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In [3]: 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 [4]: (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 [5]: 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.flatten = Flatten()
        self.f1 = Dense(128, activation='relu')
        self.d2 = 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.flatten(x)
        x = self.f1(x)
        x = self.d2(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 [=====] - 9s 4ms/step - loss: 1.6623 - sparse_categorical_accuracy: 0.3999 - val_loss: 1.3703 - val_sparse_categorical_accuracy: 0.5143

Epoch 2/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.4224 - sparse_categorical_accuracy: 0.4893 - val_loss: 1.2799 - val_sparse_categorical_accuracy: 0.5467

Epoch 3/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.3333 - sparse_categorical_accuracy: 0.5221 - val_loss: 1.2124 - val_sparse_categorical_accuracy: 0.5727

Epoch 4/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.2689 - sparse_categorical_accuracy: 0.5501 - val_loss: 1.1577 - val_sparse_categorical_accuracy: 0.5939

Epoch 5/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.2209 - sparse_categorical_accuracy: 0.5646 - val_loss: 1.1398 - val_sparse_categorical_accuracy: 0.6010

Epoch 6/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.1780 - sparse_categorical_accuracy: 0.5831 - val_loss: 1.1253 - val_sparse_categorical_accuracy: 0.6048

Epoch 7/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.1483 - sparse_categorical_accuracy: 0.5935 - val_loss: 1.1112 - val_sparse_categorical_accuracy: 0.6092

Epoch 8/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.1161 - sparse_categorical_accuracy: 0.6058 - val_loss: 1.1385 - val_sparse_categorical_accuracy: 0.6024

Epoch 9/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.0917 - sparse_categorical_accuracy: 0.6127 - val_loss: 1.0999 - val_sparse_categorical_accuracy: 0.6155

Epoch 10/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.0667 - sparse_categorical_accuracy: 0.6219 - val_loss: 1.0800 - val_sparse_categorical_accuracy: 0.6160

Epoch 11/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.0513 - sparse_categorical_accuracy: 0.6256 - val_loss: 1.0955 - val_sparse_categorical_accuracy: 0.6149

Epoch 12/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.0165 - sparse_categorical_accuracy: 0.6380 - val_loss: 1.0987 - val_sparse_categorical_accuracy: 0.6146

Epoch 13/300
1563/1563 [=====] - 5s 3ms/step - loss: 1.0032 - sparse_categorical_accuracy: 0.6431 - val_loss: 1.0592 - val_sparse_categorical_accuracy: 0.6288

Epoch 14/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.9863 - sparse_categorical_accuracy: 0.6492 - val_loss: 1.0653 - val_sparse_categorical_accuracy: 0.6305

Epoch 15/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.9653 - sparse_categorical_accuracy: 0.6580 - val_loss: 1.0638 - val_sparse_categorical_accuracy: 0.6277

Epoch 16/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.9498 - sparse_categorical_accuracy: 0.6640 - val_loss: 1.0779 - val_sparse_categorical_accuracy: 0.6245

Epoch 17/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.9313 - sparse_categorical_accuracy: 0.6682 - val_loss: 1.0882 - val_sparse_categorical_accuracy: 0.6230

Epoch 18/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.9211 - sparse_categorical_accuracy: 0.6712 - val_loss: 1.0804 - val_sparse_categorical_accuracy: 0.6251

Epoch 19/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.9090 - sparse_categorical_accuracy: 0.6785 - val_loss: 1.0664 - val_sparse_categorical_accuracy: 0.6334

Epoch 20/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.9000 - sparse_categorical_accuracy: 0.6800 - val_loss: 1.0786 - val_sparse_categorical_accuracy: 0.6259

Epoch 21/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8882 - sparse_categorical_accuracy: 0.6861 - val_loss: 1.0695 - val_sparse_categorical_accuracy: 0.6302

Epoch 22/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8721 - sparse_categorical_accuracy: 0.6884 - val_loss: 1.0633 - val_sparse_categorical_accuracy: 0.6317

Epoch 23/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8608 - sparse_categorical_accuracy: 0.6938 - val_loss: 1.0826 - val_sparse_categorical_accuracy: 0.6271

Epoch 24/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8472 - sparse_categorical_accuracy: 0.6993 - val_loss: 1.0742 - val_sparse_categorical_accuracy: 0.6333

Epoch 25/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8426 - sparse_categorical_accuracy: 0.7011 - val_loss: 1.0814 - val_sparse_categorical_accuracy: 0.6296

Epoch 26/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8378 - sparse_categorical_accuracy: 0.7039 - val_loss: 1.0665 - val_sparse_categorical_accuracy: 0.6343

Epoch 27/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8217 - sparse_categorical_accuracy: 0.7071 - val_loss: 1.0760 - val_sparse_categorical_accuracy: 0.6315

Epoch 28/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8176 - sparse_categorical_accuracy: 0.7095 - val_loss: 1.1044 - val_sparse_categorical_accuracy: 0.6320

Epoch 29/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8025 - sparse_categorical_accuracy: 0.7147 - val_loss: 1.0835 - val_sparse_categorical_accuracy: 0.6332

Epoch 30/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.8009 - sparse_categorical_accuracy: 0.7142 - val_loss: 1.0937 - val_sparse_categorical_accuracy: 0.6306

Epoch 31/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7924 - sparse_categorical_accuracy: 0.7170 - val_loss: 1.0799 - val_sparse_categorical_accuracy: 0.6286

Epoch 32/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7869 - sparse_categorical_accuracy: 0.7202 - val_loss: 1.0934 - val_sparse_categorical_accuracy: 0.6239

Epoch 33/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7764 - sparse_categorical_accuracy: 0.7238 - val_loss: 1.0782 - val_sparse_categorical_accuracy: 0.6317

Epoch 34/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7715 - sparse_categorical_accuracy: 0.7235 - val_loss: 1.0919 - val_sparse_categorical_accuracy: 0.6303

Epoch 35/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7623 - sparse_categorical_accuracy: 0.7284 - val_loss: 1.1117 - val_sparse_categorical_accuracy: 0.6276

Epoch 36/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7602 - sparse_categorical_accuracy: 0.7272 - val_loss: 1.1043 - val_sparse_categorical_accuracy: 0.6315

Epoch 37/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7488 - sparse_categorical_accuracy: 0.7322 - val_loss: 1.0934 - val_sparse_categorical_accuracy: 0.6360

Epoch 38/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7446 - sparse_categorical_accuracy: 0.7359 - val_loss: 1.1189 - val_sparse_categorical_accuracy: 0.6342

Epoch 39/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7437 - sparse_categorical_accuracy: 0.7334 - val_loss: 1.1123 - val_sparse_categorical_accuracy: 0.6328

Epoch 40/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7354 - sparse_categorical_accuracy: 0.7378 - val_loss: 1.1084 - val_sparse_categorical_accuracy: 0.6341

Epoch 41/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7321 - sparse_categorical_accuracy: 0.7406 - val_loss: 1.1093 - val_sparse_categorical_accuracy: 0.6316

Epoch 42/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7247 - sparse_categorical_accuracy: 0.7403 - val_loss: 1.1213 - val_sparse_categorical_accuracy: 0.6284

Epoch 43/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7229 - sparse_categorical_accuracy: 0.7440 - val_loss: 1.1120 - val_sparse_categorical_accuracy: 0.6297

Epoch 44/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7215 - sparse_categorical_accuracy: 0.7425 - val_loss: 1.1198 - val_sparse_categorical_accuracy: 0.6298

Epoch 45/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7076 - sparse_categorical_accuracy: 0.7479 - val_loss: 1.1319 - val_sparse_categorical_accuracy: 0.6296

Epoch 46/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7089 - sparse_categorical_accuracy: 0.7468 - val_loss: 1.1125 - val_sparse_categorical_accuracy: 0.6303

Epoch 47/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.7061 - sparse_categorical_accuracy: 0.7494 - val_loss: 1.1303 - val_sparse_categorical_accuracy: 0.6334

Epoch 48/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6990 - sparse_categorical_accuracy: 0.7504 - val_loss: 1.1322 - val_sparse_categorical_accuracy: 0.6333

Epoch 49/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6978 - sparse_categorical_accuracy: 0.7525 - val_loss: 1.1197 - val_sparse_categorical_accuracy: 0.6349

Epoch 50/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6962 - sparse_categorical_accuracy: 0.7500 - val_loss: 1.1394 - val_sparse_categorical_accuracy: 0.6298

Epoch 51/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6933 - sparse_categorical_accuracy: 0.7521 - val_loss: 1.1399 - val_sparse_categorical_accuracy: 0.6239

Epoch 52/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6844 - sparse_categorical_accuracy: 0.7563 - val_loss: 1.1367 - val_sparse_categorical_accuracy: 0.6329

Epoch 53/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6873 - sparse_categorical_accuracy: 0.7550 - val_loss: 1.1250 - val_sparse_categorical_accuracy: 0.6301

Epoch 54/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6788 - sparse_categorical_accuracy: 0.7588 - val_loss: 1.1378 - val_sparse_categorical_accuracy: 0.6296

Epoch 55/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6788 - sparse_categorical_accuracy: 0.7580 - val_loss: 1.1256 - val_sparse_categorical_accuracy: 0.6305

Epoch 56/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6721 - sparse_categorical_accuracy: 0.7586 - val_loss: 1.1350 - val_sparse_categorical_accuracy: 0.6351

Epoch 57/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6776 - sparse_categorical_accuracy: 0.7577 - val_loss: 1.1369 - val_sparse_categorical_accuracy: 0.6336

Epoch 58/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6655 - sparse_categorical_accuracy: 0.7630 - val_loss: 1.1439 - val_sparse_categorical_accuracy: 0.6311

Epoch 59/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6663 - sparse_categorical_accuracy: 0.7621 - val_loss: 1.1429 - val_sparse_categorical_accuracy: 0.6364

Epoch 60/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6691 - sparse_categorical_accuracy: 0.7626 - val_loss: 1.1297 - val_sparse_categorical_accuracy: 0.6352

Epoch 61/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6602 - sparse_categorical_accuracy: 0.7653 - val_loss: 1.1455 - val_sparse_categorical_accuracy: 0.6333

Epoch 62/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6646 - sparse_categorical_accuracy: 0.7646 - val_loss: 1.1466 - val_sparse_categorical_accuracy: 0.6332

Epoch 63/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6551 - sparse_categorical_accuracy: 0.7656 - val_loss: 1.1455 - val_sparse_categorical_accuracy: 0.6356

Epoch 64/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6518 - sparse_categorical_accuracy: 0.7673 - val_loss: 1.1490 - val_sparse_categorical_accuracy: 0.6372

Epoch 65/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6510 - sparse_categorical_accuracy: 0.7688 - val_loss: 1.1403 - val_sparse_categorical_accuracy: 0.6355

Epoch 66/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6459 - sparse_categorical_accuracy: 0.7684 - val_loss: 1.1552 - val_sparse_categorical_accuracy: 0.6317

Epoch 67/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.6571 - sparse_categorical_accuracy: 0.7668 - val_loss: 1.1470 - val_sparse_categorical_accuracy: 0.6285

Epoch 68/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6437 - sparse_categorical_accuracy: 0.7703 - val_loss: 1.1706 - val_sparse_categorical_accuracy: 0.6296

Epoch 69/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6456 - sparse_categorical_accuracy: 0.7725 - val_loss: 1.1628 - val_sparse_categorical_accuracy: 0.6284

Epoch 70/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6481 - sparse_categorical_accuracy: 0.7695 - val_loss: 1.1521 - val_sparse_categorical_accuracy: 0.6318

Epoch 71/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6403 - sparse_categorical_accuracy: 0.7721 - val_loss: 1.1518 - val_sparse_categorical_accuracy: 0.6276

Epoch 72/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6358 - sparse_categorical_accuracy: 0.7744 - val_loss: 1.1553 - val_sparse_categorical_accuracy: 0.6323

Epoch 73/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6416 - sparse_categorical_accuracy: 0.7713 - val_loss: 1.1642 - val_sparse_categorical_accuracy: 0.6337

Epoch 74/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6392 - sparse_categorical_accuracy: 0.7720 - val_loss: 1.1458 - val_sparse_categorical_accuracy: 0.6374

Epoch 75/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6331 - sparse_categorical_accuracy: 0.7757 - val_loss: 1.1546 - val_sparse_categorical_accuracy: 0.6318

Epoch 76/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6342 - sparse_categorical_accuracy: 0.7739 - val_loss: 1.1516 - val_sparse_categorical_accuracy: 0.6377

Epoch 77/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6310 - sparse_categorical_accuracy: 0.7753 - val_loss: 1.1701 - val_sparse_categorical_accuracy: 0.6341

Epoch 78/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6214 - sparse_categorical_accuracy: 0.7793 - val_loss: 1.1724 - val_sparse_categorical_accuracy: 0.6322

Epoch 79/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6320 - sparse_categorical_accuracy: 0.7762 - val_loss: 1.1555 - val_sparse_categorical_accuracy: 0.6340

Epoch 80/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6244 - sparse_categorical_accuracy: 0.7785 - val_loss: 1.1800 - val_sparse_categorical_accuracy: 0.6319

Epoch 81/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6178 - sparse_categorical_accuracy: 0.7829 - val_loss: 1.1727 - val_sparse_categorical_accuracy: 0.6325
Epoch 82/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6234 - sparse_categorical_accuracy: 0.7793 - val_loss: 1.1685 - val_sparse_categorical_accuracy: 0.6334
Epoch 83/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6248 - sparse_categorical_accuracy: 0.7791 - val_loss: 1.1516 - val_sparse_categorical_accuracy: 0.6344
Epoch 84/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6194 - sparse_categorical_accuracy: 0.7794 - val_loss: 1.1805 - val_sparse_categorical_accuracy: 0.6267
Epoch 85/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6151 - sparse_categorical_accuracy: 0.7835 - val_loss: 1.1927 - val_sparse_categorical_accuracy: 0.6319
Epoch 86/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6176 - sparse_categorical_accuracy: 0.7811 - val_loss: 1.1770 - val_sparse_categorical_accuracy: 0.6319
Epoch 87/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6163 - sparse_categorical_accuracy: 0.7814 - val_loss: 1.1655 - val_sparse_categorical_accuracy: 0.6312
Epoch 88/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6116 - sparse_categorical_accuracy: 0.7815 - val_loss: 1.1738 - val_sparse_categorical_accuracy: 0.6348
Epoch 89/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6145 - sparse_categorical_accuracy: 0.7821 - val_loss: 1.1507 - val_sparse_categorical_accuracy: 0.6361
Epoch 90/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6135 - sparse_categorical_accuracy: 0.7834 - val_loss: 1.1700 - val_sparse_categorical_accuracy: 0.6305
Epoch 91/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6073 - sparse_categorical_accuracy: 0.7840 - val_loss: 1.1828 - val_sparse_categorical_accuracy: 0.6274
Epoch 92/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6053 - sparse_categorical_accuracy: 0.7846 - val_loss: 1.1744 - val_sparse_categorical_accuracy: 0.6353
Epoch 93/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6017 - sparse_categorical_accuracy: 0.7861 - val_loss: 1.1804 - val_sparse_categorical_accuracy: 0.6291
Epoch 94/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6065 - sparse_categorical_accuracy: 0.7828 - val_loss: 1.1717 - val_sparse_categorical_accuracy: 0.6329
Epoch 95/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6034 - sparse_categorical_accuracy: 0.7856 - val_loss: 1.1712 - val_sparse_categorical_accuracy: 0.6314
Epoch 96/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5997 - sparse_categorical_accuracy: 0.7890 - val_loss: 1.1778 - val_sparse_categorical_accuracy: 0.6345

Epoch 97/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5986 - sparse_categorical_accuracy: 0.7854 - val_loss: 1.1824 - val_sparse_categorical_accuracy: 0.6315

Epoch 98/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.6027 - sparse_categorical_accuracy: 0.7853 - val_loss: 1.1851 - val_sparse_categorical_accuracy: 0.6345

Epoch 99/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5959 - sparse_categorical_accuracy: 0.7867 - val_loss: 1.1872 - val_sparse_categorical_accuracy: 0.6345

Epoch 100/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5932 - sparse_categorical_accuracy: 0.7900 - val_loss: 1.1859 - val_sparse_categorical_accuracy: 0.6288

Epoch 101/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5916 - sparse_categorical_accuracy: 0.7897 - val_loss: 1.1959 - val_sparse_categorical_accuracy: 0.6325

Epoch 102/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5929 - sparse_categorical_accuracy: 0.7875 - val_loss: 1.1856 - val_sparse_categorical_accuracy: 0.6298

Epoch 103/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5942 - sparse_categorical_accuracy: 0.7894 - val_loss: 1.1925 - val_sparse_categorical_accuracy: 0.6290

Epoch 104/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5921 - sparse_categorical_accuracy: 0.7900 - val_loss: 1.2216 - val_sparse_categorical_accuracy: 0.6243

Epoch 105/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5946 - sparse_categorical_accuracy: 0.7885 - val_loss: 1.2058 - val_sparse_categorical_accuracy: 0.6318

Epoch 106/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5952 - sparse_categorical_accuracy: 0.7891 - val_loss: 1.1973 - val_sparse_categorical_accuracy: 0.6344

Epoch 107/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5937 - sparse_categorical_accuracy: 0.7889 - val_loss: 1.1887 - val_sparse_categorical_accuracy: 0.6318

Epoch 108/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5945 - sparse_categorical_accuracy: 0.7895 - val_loss: 1.1840 - val_sparse_categorical_accuracy: 0.6333

Epoch 109/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.5927 - sparse_categorical_accuracy: 0.7898 - val_loss: 1.1829 - val_sparse_categorical_accuracy: 0.6363

Epoch 110/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5896 - sparse_categorical_accuracy: 0.7900 - val_loss: 1.1993 - val_sparse_categorical_accuracy: 0.6304

Epoch 111/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5863 - sparse_categorical_accuracy: 0.7911 - val_loss: 1.2108 - val_sparse_categorical_accuracy: 0.6360

Epoch 112/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5915 - sparse_categorical_accuracy: 0.7879 - val_loss: 1.1863 - val_sparse_categorical_accuracy: 0.6332

Epoch 113/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5890 - sparse_categorical_accuracy: 0.7904 - val_loss: 1.1784 - val_sparse_categorical_accuracy: 0.6305
Epoch 114/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5821 - sparse_categorical_accuracy: 0.7919 - val_loss: 1.2093 - val_sparse_categorical_accuracy: 0.6318
Epoch 115/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5886 - sparse_categorical_accuracy: 0.7913 - val_loss: 1.1974 - val_sparse_categorical_accuracy: 0.6303
Epoch 116/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5850 - sparse_categorical_accuracy: 0.7913 - val_loss: 1.1978 - val_sparse_categorical_accuracy: 0.6314
Epoch 117/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5784 - sparse_categorical_accuracy: 0.7946 - val_loss: 1.1966 - val_sparse_categorical_accuracy: 0.6320
Epoch 118/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5756 - sparse_categorical_accuracy: 0.7947 - val_loss: 1.2171 - val_sparse_categorical_accuracy: 0.6277
Epoch 119/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5760 - sparse_categorical_accuracy: 0.7961 - val_loss: 1.2205 - val_sparse_categorical_accuracy: 0.6305
Epoch 120/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5771 - sparse_categorical_accuracy: 0.7952 - val_loss: 1.1997 - val_sparse_categorical_accuracy: 0.6310
Epoch 121/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5835 - sparse_categorical_accuracy: 0.7952 - val_loss: 1.1894 - val_sparse_categorical_accuracy: 0.6349
Epoch 122/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5761 - sparse_categorical_accuracy: 0.7940 - val_loss: 1.2007 - val_sparse_categorical_accuracy: 0.6327
Epoch 123/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5734 - sparse_categorical_accuracy: 0.7961 - val_loss: 1.2000 - val_sparse_categorical_accuracy: 0.6372
Epoch 124/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5786 - sparse_categorical_accuracy: 0.7941 - val_loss: 1.2074 - val_sparse_categorical_accuracy: 0.6326
Epoch 125/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5749 - sparse_categorical_accuracy: 0.7969 - val_loss: 1.1988 - val_sparse_categorical_accuracy: 0.6360
Epoch 126/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5845 - sparse_categorical_accuracy: 0.7940 - val_loss: 1.1979 - val_sparse_categorical_accuracy: 0.6341
Epoch 127/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5714 - sparse_categorical_accuracy: 0.7974 - val_loss: 1.2149 - val_sparse_categorical_accuracy: 0.6294
Epoch 128/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5771 - sparse_categorical_accuracy: 0.7968 - val_loss: 1.2069 - val_sparse_categorical_accuracy: 0.6345

Epoch 129/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5730 - sparse_categorical_accuracy: 0.7977 - val_loss: 1.2177 - val_sparse_categorical_accuracy: 0.6274

Epoch 130/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5687 - sparse_categorical_accuracy: 0.7983 - val_loss: 1.2130 - val_sparse_categorical_accuracy: 0.6319

Epoch 131/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5696 - sparse_categorical_accuracy: 0.7982 - val_loss: 1.2094 - val_sparse_categorical_accuracy: 0.6354

Epoch 132/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5703 - sparse_categorical_accuracy: 0.7984 - val_loss: 1.1990 - val_sparse_categorical_accuracy: 0.6335

Epoch 133/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5707 - sparse_categorical_accuracy: 0.7979 - val_loss: 1.2139 - val_sparse_categorical_accuracy: 0.6348

Epoch 134/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5713 - sparse_categorical_accuracy: 0.7983 - val_loss: 1.2074 - val_sparse_categorical_accuracy: 0.6311

Epoch 135/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5625 - sparse_categorical_accuracy: 0.8003 - val_loss: 1.2158 - val_sparse_categorical_accuracy: 0.6356

Epoch 136/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5766 - sparse_categorical_accuracy: 0.7962 - val_loss: 1.1950 - val_sparse_categorical_accuracy: 0.6373

Epoch 137/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5668 - sparse_categorical_accuracy: 0.7986 - val_loss: 1.2134 - val_sparse_categorical_accuracy: 0.6324

Epoch 138/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5624 - sparse_categorical_accuracy: 0.8011 - val_loss: 1.1987 - val_sparse_categorical_accuracy: 0.6344

Epoch 139/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5674 - sparse_categorical_accuracy: 0.7984 - val_loss: 1.2203 - val_sparse_categorical_accuracy: 0.6308

Epoch 140/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5634 - sparse_categorical_accuracy: 0.8016 - val_loss: 1.2113 - val_sparse_categorical_accuracy: 0.6310

Epoch 141/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5635 - sparse_categorical_accuracy: 0.8003 - val_loss: 1.2102 - val_sparse_categorical_accuracy: 0.6352

Epoch 142/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5674 - sparse_categorical_accuracy: 0.7995 - val_loss: 1.2156 - val_sparse_categorical_accuracy: 0.6349

Epoch 143/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5635 - sparse_categorical_accuracy: 0.8020 - val_loss: 1.2103 - val_sparse_categorical_accuracy: 0.6298

Epoch 144/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5555 - sparse_categorical_accuracy: 0.8036 - val_loss: 1.2155 - val_sparse_categorical_accuracy: 0.6308

Epoch 145/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5616 - sparse_categorical_accuracy: 0.8034 - val_loss: 1.2062 - val_sparse_categorical_accuracy: 0.6350

Epoch 146/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5605 - sparse_categorical_accuracy: 0.8017 - val_loss: 1.2221 - val_sparse_categorical_accuracy: 0.6350

Epoch 147/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5549 - sparse_categorical_accuracy: 0.8042 - val_loss: 1.2093 - val_sparse_categorical_accuracy: 0.6333

Epoch 148/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5607 - sparse_categorical_accuracy: 0.8032 - val_loss: 1.2300 - val_sparse_categorical_accuracy: 0.6356

Epoch 149/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5547 - sparse_categorical_accuracy: 0.8048 - val_loss: 1.2176 - val_sparse_categorical_accuracy: 0.6336

Epoch 150/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5500 - sparse_categorical_accuracy: 0.8070 - val_loss: 1.2338 - val_sparse_categorical_accuracy: 0.6250

Epoch 151/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5574 - sparse_categorical_accuracy: 0.8023 - val_loss: 1.2223 - val_sparse_categorical_accuracy: 0.6355

Epoch 152/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5489 - sparse_categorical_accuracy: 0.8055 - val_loss: 1.2262 - val_sparse_categorical_accuracy: 0.6316

Epoch 153/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5534 - sparse_categorical_accuracy: 0.8051 - val_loss: 1.2177 - val_sparse_categorical_accuracy: 0.6364

Epoch 154/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5532 - sparse_categorical_accuracy: 0.8023 - val_loss: 1.2140 - val_sparse_categorical_accuracy: 0.6331

Epoch 155/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5504 - sparse_categorical_accuracy: 0.8023 - val_loss: 1.2234 - val_sparse_categorical_accuracy: 0.6298

Epoch 156/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5512 - sparse_categorical_accuracy: 0.8061 - val_loss: 1.2147 - val_sparse_categorical_accuracy: 0.6356

Epoch 157/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5511 - sparse_categorical_accuracy: 0.8032 - val_loss: 1.2074 - val_sparse_categorical_accuracy: 0.6365

Epoch 158/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5577 - sparse_categorical_accuracy: 0.8037 - val_loss: 1.2158 - val_sparse_categorical_accuracy: 0.6304

Epoch 159/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5567 - sparse_categorical_accuracy: 0.8027 - val_loss: 1.2178 - val_sparse_categorical_accuracy: 0.6353

Epoch 160/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5476 - sparse_categorical_accuracy: 0.8074 - val_loss: 1.2157 - val_sparse_categorical_accuracy: 0.6331

Epoch 161/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5460 - sparse_categorical_accuracy: 0.8058 - val_loss: 1.2328 - val_sparse_categorical_accuracy: 0.6324

Epoch 162/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5531 - sparse_categorical_accuracy: 0.8022 - val_loss: 1.2124 - val_sparse_categorical_accuracy: 0.6330

Epoch 163/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5518 - sparse_categorical_accuracy: 0.8048 - val_loss: 1.2151 - val_sparse_categorical_accuracy: 0.6405

Epoch 164/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5525 - sparse_categorical_accuracy: 0.8040 - val_loss: 1.2409 - val_sparse_categorical_accuracy: 0.6300

Epoch 165/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5465 - sparse_categorical_accuracy: 0.8046 - val_loss: 1.2331 - val_sparse_categorical_accuracy: 0.6369

Epoch 166/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5502 - sparse_categorical_accuracy: 0.8053 - val_loss: 1.2203 - val_sparse_categorical_accuracy: 0.6321

Epoch 167/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5429 - sparse_categorical_accuracy: 0.8084 - val_loss: 1.2396 - val_sparse_categorical_accuracy: 0.6341

Epoch 168/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5460 - sparse_categorical_accuracy: 0.8079 - val_loss: 1.2246 - val_sparse_categorical_accuracy: 0.6385

Epoch 169/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5496 - sparse_categorical_accuracy: 0.8061 - val_loss: 1.2376 - val_sparse_categorical_accuracy: 0.6363

Epoch 170/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5435 - sparse_categorical_accuracy: 0.8061 - val_loss: 1.2287 - val_sparse_categorical_accuracy: 0.6351

Epoch 171/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5433 - sparse_categorical_accuracy: 0.8080 - val_loss: 1.2358 - val_sparse_categorical_accuracy: 0.6327

Epoch 172/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5442 - sparse_categorical_accuracy: 0.8087 - val_loss: 1.2151 - val_sparse_categorical_accuracy: 0.6314

Epoch 173/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5440 - sparse_categorical_accuracy: 0.8081 - val_loss: 1.2344 - val_sparse_categorical_accuracy: 0.6367

Epoch 174/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5379 - sparse_categorical_accuracy: 0.8105 - val_loss: 1.2401 - val_sparse_categorical_accuracy: 0.6297

Epoch 175/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5429 - sparse_categorical_accuracy: 0.8067 - val_loss: 1.2416 - val_sparse_categorical_accuracy: 0.6334

Epoch 176/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5394 - sparse_categorical_accuracy: 0.8089 - val_loss: 1.2490 - val_sparse_categorical_accuracy: 0.6327

Epoch 177/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5340 - sparse_categorical_accuracy: 0.8119 - val_loss: 1.2439 - val_sparse_categorical_accuracy: 0.6313

Epoch 178/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5417 - sparse_categorical_accuracy: 0.8062 - val_loss: 1.2353 - val_sparse_categorical_accuracy: 0.6309

Epoch 179/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5424 - sparse_categorical_accuracy: 0.8083 - val_loss: 1.2298 - val_sparse_categorical_accuracy: 0.6341

Epoch 180/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5368 - sparse_categorical_accuracy: 0.8113 - val_loss: 1.2462 - val_sparse_categorical_accuracy: 0.6324

Epoch 181/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5401 - sparse_categorical_accuracy: 0.8088 - val_loss: 1.2331 - val_sparse_categorical_accuracy: 0.6327

Epoch 182/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5377 - sparse_categorical_accuracy: 0.8113 - val_loss: 1.2411 - val_sparse_categorical_accuracy: 0.6366

Epoch 183/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5387 - sparse_categorical_accuracy: 0.8091 - val_loss: 1.2138 - val_sparse_categorical_accuracy: 0.6347

Epoch 184/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5395 - sparse_categorical_accuracy: 0.8074 - val_loss: 1.2504 - val_sparse_categorical_accuracy: 0.6292

Epoch 185/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5355 - sparse_categorical_accuracy: 0.8105 - val_loss: 1.2499 - val_sparse_categorical_accuracy: 0.6366

Epoch 186/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5310 - sparse_categorical_accuracy: 0.8120 - val_loss: 1.2442 - val_sparse_categorical_accuracy: 0.6315

Epoch 187/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5360 - sparse_categorical_accuracy: 0.8120 - val_loss: 1.2314 - val_sparse_categorical_accuracy: 0.6317

Epoch 188/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5354 - sparse_categorical_accuracy: 0.8105 - val_loss: 1.2491 - val_sparse_categorical_accuracy: 0.6309

Epoch 189/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5333 - sparse_categorical_accuracy: 0.8098 - val_loss: 1.2458 - val_sparse_categorical_accuracy: 0.6350

Epoch 190/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5388 - sparse_categorical_accuracy: 0.8088 - val_loss: 1.2367 - val_sparse_categorical_accuracy: 0.6376

Epoch 191/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5331 - sparse_categorical_accuracy: 0.8117 - val_loss: 1.2477 - val_sparse_categorical_accuracy: 0.6343

Epoch 192/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5365 - sparse_categorical_accuracy: 0.8101 - val_loss: 1.2310 - val_sparse_categorical_accuracy: 0.6356

Epoch 193/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5327 - sparse_categorical_accuracy: 0.8096 - val_loss: 1.2560 - val_sparse_categorical_accuracy: 0.6321

Epoch 194/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5345 - sparse_categorical_accuracy: 0.8113 - val_loss: 1.2380 - val_sparse_categorical_accuracy: 0.6363

Epoch 195/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5338 - sparse_categorical_accuracy: 0.8119 - val_loss: 1.2480 - val_sparse_categorical_accuracy: 0.6336

Epoch 196/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5341 - sparse_categorical_accuracy: 0.8113 - val_loss: 1.2468 - val_sparse_categorical_accuracy: 0.6327

Epoch 197/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5297 - sparse_categorical_accuracy: 0.8121 - val_loss: 1.2489 - val_sparse_categorical_accuracy: 0.6337

Epoch 198/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5326 - sparse_categorical_accuracy: 0.8120 - val_loss: 1.2375 - val_sparse_categorical_accuracy: 0.6303

Epoch 199/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5347 - sparse_categorical_accuracy: 0.8118 - val_loss: 1.2447 - val_sparse_categorical_accuracy: 0.6286

Epoch 200/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5239 - sparse_categorical_accuracy: 0.8142 - val_loss: 1.2416 - val_sparse_categorical_accuracy: 0.6345

Epoch 201/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5296 - sparse_categorical_accuracy: 0.8132 - val_loss: 1.2387 - val_sparse_categorical_accuracy: 0.6305

Epoch 202/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5370 - sparse_categorical_accuracy: 0.8098 - val_loss: 1.2360 - val_sparse_categorical_accuracy: 0.6354

Epoch 203/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5308 - sparse_categorical_accuracy: 0.8108 - val_loss: 1.2288 - val_sparse_categorical_accuracy: 0.6314

Epoch 204/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5315 - sparse_categorical_accuracy: 0.8130 - val_loss: 1.2419 - val_sparse_categorical_accuracy: 0.6328

Epoch 205/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5207 - sparse_categorical_accuracy: 0.8172 - val_loss: 1.2461 - val_sparse_categorical_accuracy: 0.6358

Epoch 206/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5293 - sparse_categorical_accuracy: 0.8138 - val_loss: 1.2414 - val_sparse_categorical_accuracy: 0.6304

Epoch 207/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5300 - sparse_categorical_accuracy: 0.8127 - val_loss: 1.2566 - val_sparse_categorical_accuracy: 0.6328

Epoch 208/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5291 - sparse_categorical_accuracy: 0.8117 - val_loss: 1.2366 - val_sparse_categorical_accuracy: 0.6337

Epoch 209/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5288 - sparse_categorical_accuracy: 0.8125 - val_loss: 1.2517 - val_sparse_categorical_accuracy: 0.6341

Epoch 210/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5341 - sparse_categorical_accuracy: 0.8107 - val_loss: 1.2476 - val_sparse_categorical_accuracy: 0.6254

Epoch 211/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5293 - sparse_categorical_accuracy: 0.8143 - val_loss: 1.2258 - val_sparse_categorical_accuracy: 0.6309

Epoch 212/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5288 - sparse_categorical_accuracy: 0.8140 - val_loss: 1.2423 - val_sparse_categorical_accuracy: 0.6326

Epoch 213/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5222 - sparse_categorical_accuracy: 0.8163 - val_loss: 1.2506 - val_sparse_categorical_accuracy: 0.6320

Epoch 214/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5303 - sparse_categorical_accuracy: 0.8135 - val_loss: 1.2404 - val_sparse_categorical_accuracy: 0.6314

Epoch 215/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5255 - sparse_categorical_accuracy: 0.8154 - val_loss: 1.2452 - val_sparse_categorical_accuracy: 0.6322

Epoch 216/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5220 - sparse_categorical_accuracy: 0.8155 - val_loss: 1.2459 - val_sparse_categorical_accuracy: 0.6310

Epoch 217/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.5334 - sparse_categorical_accuracy: 0.8124 - val_loss: 1.2516 - val_sparse_categorical_accuracy: 0.6310

Epoch 218/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5223 - sparse_categorical_accuracy: 0.8147 - val_loss: 1.2430 - val_sparse_categorical_accuracy: 0.6288

Epoch 219/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5264 - sparse_categorical_accuracy: 0.8134 - val_loss: 1.2522 - val_sparse_categorical_accuracy: 0.6323

Epoch 220/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5270 - sparse_categorical_accuracy: 0.8144 - val_loss: 1.2554 - val_sparse_categorical_accuracy: 0.6279

Epoch 221/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5248 - sparse_categorical_accuracy: 0.8146 - val_loss: 1.2530 - val_sparse_categorical_accuracy: 0.6310

Epoch 222/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5237 - sparse_categorical_accuracy: 0.8159 - val_loss: 1.2701 - val_sparse_categorical_accuracy: 0.6307

Epoch 223/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5217 - sparse_categorical_accuracy: 0.8159 - val_loss: 1.2461 - val_sparse_categorical_accuracy: 0.6355

Epoch 224/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5244 - sparse_categorical_accuracy: 0.8157 - val_loss: 1.2582 - val_sparse_categorical_accuracy: 0.6348

Epoch 225/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5215 - sparse_categorical_accuracy: 0.8170 - val_loss: 1.2474 - val_sparse_categorical_accuracy: 0.6342

Epoch 226/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5263 - sparse_categorical_accuracy: 0.8138 - val_loss: 1.2422 - val_sparse_categorical_accuracy: 0.6326

Epoch 227/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5196 - sparse_categorical_accuracy: 0.8169 - val_loss: 1.2430 - val_sparse_categorical_accuracy: 0.6348

Epoch 228/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5242 - sparse_categorical_accuracy: 0.8155 - val_loss: 1.2483 - val_sparse_categorical_accuracy: 0.6324

Epoch 229/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5186 - sparse_categorical_accuracy: 0.8159 - val_loss: 1.2492 - val_sparse_categorical_accuracy: 0.6337

Epoch 230/300
1563/1563 [=====] - 6s 4ms/step - loss: 0.5246 - sparse_categorical_accuracy: 0.8157 - val_loss: 1.2373 - val_sparse_categorical_accuracy: 0.6353

Epoch 231/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5274 - sparse_categorical_accuracy: 0.8139 - val_loss: 1.2354 - val_sparse_categorical_accuracy: 0.6329

Epoch 232/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5166 - sparse_categorical_accuracy: 0.8171 - val_loss: 1.2556 - val_sparse_categorical_accuracy: 0.6337

Epoch 233/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5200 - sparse_categorical_accuracy: 0.8159 - val_loss: 1.2542 - val_sparse_categorical_accuracy: 0.6341

Epoch 234/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5179 - sparse_categorical_accuracy: 0.8182 - val_loss: 1.2510 - val_sparse_categorical_accuracy: 0.6308

Epoch 235/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5196 - sparse_categorical_accuracy: 0.8156 - val_loss: 1.2325 - val_sparse_categorical_accuracy: 0.6338

Epoch 236/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5172 - sparse_categorical_accuracy: 0.8187 - val_loss: 1.2595 - val_sparse_categorical_accuracy: 0.6346

Epoch 237/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5224 - sparse_categorical_accuracy: 0.8154 - val_loss: 1.2542 - val_sparse_categorical_accuracy: 0.6311

Epoch 238/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5208 - sparse_categorical_accuracy: 0.8171 - val_loss: 1.2750 - val_sparse_categorical_accuracy: 0.6276

Epoch 239/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5213 - sparse_categorical_accuracy: 0.8167 - val_loss: 1.2649 - val_sparse_categorical_accuracy: 0.6298

Epoch 240/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5138 - sparse_categorical_accuracy: 0.8204 - val_loss: 1.2629 - val_sparse_categorical_accuracy: 0.6337

Epoch 241/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5181 - sparse_categorical_accuracy: 0.8173 - val_loss: 1.2498 - val_sparse_categorical_accuracy: 0.6303
Epoch 242/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5160 - sparse_categorical_accuracy: 0.8182 - val_loss: 1.2533 - val_sparse_categorical_accuracy: 0.6339
Epoch 243/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5206 - sparse_categorical_accuracy: 0.8167 - val_loss: 1.2459 - val_sparse_categorical_accuracy: 0.6364
Epoch 244/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5162 - sparse_categorical_accuracy: 0.8199 - val_loss: 1.2589 - val_sparse_categorical_accuracy: 0.6340
Epoch 245/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5176 - sparse_categorical_accuracy: 0.8189 - val_loss: 1.2632 - val_sparse_categorical_accuracy: 0.6344
Epoch 246/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5162 - sparse_categorical_accuracy: 0.8191 - val_loss: 1.2583 - val_sparse_categorical_accuracy: 0.6311
Epoch 247/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5149 - sparse_categorical_accuracy: 0.8176 - val_loss: 1.2601 - val_sparse_categorical_accuracy: 0.6343
Epoch 248/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5102 - sparse_categorical_accuracy: 0.8211 - val_loss: 1.2493 - val_sparse_categorical_accuracy: 0.6347
Epoch 249/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5186 - sparse_categorical_accuracy: 0.8174 - val_loss: 1.2379 - val_sparse_categorical_accuracy: 0.6317
Epoch 250/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5125 - sparse_categorical_accuracy: 0.8210 - val_loss: 1.2602 - val_sparse_categorical_accuracy: 0.6334
Epoch 251/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5181 - sparse_categorical_accuracy: 0.8149 - val_loss: 1.2443 - val_sparse_categorical_accuracy: 0.6269
Epoch 252/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5197 - sparse_categorical_accuracy: 0.8164 - val_loss: 1.2453 - val_sparse_categorical_accuracy: 0.6338
Epoch 253/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5143 - sparse_categorical_accuracy: 0.8188 - val_loss: 1.2464 - val_sparse_categorical_accuracy: 0.6329
Epoch 254/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5174 - sparse_categorical_accuracy: 0.8189 - val_loss: 1.2539 - val_sparse_categorical_accuracy: 0.6365
Epoch 255/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5144 - sparse_categorical_accuracy: 0.8187 - val_loss: 1.2693 - val_sparse_categorical_accuracy: 0.6294
Epoch 256/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5144 - sparse_categorical_accuracy: 0.8198 - val_loss: 1.2579 - val_sparse_categorical_accuracy: 0.6349

Epoch 257/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5181 - sparse_categorical_accuracy: 0.8173 - val_loss: 1.2519 - val_sparse_categorical_accuracy: 0.6323

Epoch 258/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5185 - sparse_categorical_accuracy: 0.8192 - val_loss: 1.2598 - val_sparse_categorical_accuracy: 0.6299

Epoch 259/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5115 - sparse_categorical_accuracy: 0.8197 - val_loss: 1.2594 - val_sparse_categorical_accuracy: 0.6324

Epoch 260/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5111 - sparse_categorical_accuracy: 0.8199 - val_loss: 1.2751 - val_sparse_categorical_accuracy: 0.6270

Epoch 261/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5133 - sparse_categorical_accuracy: 0.8184 - val_loss: 1.2733 - val_sparse_categorical_accuracy: 0.6299

Epoch 262/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5113 - sparse_categorical_accuracy: 0.8201 - val_loss: 1.2835 - val_sparse_categorical_accuracy: 0.6324

Epoch 263/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5161 - sparse_categorical_accuracy: 0.8179 - val_loss: 1.2693 - val_sparse_categorical_accuracy: 0.6270

Epoch 264/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5137 - sparse_categorical_accuracy: 0.8188 - val_loss: 1.2623 - val_sparse_categorical_accuracy: 0.6319

Epoch 265/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5094 - sparse_categorical_accuracy: 0.8208 - val_loss: 1.2724 - val_sparse_categorical_accuracy: 0.6340

Epoch 266/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5105 - sparse_categorical_accuracy: 0.8215 - val_loss: 1.2595 - val_sparse_categorical_accuracy: 0.6320

Epoch 267/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5141 - sparse_categorical_accuracy: 0.8201 - val_loss: 1.2717 - val_sparse_categorical_accuracy: 0.6331

Epoch 268/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5097 - sparse_categorical_accuracy: 0.8215 - val_loss: 1.2691 - val_sparse_categorical_accuracy: 0.6297

Epoch 269/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5116 - sparse_categorical_accuracy: 0.8209 - val_loss: 1.2577 - val_sparse_categorical_accuracy: 0.6350

Epoch 270/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5045 - sparse_categorical_accuracy: 0.8233 - val_loss: 1.2703 - val_sparse_categorical_accuracy: 0.6333

Epoch 271/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5079 - sparse_categorical_accuracy: 0.8226 - val_loss: 1.2862 - val_sparse_categorical_accuracy: 0.6330

Epoch 272/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5178 - sparse_categorical_accuracy: 0.8168 - val_loss: 1.2647 - val_sparse_categorical_accuracy: 0.6263

Epoch 273/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5076 - sparse_categorical_accuracy: 0.8205 - val_loss: 1.2628 - val_sparse_categorical_accuracy: 0.6300

Epoch 274/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5089 - sparse_categorical_accuracy: 0.8219 - val_loss: 1.2863 - val_sparse_categorical_accuracy: 0.6300

Epoch 275/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5113 - sparse_categorical_accuracy: 0.8195 - val_loss: 1.2774 - val_sparse_categorical_accuracy: 0.6311

Epoch 276/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5065 - sparse_categorical_accuracy: 0.8223 - val_loss: 1.2900 - val_sparse_categorical_accuracy: 0.6304

Epoch 277/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5068 - sparse_categorical_accuracy: 0.8214 - val_loss: 1.2741 - val_sparse_categorical_accuracy: 0.6280

Epoch 278/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5140 - sparse_categorical_accuracy: 0.8187 - val_loss: 1.2607 - val_sparse_categorical_accuracy: 0.6309

Epoch 279/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5087 - sparse_categorical_accuracy: 0.8200 - val_loss: 1.2789 - val_sparse_categorical_accuracy: 0.6296

Epoch 280/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5111 - sparse_categorical_accuracy: 0.8219 - val_loss: 1.2642 - val_sparse_categorical_accuracy: 0.6351

Epoch 281/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5075 - sparse_categorical_accuracy: 0.8216 - val_loss: 1.2659 - val_sparse_categorical_accuracy: 0.6320

Epoch 282/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5102 - sparse_categorical_accuracy: 0.8181 - val_loss: 1.2839 - val_sparse_categorical_accuracy: 0.6293

Epoch 283/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5109 - sparse_categorical_accuracy: 0.8210 - val_loss: 1.2600 - val_sparse_categorical_accuracy: 0.6291

Epoch 284/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5051 - sparse_categorical_accuracy: 0.8222 - val_loss: 1.2627 - val_sparse_categorical_accuracy: 0.6328

Epoch 285/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.4991 - sparse_categorical_accuracy: 0.8228 - val_loss: 1.2695 - val_sparse_categorical_accuracy: 0.6322

Epoch 286/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5087 - sparse_categorical_accuracy: 0.8201 - val_loss: 1.2618 - val_sparse_categorical_accuracy: 0.6318

Epoch 287/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5061 - sparse_categorical_accuracy: 0.8228 - val_loss: 1.2664 - val_sparse_categorical_accuracy: 0.6311

Epoch 288/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5085 - sparse_categorical_accuracy: 0.8196 - val_loss: 1.2739 - val_sparse_categorical_accuracy: 0.6303

Epoch 289/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5083 - sparse_categorical_accuracy: 0.8209 - val_loss: 1.2702 - val_sparse_categorical_accuracy: 0.6338

Epoch 290/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5046 - sparse_categorical_accuracy: 0.8231 - val_loss: 1.2676 - val_sparse_categorical_accuracy: 0.6317

Epoch 291/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.4963 - sparse_categorical_accuracy: 0.8261 - val_loss: 1.2779 - val_sparse_categorical_accuracy: 0.6279

Epoch 292/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5070 - sparse_categorical_accuracy: 0.8208 - val_loss: 1.2872 - val_sparse_categorical_accuracy: 0.6325

Epoch 293/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5075 - sparse_categorical_accuracy: 0.8229 - val_loss: 1.2586 - val_sparse_categorical_accuracy: 0.6298

Epoch 294/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5070 - sparse_categorical_accuracy: 0.8207 - val_loss: 1.2811 - val_sparse_categorical_accuracy: 0.6261

Epoch 295/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5107 - sparse_categorical_accuracy: 0.8209 - val_loss: 1.2531 - val_sparse_categorical_accuracy: 0.6304

Epoch 296/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5028 - sparse_categorical_accuracy: 0.8231 - val_loss: 1.2791 - val_sparse_categorical_accuracy: 0.6274

Epoch 297/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5031 - sparse_categorical_accuracy: 0.8258 - val_loss: 1.2844 - val_sparse_categorical_accuracy: 0.6279

Epoch 298/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5021 - sparse_categorical_accuracy: 0.8225 - val_loss: 1.2701 - val_sparse_categorical_accuracy: 0.6341

Epoch 299/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5069 - sparse_categorical_accuracy: 0.8219 - val_loss: 1.2737 - val_sparse_categorical_accuracy: 0.6298

Epoch 300/300
1563/1563 [=====] - 5s 3ms/step - loss: 0.5062 - sparse_categorical_accuracy: 0.8228 - val_loss: 1.2697 - val_sparse_categorical_accuracy: 0.6295

Model: "baseline"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	multiple	456
batch_normalization (BatchNormal)	multiple	24
activation (Activation)	multiple	0
max_pooling2d (MaxPooling2D)	multiple	0
dropout (Dropout)	multiple	0
flatten (Flatten)	multiple	0

dense (Dense)	multiple	196736
dropout_1 (Dropout)	multiple	0
dense_1 (Dense)	multiple	1290
<hr/>		
Total params: 198,506		
Trainable params: 198,494		
Non-trainable params: 12		

