

```
In [6]: import tensorflow as tf
import numpy as np
from tensorflow import keras
from matplotlib import pyplot as plt
from tensorflow.keras.layers import Conv2D, BatchNormalization, Activation, MaxPool2D
from tensorflow.keras import Model
```

```
In [7]: (x_train, y_train), (x_test, y_test) = keras.datasets.cifar10.load_data()
train_mean, train_std = x_train.mean(), x_train.std()
x_train = (x_train - train_mean)/train_std
x_test = (x_test - train_mean)/train_std
```

```
In [8]: class Baseline(Model):
    def __init__(self):
        super(Baseline, self).__init__()
        self.c1 = Conv2D(filters=6, kernel_size=(5, 5), padding='same') # 卷积层
        self.b1 = BatchNormalization() # BN层
        self.a1 = Activation('relu') # 激活层
        self.p1 = MaxPool2D(pool_size=(2, 2), strides=2, padding='same') # 池化层
        self.d1 = Dropout(0.2) # dropout层
        self.c2 = Conv2D(filters=6, kernel_size=(5, 5), padding='same') # 卷积层
        self.b2 = BatchNormalization() # BN层
        self.a2 = Activation('relu') # 激活层
        self.p2 = MaxPool2D(pool_size=(2, 2), strides=2, padding='same') # 池化层
        self.d2 = Dropout(0.2) # dropout层

        self.flatten = Flatten()
        self.f1 = Dense(128, activation='relu')
        self.d3 = Dropout(0.2)
        self.f2 = Dense(10, activation='softmax')

    def call(self, x):
        x = self.c1(x)
        x = self.b1(x)
        x = self.a1(x)
        x = self.p1(x)
        x = self.d1(x)
        x = self.c2(x)
        x = self.b2(x)
        x = self.a2(x)
        x = self.p2(x)
        x = self.d2(x)

        x = self.flatten(x)
        x = self.f1(x)
        x = self.d3(x)
        y = self.f2(x)
        return y

model = Baseline()

model.compile(optimizer='adam',
              loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=False),
              metrics=['sparse_categorical_accuracy'])

history = model.fit(x_train, y_train, batch_size=32, epochs=300, validation_data=(x_test, y_test))
model.summary()
```

```
# 搞定，画图，显示训练集和验证集的acc和loss曲线
acc = history.history['sparse_categorical_accuracy']
val_acc = history.history['val_sparse_categorical_accuracy']
loss = history.history['loss']
val_loss = history.history['val_loss']

plt.subplot(1, 2, 1)
plt.plot(acc, label='Training Accuracy')
plt.plot(val_acc, label='Validation Accuracy')
plt.title('Training and Validation Accuracy')
plt.legend()

plt.subplot(1, 2, 2)
plt.plot(loss, label='Training Loss')
plt.plot(val_loss, label='Validation Loss')
plt.title('Training and Validation Loss')
plt.legend()
plt.show()
```

Epoch 1/300
1563/1563 [=====] - 7s 4ms/step - loss: 1.6853 - sparse_categorical_accuracy: 0.3822 - val_loss: 1.4175 - val_sparse_categorical_accuracy: 0.4863
Epoch 2/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.4553 - sparse_categorical_accuracy: 0.4701 - val_loss: 1.3146 - val_sparse_categorical_accuracy: 0.5371
Epoch 3/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.3740 - sparse_categorical_accuracy: 0.5015 - val_loss: 1.2183 - val_sparse_categorical_accuracy: 0.5669
Epoch 4/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.3253 - sparse_categorical_accuracy: 0.5221 - val_loss: 1.1884 - val_sparse_categorical_accuracy: 0.5774
Epoch 5/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.2842 - sparse_categorical_accuracy: 0.5362 - val_loss: 1.1724 - val_sparse_categorical_accuracy: 0.5814
Epoch 6/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.2577 - sparse_categorical_accuracy: 0.5521 - val_loss: 1.1121 - val_sparse_categorical_accuracy: 0.6064
Epoch 7/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.2267 - sparse_categorical_accuracy: 0.5610 - val_loss: 1.1063 - val_sparse_categorical_accuracy: 0.6108
Epoch 8/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.2016 - sparse_categorical_accuracy: 0.5711 - val_loss: 1.0731 - val_sparse_categorical_accuracy: 0.6171
Epoch 9/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.1828 - sparse_categorical_accuracy: 0.5792 - val_loss: 1.0858 - val_sparse_categorical_accuracy: 0.6164
Epoch 10/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.1718 - sparse_categorical_accuracy: 0.5828 - val_loss: 1.0426 - val_sparse_categorical_accuracy: 0.6376
Epoch 11/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.1557 - sparse_categorical_accuracy: 0.5887 - val_loss: 1.0570 - val_sparse_categorical_accuracy: 0.6293
Epoch 12/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.1438 - sparse_categorical_accuracy: 0.5930 - val_loss: 1.0285 - val_sparse_categorical_accuracy: 0.6411
Epoch 13/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.1319 - sparse_categorical_accuracy: 0.5996 - val_loss: 1.0352 - val_sparse_categorical_accuracy: 0.6384
Epoch 14/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.1227 - sparse_categorical_accuracy: 0.6015 - val_loss: 1.0273 - val_sparse_categorical_accuracy: 0.6391
Epoch 15/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.1047 - sparse_categorical_accuracy: 0.6117 - val_loss: 1.0201 - val_sparse_categorical_accuracy: 0.6417
Epoch 16/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.1002 - sparse_categorical_accuracy: 0.6104 - val_loss: 0.9879 - val_sparse_categorical_accuracy: 0.6564

Epoch 17/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0955 - sparse_cat
egorical_accuracy: 0.6165 - val_loss: 0.9824 - val_sparse_categorical_accuracy: 0.65
68

Epoch 18/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0831 - sparse_cat
egorical_accuracy: 0.6163 - val_loss: 0.9882 - val_sparse_categorical_accuracy: 0.65
63

Epoch 19/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0795 - sparse_cat
egorical_accuracy: 0.6192 - val_loss: 0.9971 - val_sparse_categorical_accuracy: 0.65
22

Epoch 20/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0673 - sparse_cat
egorical_accuracy: 0.6205 - val_loss: 0.9912 - val_sparse_categorical_accuracy: 0.65
38

Epoch 21/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0691 - sparse_cat
egorical_accuracy: 0.6236 - val_loss: 0.9781 - val_sparse_categorical_accuracy: 0.65
77

Epoch 22/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0559 - sparse_cat
egorical_accuracy: 0.6265 - val_loss: 0.9597 - val_sparse_categorical_accuracy: 0.67
11

Epoch 23/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0548 - sparse_cat
egorical_accuracy: 0.6259 - val_loss: 0.9579 - val_sparse_categorical_accuracy: 0.66
85

Epoch 24/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0468 - sparse_cat
egorical_accuracy: 0.6277 - val_loss: 0.9454 - val_sparse_categorical_accuracy: 0.67
21

Epoch 25/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0485 - sparse_cat
egorical_accuracy: 0.6306 - val_loss: 0.9745 - val_sparse_categorical_accuracy: 0.65
76

Epoch 26/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0438 - sparse_cat
egorical_accuracy: 0.6308 - val_loss: 0.9775 - val_sparse_categorical_accuracy: 0.65
91

Epoch 27/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0372 - sparse_cat
egorical_accuracy: 0.6332 - val_loss: 0.9414 - val_sparse_categorical_accuracy: 0.67
25

Epoch 28/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0383 - sparse_cat
egorical_accuracy: 0.6335 - val_loss: 0.9389 - val_sparse_categorical_accuracy: 0.67
28

Epoch 29/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0275 - sparse_cat
egorical_accuracy: 0.6367 - val_loss: 0.9337 - val_sparse_categorical_accuracy: 0.67
64

Epoch 30/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0273 - sparse_cat
egorical_accuracy: 0.6356 - val_loss: 0.9555 - val_sparse_categorical_accuracy: 0.66
79

Epoch 31/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0200 - sparse_cat
egorical_accuracy: 0.6405 - val_loss: 0.9462 - val_sparse_categorical_accuracy: 0.67
44

Epoch 32/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0165 - sparse_cat
egorical_accuracy: 0.6414 - val_loss: 0.9241 - val_sparse_categorical_accuracy: 0.67
75

Epoch 33/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0113 - sparse_categorical_accuracy: 0.6416 - val_loss: 0.9343 - val_sparse_categorical_accuracy: 0.6725

Epoch 34/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0117 - sparse_categorical_accuracy: 0.6413 - val_loss: 0.9190 - val_sparse_categorical_accuracy: 0.6765

Epoch 35/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0048 - sparse_categorical_accuracy: 0.6444 - val_loss: 0.9425 - val_sparse_categorical_accuracy: 0.6731

Epoch 36/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0173 - sparse_categorical_accuracy: 0.6415 - val_loss: 0.9691 - val_sparse_categorical_accuracy: 0.6631

Epoch 37/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0052 - sparse_categorical_accuracy: 0.6447 - val_loss: 0.9399 - val_sparse_categorical_accuracy: 0.6739

Epoch 38/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0073 - sparse_categorical_accuracy: 0.6452 - val_loss: 0.9255 - val_sparse_categorical_accuracy: 0.6774

Epoch 39/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0004 - sparse_categorical_accuracy: 0.6452 - val_loss: 0.9565 - val_sparse_categorical_accuracy: 0.6675

Epoch 40/300
1563/1563 [=====] - 6s 4ms/step - loss: 1.0036 - sparse_categorical_accuracy: 0.6448 - val_loss: 0.9509 - val_sparse_categorical_accuracy: 0.6688

Epoch 41/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9956 - sparse_categorical_accuracy: 0.6469 - val_loss: 0.9356 - val_sparse_categorical_accuracy: 0.6731

Epoch 42/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9949 - sparse_categorical_accuracy: 0.6485 - val_loss: 0.9105 - val_sparse_categorical_accuracy: 0.6822

Epoch 43/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9896 - sparse_categorical_accuracy: 0.6490 - val_loss: 0.9102 - val_sparse_categorical_accuracy: 0.6859

Epoch 44/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9893 - sparse_categorical_accuracy: 0.6491 - val_loss: 0.9201 - val_sparse_categorical_accuracy: 0.6826

Epoch 45/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9832 - sparse_categorical_accuracy: 0.6532 - val_loss: 0.9230 - val_sparse_categorical_accuracy: 0.6771

Epoch 46/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9940 - sparse_categorical_accuracy: 0.6467 - val_loss: 0.9178 - val_sparse_categorical_accuracy: 0.6805

Epoch 47/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9807 - sparse_categorical_accuracy: 0.6538 - val_loss: 0.9183 - val_sparse_categorical_accuracy: 0.6798

Epoch 48/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9846 - sparse_categorical_accuracy: 0.6516 - val_loss: 0.9104 - val_sparse_categorical_accuracy: 0.6819

Epoch 49/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9804 - sparse_categorical_accuracy: 0.6530 - val_loss: 0.9496 - val_sparse_categorical_accuracy: 0.6699

Epoch 50/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9780 - sparse_categorical_accuracy: 0.6549 - val_loss: 0.9108 - val_sparse_categorical_accuracy: 0.6821

Epoch 51/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9803 - sparse_categorical_accuracy: 0.6531 - val_loss: 0.9035 - val_sparse_categorical_accuracy: 0.6858

Epoch 52/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9733 - sparse_categorical_accuracy: 0.6552 - val_loss: 0.9281 - val_sparse_categorical_accuracy: 0.6815

Epoch 53/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9754 - sparse_categorical_accuracy: 0.6553 - val_loss: 0.9142 - val_sparse_categorical_accuracy: 0.6836

Epoch 54/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9757 - sparse_categorical_accuracy: 0.6551 - val_loss: 0.9088 - val_sparse_categorical_accuracy: 0.6825

Epoch 55/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9706 - sparse_categorical_accuracy: 0.6576 - val_loss: 0.9121 - val_sparse_categorical_accuracy: 0.6818

Epoch 56/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9718 - sparse_categorical_accuracy: 0.6557 - val_loss: 0.9150 - val_sparse_categorical_accuracy: 0.6824

Epoch 57/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9704 - sparse_categorical_accuracy: 0.6555 - val_loss: 0.9257 - val_sparse_categorical_accuracy: 0.6801

Epoch 58/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9702 - sparse_categorical_accuracy: 0.6586 - val_loss: 0.9386 - val_sparse_categorical_accuracy: 0.6754

Epoch 59/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9689 - sparse_categorical_accuracy: 0.6566 - val_loss: 0.9062 - val_sparse_categorical_accuracy: 0.6832

Epoch 60/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9627 - sparse_categorical_accuracy: 0.6599 - val_loss: 0.9263 - val_sparse_categorical_accuracy: 0.6776

Epoch 61/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9667 - sparse_categorical_accuracy: 0.6561 - val_loss: 0.9027 - val_sparse_categorical_accuracy: 0.6879

Epoch 62/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9664 - sparse_categorical_accuracy: 0.6597 - val_loss: 0.8972 - val_sparse_categorical_accuracy: 0.6889

Epoch 63/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9639 - sparse_categorical_accuracy: 0.6599 - val_loss: 0.8999 - val_sparse_categorical_accuracy: 0.6873

Epoch 64/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9674 - sparse_categorical_accuracy: 0.6591 - val_loss: 0.8955 - val_sparse_categorical_accuracy: 0.6853

Epoch 65/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9612 - sparse_categorical_accuracy: 0.6595 - val_loss: 0.8982 - val_sparse_categorical_accuracy: 0.6918

Epoch 66/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9644 - sparse_categorical_accuracy: 0.6613 - val_loss: 0.9425 - val_sparse_categorical_accuracy: 0.6764

Epoch 67/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9620 - sparse_categorical_accuracy: 0.6608 - val_loss: 0.9003 - val_sparse_categorical_accuracy: 0.6887

Epoch 68/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9599 - sparse_categorical_accuracy: 0.6609 - val_loss: 0.8836 - val_sparse_categorical_accuracy: 0.6928

Epoch 69/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9544 - sparse_categorical_accuracy: 0.6628 - val_loss: 0.9178 - val_sparse_categorical_accuracy: 0.6834

Epoch 70/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9549 - sparse_categorical_accuracy: 0.6605 - val_loss: 0.9023 - val_sparse_categorical_accuracy: 0.6863

Epoch 71/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9536 - sparse_categorical_accuracy: 0.6625 - val_loss: 0.9088 - val_sparse_categorical_accuracy: 0.6847

Epoch 72/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9498 - sparse_categorical_accuracy: 0.6632 - val_loss: 0.9110 - val_sparse_categorical_accuracy: 0.6817

Epoch 73/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9561 - sparse_categorical_accuracy: 0.6612 - val_loss: 0.8851 - val_sparse_categorical_accuracy: 0.6941

Epoch 74/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9554 - sparse_categorical_accuracy: 0.6637 - val_loss: 0.9004 - val_sparse_categorical_accuracy: 0.6900

Epoch 75/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9507 - sparse_categorical_accuracy: 0.6635 - val_loss: 0.9066 - val_sparse_categorical_accuracy: 0.6854

Epoch 76/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9553 - sparse_categorical_accuracy: 0.6633 - val_loss: 0.9155 - val_sparse_categorical_accuracy: 0.6846

Epoch 77/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9501 - sparse_categorical_accuracy: 0.6629 - val_loss: 0.9179 - val_sparse_categorical_accuracy: 0.6823

Epoch 78/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9537 - sparse_categorical_accuracy: 0.6606 - val_loss: 0.8963 - val_sparse_categorical_accuracy: 0.6899

Epoch 79/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9506 - sparse_categorical_accuracy: 0.6634 - val_loss: 0.8912 - val_sparse_categorical_accuracy: 0.6880

Epoch 80/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9482 - sparse_categorical_accuracy: 0.6645 - val_loss: 0.9052 - val_sparse_categorical_accuracy: 0.6844

Epoch 81/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9498 - sparse_categorical_accuracy: 0.6660 - val_loss: 0.8947 - val_sparse_categorical_accuracy: 0.6880

Epoch 82/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9524 - sparse_categorical_accuracy: 0.6637 - val_loss: 0.8864 - val_sparse_categorical_accuracy: 0.6920

Epoch 83/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9506 - sparse_categorical_accuracy: 0.6645 - val_loss: 0.8934 - val_sparse_categorical_accuracy: 0.6922

Epoch 84/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9470 - sparse_categorical_accuracy: 0.6651 - val_loss: 0.8939 - val_sparse_categorical_accuracy: 0.6894

Epoch 85/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9472 - sparse_categorical_accuracy: 0.6652 - val_loss: 0.9394 - val_sparse_categorical_accuracy: 0.6741

Epoch 86/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9495 - sparse_categorical_accuracy: 0.6647 - val_loss: 0.8800 - val_sparse_categorical_accuracy: 0.6960

Epoch 87/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9482 - sparse_categorical_accuracy: 0.6620 - val_loss: 0.8983 - val_sparse_categorical_accuracy: 0.6834

Epoch 88/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9446 - sparse_categorical_accuracy: 0.6655 - val_loss: 0.8861 - val_sparse_categorical_accuracy: 0.6938

Epoch 89/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9420 - sparse_categorical_accuracy: 0.6643 - val_loss: 0.9223 - val_sparse_categorical_accuracy: 0.6810

Epoch 90/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9366 - sparse_categorical_accuracy: 0.6682 - val_loss: 0.8962 - val_sparse_categorical_accuracy: 0.6866

Epoch 91/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9425 - sparse_categorical_accuracy: 0.6670 - val_loss: 0.8980 - val_sparse_categorical_accuracy: 0.6882

Epoch 92/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9422 - sparse_categorical_accuracy: 0.6669 - val_loss: 0.8900 - val_sparse_categorical_accuracy: 0.6934

Epoch 93/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9412 - sparse_categorical_accuracy: 0.6664 - val_loss: 0.8983 - val_sparse_categorical_accuracy: 0.6853

Epoch 94/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9425 - sparse_categorical_accuracy: 0.6665 - val_loss: 0.9058 - val_sparse_categorical_accuracy: 0.6866

Epoch 95/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9390 - sparse_categorical_accuracy: 0.6703 - val_loss: 0.8733 - val_sparse_categorical_accuracy: 0.6972

Epoch 96/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9400 - sparse_categorical_accuracy: 0.6670 - val_loss: 0.8959 - val_sparse_categorical_accuracy: 0.6904

Epoch 97/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9375 - sparse_categorical_accuracy: 0.6689 - val_loss: 0.8911 - val_sparse_categorical_accuracy: 0.6918
Epoch 98/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9381 - sparse_categorical_accuracy: 0.6678 - val_loss: 0.8953 - val_sparse_categorical_accuracy: 0.6869
Epoch 99/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9354 - sparse_categorical_accuracy: 0.6691 - val_loss: 0.9042 - val_sparse_categorical_accuracy: 0.6879
Epoch 100/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9381 - sparse_categorical_accuracy: 0.6704 - val_loss: 0.9065 - val_sparse_categorical_accuracy: 0.6830
Epoch 101/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9342 - sparse_categorical_accuracy: 0.6674 - val_loss: 0.9085 - val_sparse_categorical_accuracy: 0.6855
Epoch 102/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9376 - sparse_categorical_accuracy: 0.6691 - val_loss: 0.8972 - val_sparse_categorical_accuracy: 0.6922
Epoch 103/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9392 - sparse_categorical_accuracy: 0.6687 - val_loss: 0.8960 - val_sparse_categorical_accuracy: 0.6889
Epoch 104/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9324 - sparse_categorical_accuracy: 0.6711 - val_loss: 0.8877 - val_sparse_categorical_accuracy: 0.6909
Epoch 105/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9354 - sparse_categorical_accuracy: 0.6688 - val_loss: 0.8891 - val_sparse_categorical_accuracy: 0.6949
Epoch 106/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9319 - sparse_categorical_accuracy: 0.6723 - val_loss: 0.8956 - val_sparse_categorical_accuracy: 0.6841
Epoch 107/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9350 - sparse_categorical_accuracy: 0.6695 - val_loss: 0.8977 - val_sparse_categorical_accuracy: 0.6888
Epoch 108/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9337 - sparse_categorical_accuracy: 0.6707 - val_loss: 0.8802 - val_sparse_categorical_accuracy: 0.6913
Epoch 109/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9348 - sparse_categorical_accuracy: 0.6698 - val_loss: 0.9061 - val_sparse_categorical_accuracy: 0.6909
Epoch 110/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9300 - sparse_categorical_accuracy: 0.6697 - val_loss: 0.9021 - val_sparse_categorical_accuracy: 0.6830
Epoch 111/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9344 - sparse_categorical_accuracy: 0.6677 - val_loss: 0.8864 - val_sparse_categorical_accuracy: 0.6916
Epoch 112/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9298 - sparse_categorical_accuracy: 0.6709 - val_loss: 0.8698 - val_sparse_categorical_accuracy: 0.6944

Epoch 113/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9323 - sparse_categorical_accuracy: 0.6696 - val_loss: 0.8921 - val_sparse_categorical_accuracy: 0.6882

Epoch 114/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9268 - sparse_categorical_accuracy: 0.6722 - val_loss: 0.8957 - val_sparse_categorical_accuracy: 0.6910

Epoch 115/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9274 - sparse_categorical_accuracy: 0.6737 - val_loss: 0.8743 - val_sparse_categorical_accuracy: 0.6967

Epoch 116/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9318 - sparse_categorical_accuracy: 0.6719 - val_loss: 0.8757 - val_sparse_categorical_accuracy: 0.6930

Epoch 117/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9306 - sparse_categorical_accuracy: 0.6700 - val_loss: 0.8818 - val_sparse_categorical_accuracy: 0.6918

Epoch 118/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9306 - sparse_categorical_accuracy: 0.6704 - val_loss: 0.9030 - val_sparse_categorical_accuracy: 0.6853

Epoch 119/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9283 - sparse_categorical_accuracy: 0.6734 - val_loss: 0.8826 - val_sparse_categorical_accuracy: 0.6947

Epoch 120/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9265 - sparse_categorical_accuracy: 0.6721 - val_loss: 0.8711 - val_sparse_categorical_accuracy: 0.6976

Epoch 121/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9285 - sparse_categorical_accuracy: 0.6722 - val_loss: 0.8715 - val_sparse_categorical_accuracy: 0.6957

Epoch 122/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9280 - sparse_categorical_accuracy: 0.6717 - val_loss: 0.8911 - val_sparse_categorical_accuracy: 0.6938

Epoch 123/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9229 - sparse_categorical_accuracy: 0.6744 - val_loss: 0.8851 - val_sparse_categorical_accuracy: 0.6914

Epoch 124/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9295 - sparse_categorical_accuracy: 0.6718 - val_loss: 0.8859 - val_sparse_categorical_accuracy: 0.6933

Epoch 125/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9252 - sparse_categorical_accuracy: 0.6733 - val_loss: 0.9416 - val_sparse_categorical_accuracy: 0.6770

Epoch 126/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9230 - sparse_categorical_accuracy: 0.6728 - val_loss: 0.8893 - val_sparse_categorical_accuracy: 0.6949

Epoch 127/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9248 - sparse_categorical_accuracy: 0.6745 - val_loss: 0.9059 - val_sparse_categorical_accuracy: 0.6837

Epoch 128/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9227 - sparse_categorical_accuracy: 0.6723 - val_loss: 0.9079 - val_sparse_categorical_accuracy: 0.6863

Epoch 129/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9278 - sparse_cat
egorical_accuracy: 0.6727 - val_loss: 0.8804 - val_sparse_categorical_accuracy: 0.69
58

Epoch 130/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9307 - sparse_cat
egorical_accuracy: 0.6701 - val_loss: 0.8951 - val_sparse_categorical_accuracy: 0.69
06

Epoch 131/300
1563/1563 [=====] - 7s 4ms/step - loss: 0.9265 - sparse_cat
egorical_accuracy: 0.6729 - val_loss: 0.8825 - val_sparse_categorical_accuracy: 0.69
30

Epoch 132/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9258 - sparse_cat
egorical_accuracy: 0.6696 - val_loss: 0.8876 - val_sparse_categorical_accuracy: 0.69
62

Epoch 133/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9190 - sparse_cat
egorical_accuracy: 0.6748 - val_loss: 0.8691 - val_sparse_categorical_accuracy: 0.69
72

Epoch 134/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9227 - sparse_cat
egorical_accuracy: 0.6737 - val_loss: 0.9082 - val_sparse_categorical_accuracy: 0.68
43

Epoch 135/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9217 - sparse_cat
egorical_accuracy: 0.6740 - val_loss: 0.8984 - val_sparse_categorical_accuracy: 0.69
12

Epoch 136/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9192 - sparse_cat
egorical_accuracy: 0.6736 - val_loss: 0.8720 - val_sparse_categorical_accuracy: 0.69
50

Epoch 137/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9247 - sparse_cat
egorical_accuracy: 0.6723 - val_loss: 0.8755 - val_sparse_categorical_accuracy: 0.69
11

Epoch 138/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9296 - sparse_cat
egorical_accuracy: 0.6715 - val_loss: 0.8669 - val_sparse_categorical_accuracy: 0.69
79

Epoch 139/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9241 - sparse_cat
egorical_accuracy: 0.6733 - val_loss: 0.9061 - val_sparse_categorical_accuracy: 0.68
54

Epoch 140/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9206 - sparse_cat
egorical_accuracy: 0.6738 - val_loss: 0.9465 - val_sparse_categorical_accuracy: 0.66
95

Epoch 141/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9201 - sparse_cat
egorical_accuracy: 0.6766 - val_loss: 0.9408 - val_sparse_categorical_accuracy: 0.67
41

Epoch 142/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9183 - sparse_cat
egorical_accuracy: 0.6731 - val_loss: 0.8721 - val_sparse_categorical_accuracy: 0.69
48

Epoch 143/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9208 - sparse_cat
egorical_accuracy: 0.6715 - val_loss: 0.8878 - val_sparse_categorical_accuracy: 0.68
86

Epoch 144/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9160 - sparse_cat
egorical_accuracy: 0.6740 - val_loss: 0.8803 - val_sparse_categorical_accuracy: 0.69
67

Epoch 145/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9184 - sparse_cat
egorical_accuracy: 0.6744 - val_loss: 0.8729 - val_sparse_categorical_accuracy: 0.69
79

Epoch 146/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9158 - sparse_cat
egorical_accuracy: 0.6773 - val_loss: 0.8777 - val_sparse_categorical_accuracy: 0.69
36

Epoch 147/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9168 - sparse_cat
egorical_accuracy: 0.6758 - val_loss: 0.8887 - val_sparse_categorical_accuracy: 0.68
90

Epoch 148/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9192 - sparse_cat
egorical_accuracy: 0.6768 - val_loss: 0.8997 - val_sparse_categorical_accuracy: 0.68
58

Epoch 149/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9259 - sparse_cat
egorical_accuracy: 0.6733 - val_loss: 0.8823 - val_sparse_categorical_accuracy: 0.69
39

Epoch 150/300
1563/1563 [=====] - 7s 4ms/step - loss: 0.9240 - sparse_cat
egorical_accuracy: 0.6732 - val_loss: 0.8745 - val_sparse_categorical_accuracy: 0.69
65

Epoch 151/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9147 - sparse_cat
egorical_accuracy: 0.6758 - val_loss: 0.9184 - val_sparse_categorical_accuracy: 0.68
05

Epoch 152/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9148 - sparse_cat
egorical_accuracy: 0.6743 - val_loss: 0.9150 - val_sparse_categorical_accuracy: 0.67
70

Epoch 153/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9145 - sparse_cat
egorical_accuracy: 0.6746 - val_loss: 0.8761 - val_sparse_categorical_accuracy: 0.69
55

Epoch 154/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9166 - sparse_cat
egorical_accuracy: 0.6746 - val_loss: 0.8949 - val_sparse_categorical_accuracy: 0.69
16

Epoch 155/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9142 - sparse_cat
egorical_accuracy: 0.6787 - val_loss: 0.8864 - val_sparse_categorical_accuracy: 0.68
97

Epoch 156/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9154 - sparse_cat
egorical_accuracy: 0.6748 - val_loss: 0.8892 - val_sparse_categorical_accuracy: 0.68
95

Epoch 157/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9154 - sparse_cat
egorical_accuracy: 0.6746 - val_loss: 0.8690 - val_sparse_categorical_accuracy: 0.69
63

Epoch 158/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9111 - sparse_cat
egorical_accuracy: 0.6790 - val_loss: 0.8622 - val_sparse_categorical_accuracy: 0.70
32

Epoch 159/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9147 - sparse_cat
egorical_accuracy: 0.6739 - val_loss: 0.8953 - val_sparse_categorical_accuracy: 0.69
06

Epoch 160/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9174 - sparse_cat
egorical_accuracy: 0.6750 - val_loss: 0.8839 - val_sparse_categorical_accuracy: 0.69
16

Epoch 161/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9170 - sparse_categorical_accuracy: 0.6755 - val_loss: 0.9061 - val_sparse_categorical_accuracy: 0.6877

Epoch 162/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9196 - sparse_categorical_accuracy: 0.6753 - val_loss: 0.8737 - val_sparse_categorical_accuracy: 0.6947

Epoch 163/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9169 - sparse_categorical_accuracy: 0.6739 - val_loss: 0.8689 - val_sparse_categorical_accuracy: 0.7007

Epoch 164/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9117 - sparse_categorical_accuracy: 0.6791 - val_loss: 0.8679 - val_sparse_categorical_accuracy: 0.6968

Epoch 165/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9162 - sparse_categorical_accuracy: 0.6747 - val_loss: 0.8806 - val_sparse_categorical_accuracy: 0.6939

Epoch 166/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9110 - sparse_categorical_accuracy: 0.6775 - val_loss: 0.8969 - val_sparse_categorical_accuracy: 0.6913

Epoch 167/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9114 - sparse_categorical_accuracy: 0.6799 - val_loss: 0.8746 - val_sparse_categorical_accuracy: 0.6948

Epoch 168/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9146 - sparse_categorical_accuracy: 0.6744 - val_loss: 0.9001 - val_sparse_categorical_accuracy: 0.6861

Epoch 169/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9105 - sparse_categorical_accuracy: 0.6773 - val_loss: 0.8864 - val_sparse_categorical_accuracy: 0.6906

Epoch 170/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9133 - sparse_categorical_accuracy: 0.6767 - val_loss: 0.8796 - val_sparse_categorical_accuracy: 0.6946

Epoch 171/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9090 - sparse_categorical_accuracy: 0.6788 - val_loss: 0.8830 - val_sparse_categorical_accuracy: 0.6947

Epoch 172/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9146 - sparse_categorical_accuracy: 0.6763 - val_loss: 0.8689 - val_sparse_categorical_accuracy: 0.6977

Epoch 173/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9113 - sparse_categorical_accuracy: 0.6764 - val_loss: 0.8842 - val_sparse_categorical_accuracy: 0.6872

Epoch 174/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9178 - sparse_categorical_accuracy: 0.6741 - val_loss: 0.8749 - val_sparse_categorical_accuracy: 0.6958

Epoch 175/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9104 - sparse_categorical_accuracy: 0.6778 - val_loss: 0.8805 - val_sparse_categorical_accuracy: 0.6927

Epoch 176/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9083 - sparse_categorical_accuracy: 0.6776 - val_loss: 0.8673 - val_sparse_categorical_accuracy: 0.6997

Epoch 177/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9076 - sparse_categorical_accuracy: 0.6779 - val_loss: 0.8806 - val_sparse_categorical_accuracy: 0.6924

Epoch 178/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9157 - sparse_categorical_accuracy: 0.6774 - val_loss: 0.8882 - val_sparse_categorical_accuracy: 0.6881

Epoch 179/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9048 - sparse_categorical_accuracy: 0.6801 - val_loss: 0.8704 - val_sparse_categorical_accuracy: 0.6956

Epoch 180/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9078 - sparse_categorical_accuracy: 0.6773 - val_loss: 0.8955 - val_sparse_categorical_accuracy: 0.6903

Epoch 181/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9093 - sparse_categorical_accuracy: 0.6778 - val_loss: 0.8734 - val_sparse_categorical_accuracy: 0.6954

Epoch 182/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9065 - sparse_categorical_accuracy: 0.6788 - val_loss: 0.9053 - val_sparse_categorical_accuracy: 0.6892

Epoch 183/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9098 - sparse_categorical_accuracy: 0.6782 - val_loss: 0.8815 - val_sparse_categorical_accuracy: 0.6942

Epoch 184/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9117 - sparse_categorical_accuracy: 0.6785 - val_loss: 0.8711 - val_sparse_categorical_accuracy: 0.6989

Epoch 185/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9082 - sparse_categorical_accuracy: 0.6782 - val_loss: 0.8943 - val_sparse_categorical_accuracy: 0.6880

Epoch 186/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9088 - sparse_categorical_accuracy: 0.6782 - val_loss: 0.8795 - val_sparse_categorical_accuracy: 0.6949

Epoch 187/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9088 - sparse_categorical_accuracy: 0.6790 - val_loss: 0.8773 - val_sparse_categorical_accuracy: 0.6955

Epoch 188/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9118 - sparse_categorical_accuracy: 0.6771 - val_loss: 0.8839 - val_sparse_categorical_accuracy: 0.6952

Epoch 189/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9056 - sparse_categorical_accuracy: 0.6809 - val_loss: 0.8746 - val_sparse_categorical_accuracy: 0.6966

Epoch 190/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9098 - sparse_categorical_accuracy: 0.6795 - val_loss: 0.8687 - val_sparse_categorical_accuracy: 0.6970

Epoch 191/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9116 - sparse_categorical_accuracy: 0.6767 - val_loss: 0.8695 - val_sparse_categorical_accuracy: 0.6944

Epoch 192/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9061 - sparse_categorical_accuracy: 0.6781 - val_loss: 0.8789 - val_sparse_categorical_accuracy: 0.6914

Epoch 193/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9092 - sparse_categorical_accuracy: 0.6775 - val_loss: 0.8694 - val_sparse_categorical_accuracy: 0.6950
Epoch 194/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9073 - sparse_categorical_accuracy: 0.6802 - val_loss: 0.8714 - val_sparse_categorical_accuracy: 0.6936
Epoch 195/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9070 - sparse_categorical_accuracy: 0.6787 - val_loss: 0.8910 - val_sparse_categorical_accuracy: 0.6944
Epoch 196/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9087 - sparse_categorical_accuracy: 0.6797 - val_loss: 0.8931 - val_sparse_categorical_accuracy: 0.6928
Epoch 197/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9111 - sparse_categorical_accuracy: 0.6782 - val_loss: 0.8708 - val_sparse_categorical_accuracy: 0.6975
Epoch 198/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9102 - sparse_categorical_accuracy: 0.6797 - val_loss: 0.8939 - val_sparse_categorical_accuracy: 0.6913
Epoch 199/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9089 - sparse_categorical_accuracy: 0.6786 - val_loss: 0.9011 - val_sparse_categorical_accuracy: 0.6843
Epoch 200/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9046 - sparse_categorical_accuracy: 0.6775 - val_loss: 0.8942 - val_sparse_categorical_accuracy: 0.6884
Epoch 201/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9064 - sparse_categorical_accuracy: 0.6791 - val_loss: 0.8741 - val_sparse_categorical_accuracy: 0.6924
Epoch 202/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9088 - sparse_categorical_accuracy: 0.6797 - val_loss: 0.8770 - val_sparse_categorical_accuracy: 0.6940
Epoch 203/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9042 - sparse_categorical_accuracy: 0.6807 - val_loss: 0.9059 - val_sparse_categorical_accuracy: 0.6885
Epoch 204/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9072 - sparse_categorical_accuracy: 0.6803 - val_loss: 0.8737 - val_sparse_categorical_accuracy: 0.6977
Epoch 205/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9025 - sparse_categorical_accuracy: 0.6826 - val_loss: 0.8714 - val_sparse_categorical_accuracy: 0.6964
Epoch 206/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9059 - sparse_categorical_accuracy: 0.6810 - val_loss: 0.8855 - val_sparse_categorical_accuracy: 0.6884
Epoch 207/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9071 - sparse_categorical_accuracy: 0.6794 - val_loss: 0.9021 - val_sparse_categorical_accuracy: 0.6889
Epoch 208/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9028 - sparse_categorical_accuracy: 0.6813 - val_loss: 0.8899 - val_sparse_categorical_accuracy: 0.6918

Epoch 209/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9073 - sparse_categorical_accuracy: 0.6782 - val_loss: 0.8629 - val_sparse_categorical_accuracy: 0.7016

Epoch 210/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9069 - sparse_categorical_accuracy: 0.6790 - val_loss: 0.8624 - val_sparse_categorical_accuracy: 0.6963

Epoch 211/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9065 - sparse_categorical_accuracy: 0.6778 - val_loss: 0.8912 - val_sparse_categorical_accuracy: 0.6901

Epoch 212/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9045 - sparse_categorical_accuracy: 0.6819 - val_loss: 0.8660 - val_sparse_categorical_accuracy: 0.6988

Epoch 213/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9057 - sparse_categorical_accuracy: 0.6792 - val_loss: 0.8888 - val_sparse_categorical_accuracy: 0.6935

Epoch 214/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8998 - sparse_categorical_accuracy: 0.6812 - val_loss: 0.8917 - val_sparse_categorical_accuracy: 0.6857

Epoch 215/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9081 - sparse_categorical_accuracy: 0.6777 - val_loss: 0.8649 - val_sparse_categorical_accuracy: 0.6995

Epoch 216/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9037 - sparse_categorical_accuracy: 0.6770 - val_loss: 0.8658 - val_sparse_categorical_accuracy: 0.7000

Epoch 217/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9092 - sparse_categorical_accuracy: 0.6801 - val_loss: 0.8961 - val_sparse_categorical_accuracy: 0.6919

Epoch 218/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9081 - sparse_categorical_accuracy: 0.6798 - val_loss: 0.8774 - val_sparse_categorical_accuracy: 0.6948

Epoch 219/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9055 - sparse_categorical_accuracy: 0.6795 - val_loss: 0.8908 - val_sparse_categorical_accuracy: 0.6883

Epoch 220/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9073 - sparse_categorical_accuracy: 0.6798 - val_loss: 0.8706 - val_sparse_categorical_accuracy: 0.7004

Epoch 221/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9029 - sparse_categorical_accuracy: 0.6792 - val_loss: 0.8726 - val_sparse_categorical_accuracy: 0.6970

Epoch 222/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8992 - sparse_categorical_accuracy: 0.6819 - val_loss: 0.9088 - val_sparse_categorical_accuracy: 0.6831

Epoch 223/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9059 - sparse_categorical_accuracy: 0.6807 - val_loss: 0.8709 - val_sparse_categorical_accuracy: 0.6991

Epoch 224/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9060 - sparse_categorical_accuracy: 0.6775 - val_loss: 0.8651 - val_sparse_categorical_accuracy: 0.6986

Epoch 225/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9050 - sparse_categorical_accuracy: 0.6796 - val_loss: 0.8673 - val_sparse_categorical_accuracy: 0.6971

Epoch 226/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9065 - sparse_categorical_accuracy: 0.6787 - val_loss: 0.8673 - val_sparse_categorical_accuracy: 0.6979

Epoch 227/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9026 - sparse_categorical_accuracy: 0.6830 - val_loss: 0.8761 - val_sparse_categorical_accuracy: 0.6910

Epoch 228/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9017 - sparse_categorical_accuracy: 0.6806 - val_loss: 0.8823 - val_sparse_categorical_accuracy: 0.6909

Epoch 229/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9051 - sparse_categorical_accuracy: 0.6798 - val_loss: 0.8751 - val_sparse_categorical_accuracy: 0.6938

Epoch 230/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9095 - sparse_categorical_accuracy: 0.6774 - val_loss: 0.8866 - val_sparse_categorical_accuracy: 0.6925

Epoch 231/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9051 - sparse_categorical_accuracy: 0.6827 - val_loss: 0.9001 - val_sparse_categorical_accuracy: 0.6890

Epoch 232/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9055 - sparse_categorical_accuracy: 0.6783 - val_loss: 0.8582 - val_sparse_categorical_accuracy: 0.7011

Epoch 233/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8975 - sparse_categorical_accuracy: 0.6816 - val_loss: 0.8653 - val_sparse_categorical_accuracy: 0.6987

Epoch 234/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9044 - sparse_categorical_accuracy: 0.6787 - val_loss: 0.8559 - val_sparse_categorical_accuracy: 0.7016

Epoch 235/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8967 - sparse_categorical_accuracy: 0.6787 - val_loss: 0.8693 - val_sparse_categorical_accuracy: 0.6961

Epoch 236/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9010 - sparse_categorical_accuracy: 0.6813 - val_loss: 0.8806 - val_sparse_categorical_accuracy: 0.6935

Epoch 237/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9047 - sparse_categorical_accuracy: 0.6791 - val_loss: 0.8765 - val_sparse_categorical_accuracy: 0.6964

Epoch 238/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9014 - sparse_categorical_accuracy: 0.6803 - val_loss: 0.8805 - val_sparse_categorical_accuracy: 0.6953

Epoch 239/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9009 - sparse_categorical_accuracy: 0.6830 - val_loss: 0.8895 - val_sparse_categorical_accuracy: 0.6921

Epoch 240/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9002 - sparse_categorical_accuracy: 0.6833 - val_loss: 0.8963 - val_sparse_categorical_accuracy: 0.6883

Epoch 241/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9019 - sparse_categorical_accuracy: 0.6801 - val_loss: 0.8655 - val_sparse_categorical_accuracy: 0.7002

Epoch 242/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9058 - sparse_categorical_accuracy: 0.6789 - val_loss: 0.9444 - val_sparse_categorical_accuracy: 0.6762

Epoch 243/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9058 - sparse_categorical_accuracy: 0.6768 - val_loss: 0.8809 - val_sparse_categorical_accuracy: 0.6928

Epoch 244/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9010 - sparse_categorical_accuracy: 0.6821 - val_loss: 0.8721 - val_sparse_categorical_accuracy: 0.6977

Epoch 245/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9044 - sparse_categorical_accuracy: 0.6835 - val_loss: 0.8786 - val_sparse_categorical_accuracy: 0.6943

Epoch 246/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8954 - sparse_categorical_accuracy: 0.6816 - val_loss: 0.9006 - val_sparse_categorical_accuracy: 0.6895

Epoch 247/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8925 - sparse_categorical_accuracy: 0.6862 - val_loss: 0.8939 - val_sparse_categorical_accuracy: 0.6866

Epoch 248/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9019 - sparse_categorical_accuracy: 0.6804 - val_loss: 0.9164 - val_sparse_categorical_accuracy: 0.6787

Epoch 249/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8999 - sparse_categorical_accuracy: 0.6800 - val_loss: 0.8822 - val_sparse_categorical_accuracy: 0.6953

Epoch 250/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8960 - sparse_categorical_accuracy: 0.6823 - val_loss: 0.8955 - val_sparse_categorical_accuracy: 0.6900

Epoch 251/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9017 - sparse_categorical_accuracy: 0.6822 - val_loss: 0.8842 - val_sparse_categorical_accuracy: 0.6927

Epoch 252/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9035 - sparse_categorical_accuracy: 0.6815 - val_loss: 0.8884 - val_sparse_categorical_accuracy: 0.6942

Epoch 253/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8973 - sparse_categorical_accuracy: 0.6804 - val_loss: 0.8675 - val_sparse_categorical_accuracy: 0.6992

Epoch 254/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9017 - sparse_categorical_accuracy: 0.6788 - val_loss: 0.9032 - val_sparse_categorical_accuracy: 0.6831

Epoch 255/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8946 - sparse_categorical_accuracy: 0.6828 - val_loss: 0.8517 - val_sparse_categorical_accuracy: 0.7060

Epoch 256/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8992 - sparse_categorical_accuracy: 0.6841 - val_loss: 0.8684 - val_sparse_categorical_accuracy: 0.6992

Epoch 257/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9012 - sparse_categorical_accuracy: 0.6812 - val_loss: 0.8567 - val_sparse_categorical_accuracy: 0.7053

Epoch 258/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9017 - sparse_categorical_accuracy: 0.6811 - val_loss: 0.8809 - val_sparse_categorical_accuracy: 0.6920

Epoch 259/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9029 - sparse_categorical_accuracy: 0.6806 - val_loss: 0.8905 - val_sparse_categorical_accuracy: 0.6888

Epoch 260/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8976 - sparse_categorical_accuracy: 0.6812 - val_loss: 0.8526 - val_sparse_categorical_accuracy: 0.7023

Epoch 261/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8948 - sparse_categorical_accuracy: 0.6852 - val_loss: 0.8718 - val_sparse_categorical_accuracy: 0.7008

Epoch 262/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8956 - sparse_categorical_accuracy: 0.6834 - val_loss: 0.8658 - val_sparse_categorical_accuracy: 0.6990

Epoch 263/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8980 - sparse_categorical_accuracy: 0.6830 - val_loss: 0.8846 - val_sparse_categorical_accuracy: 0.6948

Epoch 264/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8968 - sparse_categorical_accuracy: 0.6803 - val_loss: 0.8926 - val_sparse_categorical_accuracy: 0.6902

Epoch 265/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8941 - sparse_categorical_accuracy: 0.6827 - val_loss: 0.8887 - val_sparse_categorical_accuracy: 0.6922

Epoch 266/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8982 - sparse_categorical_accuracy: 0.6811 - val_loss: 0.8679 - val_sparse_categorical_accuracy: 0.6982

Epoch 267/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8981 - sparse_categorical_accuracy: 0.6827 - val_loss: 0.8780 - val_sparse_categorical_accuracy: 0.6946

Epoch 268/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8967 - sparse_categorical_accuracy: 0.6835 - val_loss: 0.8617 - val_sparse_categorical_accuracy: 0.7001

Epoch 269/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9022 - sparse_categorical_accuracy: 0.6803 - val_loss: 0.8620 - val_sparse_categorical_accuracy: 0.6995

Epoch 270/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8985 - sparse_categorical_accuracy: 0.6827 - val_loss: 0.8794 - val_sparse_categorical_accuracy: 0.6939

Epoch 271/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8927 - sparse_categorical_accuracy: 0.6819 - val_loss: 0.8907 - val_sparse_categorical_accuracy: 0.6880

Epoch 272/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8978 - sparse_categorical_accuracy: 0.6842 - val_loss: 0.9026 - val_sparse_categorical_accuracy: 0.6872

Epoch 273/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8955 - sparse_categorical_accuracy: 0.6810 - val_loss: 0.8689 - val_sparse_categorical_accuracy: 0.6973

Epoch 274/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9032 - sparse_categorical_accuracy: 0.6811 - val_loss: 0.8849 - val_sparse_categorical_accuracy: 0.6929

Epoch 275/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9004 - sparse_categorical_accuracy: 0.6815 - val_loss: 0.8798 - val_sparse_categorical_accuracy: 0.6936

Epoch 276/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9000 - sparse_categorical_accuracy: 0.6822 - val_loss: 0.8852 - val_sparse_categorical_accuracy: 0.6940

Epoch 277/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9002 - sparse_categorical_accuracy: 0.6817 - val_loss: 0.8820 - val_sparse_categorical_accuracy: 0.6961

Epoch 278/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8965 - sparse_categorical_accuracy: 0.6832 - val_loss: 0.8586 - val_sparse_categorical_accuracy: 0.7060

Epoch 279/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8981 - sparse_categorical_accuracy: 0.6803 - val_loss: 0.8568 - val_sparse_categorical_accuracy: 0.7025

Epoch 280/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8951 - sparse_categorical_accuracy: 0.6849 - val_loss: 0.8923 - val_sparse_categorical_accuracy: 0.6896

Epoch 281/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8973 - sparse_categorical_accuracy: 0.6834 - val_loss: 0.8620 - val_sparse_categorical_accuracy: 0.7010

Epoch 282/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8945 - sparse_categorical_accuracy: 0.6847 - val_loss: 0.8750 - val_sparse_categorical_accuracy: 0.6939

Epoch 283/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8989 - sparse_categorical_accuracy: 0.6805 - val_loss: 0.8611 - val_sparse_categorical_accuracy: 0.6980

Epoch 284/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8943 - sparse_categorical_accuracy: 0.6826 - val_loss: 0.8961 - val_sparse_categorical_accuracy: 0.6868

Epoch 285/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8993 - sparse_categorical_accuracy: 0.6841 - val_loss: 0.8599 - val_sparse_categorical_accuracy: 0.7001

Epoch 286/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8937 - sparse_categorical_accuracy: 0.6848 - val_loss: 0.8975 - val_sparse_categorical_accuracy: 0.6857

Epoch 287/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8940 - sparse_categorical_accuracy: 0.6843 - val_loss: 0.8608 - val_sparse_categorical_accuracy: 0.7006

Epoch 288/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8985 - sparse_categorical_accuracy: 0.6800 - val_loss: 0.9034 - val_sparse_categorical_accuracy: 0.6882

Epoch 289/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8963 - sparse_categorical_accuracy: 0.6835 - val_loss: 0.8590 - val_sparse_categorical_accuracy: 0.7019

Epoch 290/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8930 - sparse_categorical_accuracy: 0.6845 - val_loss: 0.8916 - val_sparse_categorical_accuracy: 0.6885

Epoch 291/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9011 - sparse_categorical_accuracy: 0.6800 - val_loss: 0.8702 - val_sparse_categorical_accuracy: 0.6974

Epoch 292/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8965 - sparse_categorical_accuracy: 0.6826 - val_loss: 0.8736 - val_sparse_categorical_accuracy: 0.6940

Epoch 293/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8949 - sparse_categorical_accuracy: 0.6825 - val_loss: 0.8748 - val_sparse_categorical_accuracy: 0.6955

Epoch 294/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8969 - sparse_categorical_accuracy: 0.6833 - val_loss: 0.8824 - val_sparse_categorical_accuracy: 0.6934

Epoch 295/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8977 - sparse_categorical_accuracy: 0.6812 - val_loss: 0.8998 - val_sparse_categorical_accuracy: 0.6868

Epoch 296/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8923 - sparse_categorical_accuracy: 0.6857 - val_loss: 0.8938 - val_sparse_categorical_accuracy: 0.6905

Epoch 297/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8985 - sparse_categorical_accuracy: 0.6826 - val_loss: 0.8762 - val_sparse_categorical_accuracy: 0.6963

Epoch 298/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8991 - sparse_categorical_accuracy: 0.6843 - val_loss: 0.8862 - val_sparse_categorical_accuracy: 0.6925

Epoch 299/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8976 - sparse_categorical_accuracy: 0.6817 - val_loss: 0.8625 - val_sparse_categorical_accuracy: 0.6981

Epoch 300/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.8940 - sparse_categorical_accuracy: 0.6820 - val_loss: 0.8678 - val_sparse_categorical_accuracy: 0.6998

Model: "baseline_1"

Layer (type)	Output Shape	Param #
conv2d_2 (Conv2D)	multiple	456
batch_normalization_2 (Batch Normalization)	multiple	24
activation_2 (Activation)	multiple	0
max_pooling2d_2 (MaxPooling2D)	multiple	0
dropout_3 (Dropout)	multiple	0
conv2d_3 (Conv2D)	multiple	906

batch_normalization_3 (Batch normalization)	multiple	24
activation_3 (Activation)	multiple	0
max_pooling2d_3 (MaxPooling2D)	multiple	0
dropout_4 (Dropout)	multiple	0
flatten_1 (Flatten)	multiple	0
dense_2 (Dense)	multiple	49280
dropout_5 (Dropout)	multiple	0
dense_3 (Dense)	multiple	1290

Total params: 51,980

Trainable params: 51,956

Non-trainable params: 24

