loss: 0.5484 - val_acc: 0.7700
Epoch 855/1000
 - 0s - loss: 0.5870 - acc: 0.6950 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 856/1000
 - 0s - loss: 0.5870 - acc: 0.6950 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 857/1000
 - 0s - loss: 0.5869 - acc: 0.6950 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 858/1000
 - 0s - loss: 0.5869 - acc: 0.6900 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 859/1000
```

```
 - 0s - loss: 0.5869 - acc: 0.6900 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 860/1000
 - 0s - loss: 0.5868 - acc: 0.6900 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 861/1000
 - 0s - loss: 0.5868 - acc: 0.6900 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 862/1000
 - 0s - loss: 0.5868 - acc: 0.6900 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 863/1000
 - 0s - loss: 0.5868 - acc: 0.6900 - val_loss: 0.5483 - val_acc: 0.7700
Epoch 864/1000
 - 0s - loss: 0.5867 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 865/1000
 - 0s - loss: 0.5867 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 866/1000
 - 0s - loss: 0.5867 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 867/1000
 - 0s - loss: 0.5866 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 868/1000
 - 0s - loss: 0.5866 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 869/1000
 - 0s - loss: 0.5866 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 870/1000
 - 0s - loss: 0.5865 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 871/1000
 - 0s - loss: 0.5865 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 872/1000
 - 0s - loss: 0.5865 - acc: 0.6900 - val_loss: 0.5482 - val_acc: 0.7700
Epoch 873/1000
 - 0s - loss: 0.5864 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 874/1000
 - 0s - loss: 0.5864 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 875/1000
 - 0s - loss: 0.5864 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 876/1000
 - 0s - loss: 0.5863 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 877/1000
 - 0s - loss: 0.5863 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 878/1000
 - 0s - loss: 0.5863 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 879/1000
 - 0s - loss: 0.5862 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 880/1000
 - 0s - loss: 0.5862 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 881/1000
 - 0s - loss: 0.5862 - acc: 0.6900 - val_loss: 0.5481 - val_acc: 0.7700
Epoch 882/1000
 - 0s - loss: 0.5862 - acc: 0.6900 - val_loss: 0.5480 - val_acc: 0.7700
Epoch 883/1000
```

```
 - 0s - loss: 0.5861 - acc: 0.6900 - val_loss: 0.5480 - val_acc: 0.7700
Epoch 884/1000
 - 0s - loss: 0.5861 - acc: 0.6900 - val_loss: 0.5480 - val_acc: 0.7700
Epoch 885/1000
 - 0s - loss: 0.5861 - acc: 0.6900 - val_loss: 0.5480 - val_acc: 0.7700
Epoch 886/1000
 - 0s - loss: 0.5860 - acc: 0.6900 - val_loss: 0.5480 - val_acc: 0.7700
Epoch 887/1000
 - 0s - loss: 0.5860 - acc: 0.6900 - val_loss: 0.5480 - val_acc: 0.7700
Epoch 888/1000
 - 0s - loss: 0.5860 - acc: 0.6900 - val_loss: 0.5480 - val_acc: 0.7700
Epoch 889/1000
 - 0s - loss: 0.5859 - acc: 0.6900 - val_loss: 0.5480 - val_acc: 0.7700
Epoch 890/1000
 - 0s - loss: 0.5859 - acc: 0.6900 - val_loss: 0.5479 - val_acc: 0.7700
Epoch 891/1000
 - 0s - loss: 0.5859 - acc: 0.6900 - val_loss: 0.5479 - val_acc: 0.7700
Epoch 892/1000
 - 0s - loss: 0.5858 - acc: 0.6900 - val_loss: 0.5479 - val_acc: 0.7700
Epoch 893/1000
 - 0s - loss: 0.5858 - acc: 0.6900 - val_loss: 0.5479 - val_acc: 0.7700
Epoch 894/1000
 - 0s - loss: 0.5858 - acc: 0.6900 - val_loss: 0.5479 - val_acc: 0.7700
Epoch 895/1000
 - 0s - loss: 0.5858 - acc: 0.6900 - val_loss: 0.5479 - val_acc: 0.7700
Epoch 896/1000
 - 0s - loss: 0.5857 - acc: 0.6900 - val_loss: 0.5479 - val_acc: 0.7700
Epoch 897/1000
 - 0s - loss: 0.5857 - acc: 0.6900 - val_loss: 0.5479 - val_acc: 0.7700
Epoch 898/1000
 - 0s - loss: 0.5857 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 899/1000
 - 0s - loss: 0.5856 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 900/1000
 - 0s - loss: 0.5856 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 901/1000
 - 0s - loss: 0.5856 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 902/1000
 - 0s - loss: 0.5855 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 903/1000
 - 0s - loss: 0.5855 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 904/1000
 - 0s - loss: 0.5855 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 905/1000
 - 0s - loss: 0.5854 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 906/1000
 - 0s - loss: 0.5854 - acc: 0.6900 - val_loss: 0.5478 - val_acc: 0.7700
Epoch 907/1000
```

```
 - 0s - loss: 0.5854 - acc: 0.6900 - val_loss: 0.5477 - val_acc: 0.7700
Epoch 908/1000
 - 0s - loss: 0.5853 - acc: 0.6900 - val_loss: 0.5477 - val_acc: 0.7700
Epoch 909/1000
 - 0s - loss: 0.5853 - acc: 0.6900 - val_loss: 0.5477 - val_acc: 0.7700
Epoch 910/1000
 - 0s - loss: 0.5853 - acc: 0.6900 - val_loss: 0.5477 - val_acc: 0.7700
Epoch 911/1000
 - 0s - loss: 0.5853 - acc: 0.6900 - val_loss: 0.5477 - val_acc: 0.7700
Epoch 912/1000
 - 0s - loss: 0.5852 - acc: 0.6900 - val_loss: 0.5477 - val_acc: 0.7800
Epoch 913/1000
 - 0s - loss: 0.5852 - acc: 0.6900 - val_loss: 0.5477 - val_acc: 0.7800
Epoch 914/1000
 - 0s - loss: 0.5852 - acc: 0.6900 - val_loss: 0.5477 - val_acc: 0.7800
Epoch 915/1000
 - 0s - loss: 0.5851 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 916/1000
 - 0s - loss: 0.5851 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 917/1000
 - 0s - loss: 0.5851 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 918/1000
 - 0s - loss: 0.5850 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 919/1000
 - 0s - loss: 0.5850 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 920/1000
 - 0s - loss: 0.5850 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 921/1000
 - 0s - loss: 0.5850 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 922/1000
 - 0s - loss: 0.5849 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 923/1000
 - 0s - loss: 0.5849 - acc: 0.6900 - val_loss: 0.5476 - val_acc: 0.7800
Epoch 924/1000
 - 0s - loss: 0.5849 - acc: 0.6900 - val_loss: 0.5475 - val_acc: 0.7800
Epoch 925/1000
 - 0s - loss: 0.5848 - acc: 0.6900 - val_loss: 0.5475 - val_acc: 0.7800
Epoch 926/1000
 - 0s - loss: 0.5848 - acc: 0.6900 - val_loss: 0.5475 - val_acc: 0.7800
Epoch 927/1000
 - 0s - loss: 0.5848 - acc: 0.6900 - val_loss: 0.5475 - val_acc: 0.7800
Epoch 928/1000
 - 0s - loss: 0.5847 - acc: 0.6900 - val_loss: 0.5475 - val_acc: 0.7800
Epoch 929/1000
 - 0s - loss: 0.5847 - acc: 0.6900 - val_loss: 0.5475 - val_acc: 0.7800
Epoch 930/1000
 - 0s - loss: 0.5847 - acc: 0.6900 - val_loss: 0.5475 - val_acc: 0.7800
Epoch 931/1000
```

```
 - 0s - loss: 0.5847 - acc: 0.6900 - val_loss: 0.5475 - val_acc: 0.7800
Epoch 932/1000
 - 0s - loss: 0.5846 - acc: 0.6900 - val_loss: 0.5474 - val_acc: 0.7800
Epoch 933/1000
 - 0s - loss: 0.5846 - acc: 0.6900 - val_loss: 0.5474 - val_acc: 0.7800
Epoch 934/1000
 - 0s - loss: 0.5846 - acc: 0.6900 - val_loss: 0.5474 - val_acc: 0.7800
Epoch 935/1000
 - 0s - loss: 0.5845 - acc: 0.6900 - val_loss: 0.5474 - val_acc: 0.7800
Epoch 936/1000
 - 0s - loss: 0.5845 - acc: 0.6900 - val_loss: 0.5474 - val_acc: 0.7800
Epoch 937/1000
 - 0s - loss: 0.5845 - acc: 0.6900 - val_loss: 0.5474 - val_acc: 0.7800
Epoch 938/1000
 - 0s - loss: 0.5844 - acc: 0.6900 - val_loss: 0.5474 - val_acc: 0.7800
Epoch 939/1000
 - 0s - loss: 0.5844 - acc: 0.6900 - val_loss: 0.5474 - val_acc: 0.7800
Epoch 940/1000
 - 0s - loss: 0.5844 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 941/1000
 - 0s - loss: 0.5844 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 942/1000
 - 0s - loss: 0.5843 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 943/1000
 - 0s - loss: 0.5843 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 944/1000
 - 0s - loss: 0.5843 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 945/1000
 - 0s - loss: 0.5842 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 946/1000
 - 0s - loss: 0.5842 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 947/1000
 - 0s - loss: 0.5842 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 948/1000
 - 0s - loss: 0.5841 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 949/1000
 - 0s - loss: 0.5841 - acc: 0.6900 - val_loss: 0.5473 - val_acc: 0.7800
Epoch 950/1000
 - 0s - loss: 0.5841 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 951/1000
 - 0s - loss: 0.5841 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 952/1000
 - 0s - loss: 0.5840 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 953/1000
 - 0s - loss: 0.5840 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 954/1000
 - 0s - loss: 0.5840 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 955/1000
```

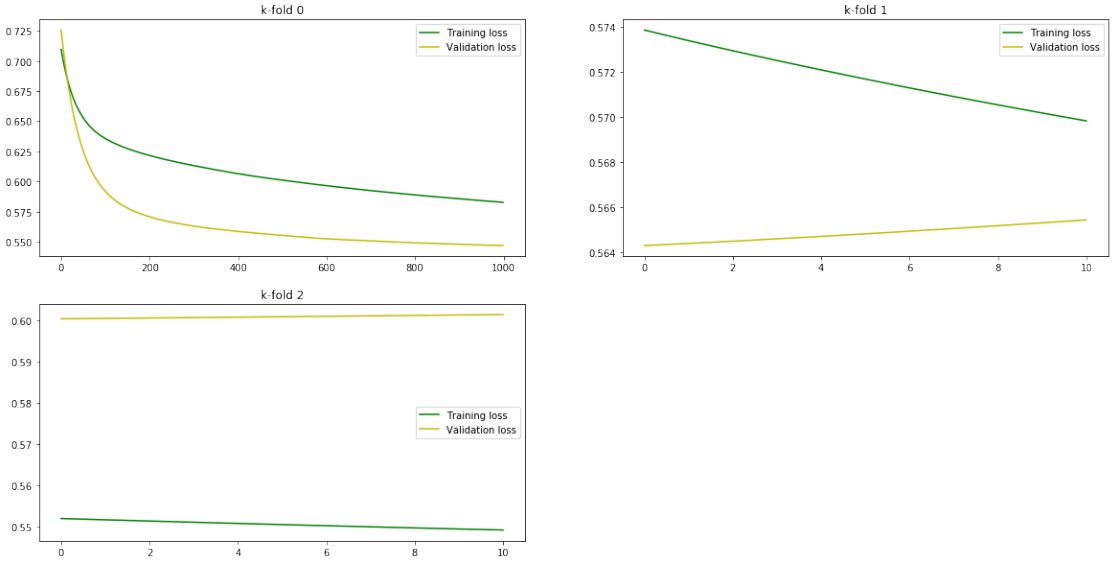
```
 - 0s - loss: 0.5839 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 956/1000
 - 0s - loss: 0.5839 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 957/1000
 - 0s - loss: 0.5839 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 958/1000
 - 0s - loss: 0.5838 - acc: 0.6900 - val_loss: 0.5472 - val_acc: 0.7800
Epoch 959/1000
 - 0s - loss: 0.5838 - acc: 0.6900 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 960/1000
 - 0s - loss: 0.5838 - acc: 0.6900 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 961/1000
 - 0s - loss: 0.5838 - acc: 0.6950 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 962/1000
 - 0s - loss: 0.5837 - acc: 0.6950 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 963/1000
 - 0s - loss: 0.5837 - acc: 0.6950 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 964/1000
 - 0s - loss: 0.5837 - acc: 0.6950 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 965/1000
 - 0s - loss: 0.5836 - acc: 0.6950 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 966/1000
 - 0s - loss: 0.5836 - acc: 0.6950 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 967/1000
 - 0s - loss: 0.5836 - acc: 0.6950 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 968/1000
 - 0s - loss: 0.5835 - acc: 0.6950 - val_loss: 0.5471 - val_acc: 0.7800
Epoch 969/1000
 - 0s - loss: 0.5835 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7800
Epoch 970/1000
 - 0s - loss: 0.5835 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7800
Epoch 971/1000
 - 0s - loss: 0.5835 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7800
Epoch 972/1000
 - 0s - loss: 0.5834 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7800
Epoch 973/1000
 - 0s - loss: 0.5834 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7900
Epoch 974/1000
 - 0s - loss: 0.5834 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7900
Epoch 975/1000
 - 0s - loss: 0.5833 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7900
Epoch 976/1000
 - 0s - loss: 0.5833 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7900
Epoch 977/1000
 - 0s - loss: 0.5833 - acc: 0.6950 - val_loss: 0.5470 - val_acc: 0.7900
Epoch 978/1000
 - 0s - loss: 0.5833 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 979/1000
```

```
 - 0s - loss: 0.5832 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 980/1000
 - 0s - loss: 0.5832 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 981/1000
 - 0s - loss: 0.5832 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 982/1000
 - 0s - loss: 0.5831 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 983/1000
 - 0s - loss: 0.5831 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 984/1000
 - 0s - loss: 0.5831 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 985/1000
 - 0s - loss: 0.5831 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 986/1000
 - 0s - loss: 0.5830 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 987/1000
 - 0s - loss: 0.5830 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 988/1000
 - 0s - loss: 0.5830 - acc: 0.7000 - val_loss: 0.5469 - val_acc: 0.7900
Epoch 989/1000
 - 0s - loss: 0.5829 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 990/1000
 - 0s - loss: 0.5829 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 991/1000
 - 0s - loss: 0.5829 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 992/1000
 - 0s - loss: 0.5829 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 993/1000
 - 0s - loss: 0.5828 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 994/1000
 - 0s - loss: 0.5828 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 995/1000
 - 0s - loss: 0.5828 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 996/1000
 - 0s - loss: 0.5827 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 997/1000
 - 0s - loss: 0.5827 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 998/1000
 - 0s - loss: 0.5827 - acc: 0.7000 - val_loss: 0.5468 - val_acc: 0.7900
Epoch 999/1000
 - 0s - loss: 0.5827 - acc: 0.7000 - val_loss: 0.5467 - val_acc: 0.7900
Epoch 1000/1000
 - 0s - loss: 0.5826 - acc: 0.7000 - val_loss: 0.5467 - val_acc: 0.7900
Train on 200 samples, validate on 100 samples
Epoch 1/1000
 - 0s - loss: 0.5739 - acc: 0.7400 - val_loss: 0.5643 - val_acc: 0.7100
Epoch 2/1000
 - 0s - loss: 0.5734 - acc: 0.7300 - val_loss: 0.5644 - val_acc: 0.7100
```

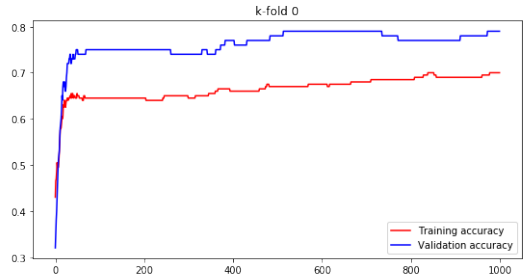
```
Epoch 3/1000
 - 0s - loss: 0.5730 - acc: 0.7350 - val_loss: 0.5645 - val_acc: 0.7100
Epoch 4/1000
 - 0s - loss: 0.5725 - acc: 0.7300 - val_loss: 0.5646 - val_acc: 0.7000
Epoch 5/1000
 - 0s - loss: 0.5721 - acc: 0.7350 - val_loss: 0.5647 - val_acc: 0.7000
Epoch 6/1000
 - 0s - loss: 0.5717 - acc: 0.7350 - val_loss: 0.5648 - val_acc: 0.7000
Epoch 7/1000
 - 0s - loss: 0.5713 - acc: 0.7350 - val_loss: 0.5649 - val_acc: 0.7000
Epoch 8/1000
 - 0s - loss: 0.5709 - acc: 0.7350 - val_loss: 0.5650 - val_acc: 0.7000
Epoch 9/1000
 - 0s - loss: 0.5705 - acc: 0.7300 - val_loss: 0.5652 - val_acc: 0.7000
Epoch 10/1000
 - 0s - loss: 0.5702 - acc: 0.7300 - val_loss: 0.5653 - val_acc: 0.7000
Epoch 11/1000
 - 0s - loss: 0.5698 - acc: 0.7350 - val_loss: 0.5654 - val_acc: 0.7000
Train on 200 samples, validate on 100 samples
Epoch 1/1000
 - 0s - loss: 0.5520 - acc: 0.7500 - val_loss: 0.6004 - val_acc: 0.6700
Epoch 2/1000
 - 0s - loss: 0.5517 - acc: 0.7450 - val_loss: 0.6005 - val_acc: 0.6700
Epoch 3/1000
 - 0s - loss: 0.5514 - acc: 0.7450 - val_loss: 0.6006 - val_acc: 0.6700
Epoch 4/1000
 - 0s - loss: 0.5511 - acc: 0.7450 - val_loss: 0.6007 - val_acc: 0.6700
Epoch 5/1000
 - 0s - loss: 0.5509 - acc: 0.7450 - val_loss: 0.6008 - val_acc: 0.6700
Epoch 6/1000
 - 0s - loss: 0.5506 - acc: 0.7450 - val_loss: 0.6009 - val_acc: 0.6700
Epoch 7/1000
 - 0s - loss: 0.5503 - acc: 0.7450 - val_loss: 0.6010 - val_acc: 0.6700
Epoch 8/1000
 - 0s - loss: 0.5500 - acc: 0.7450 - val_loss: 0.6011 - val_acc: 0.6700
Epoch 9/1000
 - 0s - loss: 0.5498 - acc: 0.7450 - val_loss: 0.6012 - val_acc: 0.6700
Epoch 10/1000
 - 0s - loss: 0.5495 - acc: 0.7450 - val_loss: 0.6013 - val_acc: 0.6700
Epoch 11/1000
 - 0s - loss: 0.5493 - acc: 0.7450 - val_loss: 0.6014 - val_acc: 0.6700
100/100 [==============================] - 0s 171us/step
Evaluation: [0.5849930369853973, 0.72]
```

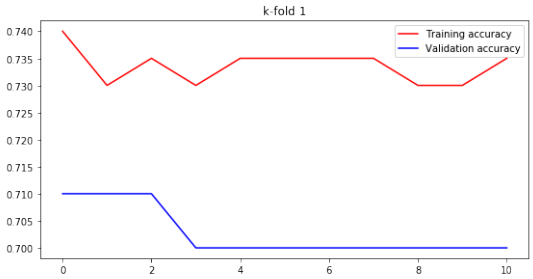
```
In [188]: f, plots = plt.subplots(2, 2, figsize=(20, 10))
          plots[-1, -1].axis('off')
```

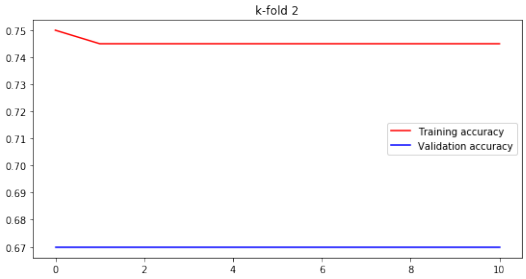
```
    for (i, (k_fit_data, plot)) in enumerate(zip(fit_data, [plot for sublist in plots fo
        loss = k_fit_data.history['loss']
        val_loss = k_fit_data.history['val_loss']

        plot.plot(range(len(loss)), loss, 'g', label='Training loss')
        plot.plot(range(len(val_loss)), val_loss, 'y', label='Validation loss')
        plot.set_title('k-fold ' + str(i))
        plot.legend()
```



In [189]:
```
f, plots = plt.subplots(2, 2, figsize=(20, 10))
plots[-1, -1].axis('off')

for (i, (k_fit_data, plot)) in enumerate(zip(fit_data, [plot for sublist in plots fo
    acc = k_fit_data.history['acc']
    val_acc = k_fit_data.history['val_acc']

    plot.plot(range(len(acc)), acc, 'r', label='Training accuracy')
    plot.plot(range(len(val_acc)), val_acc, 'b', label='Validation accuracy')
    plot.set_title('k-fold ' + str(i))
    plot.legend()
```







1.2.2 Obtained accuracy: 72%

Comments:

This dataset is particularly small, and no obvious patterns are detectable for a human observer. It is therefore expected that the accuracy will be low.

Applied techniques:

- Early stopping
- One-hot-encoding of ranks
- Data standardization using averaging and standard deviation
- k-fold switching between validation and training sets