```
/home/ubuntu/.virtualenvs/Exam2/bin/python /home/ubuntu/Project/Code/Train.py
xception
Epoch 1/50
125/125 [==============================] - 15s 75ms/step - loss: 1.0787 - accuracy: 0.7019 - val_loss: 0.6683 - val_accuracy: 0.7716
Epoch 2/50
125/125 [==============================] - 8s 60ms/step - loss: 0.5617 - accuracy: 0.8013 - val_loss: 0.6150 - val_accuracy: 0.7907
Epoch 3/50
125/125 [==============================] - 8s 60ms/step - loss: 0.4487 - accuracy: 0.8410 - val_loss: 0.5825 - val_accuracy: 0.8068
Epoch 4/50
125/125 [==============================] - 8s 60ms/step - loss: 0.3448 - accuracy: 0.8737 - val_loss: 0.6076 - val_accuracy: 0.7877
Epoch 5/50
125/125 [==============================] - 8s 60ms/step - loss: 0.2646 - accuracy: 0.9049 - val_loss: 0.7762 - val_accuracy: 0.7827
Epoch 6/50
125/125 [==============================] - 8s 61ms/step - loss: 0.2488 - accuracy: 0.9155 - val_loss: 0.7850 - val_accuracy: 0.7746
Epoch 7/50
125/125 [==============================] - 8s 60ms/step - loss: 0.1755 - accuracy: 0.9406 - val_loss: 0.8811 - val_accuracy: 0.7867
Epoch 8/50
125/125 [==============================] - 8s 61ms/step - loss: 0.1590 - accuracy: 0.9484 - val_loss: 0.9978 - val_accuracy: 0.7757
Epoch 9/50
125/125 [==============================] - 8s 61ms/step - loss: 0.1145 - accuracy: 0.9635 - val_loss: 1.2742 - val_accuracy: 0.7887
Epoch 10/50
125/125 [==============================] - 8s 61ms/
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22 step - loss: 0.2090 - accuracy: 0.9535 - val_loss: 0.
   9928 - val_accuracy: 0.8078
23 Epoch 11/50
24 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1395 - accuracy: 0.9570 - val_loss: 0.
   9528 - val_accuracy: 0.7988
25 Epoch 12/50
26 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0914 - accuracy: 0.9743 - val_loss: 1.
   1148 - val_accuracy: 0.8048
27 Epoch 13/50
28 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1009 - accuracy: 0.9716 - val_loss: 1.
   0633 - val_accuracy: 0.8078
29 Epoch 14/50
30 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1134 - accuracy: 0.9691 - val_loss: 1.
   1402 - val_accuracy: 0.8008
31 Epoch 15/50
32 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0609 - accuracy: 0.9842 - val_loss: 1.
   4382 - val_accuracy: 0.7837
33 Epoch 16/50
34 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1214 - accuracy: 0.9706 - val_loss: 1.
   2175 - val_accuracy: 0.7938
35 Epoch 17/50
36 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0834 - accuracy: 0.9821 - val_loss: 1.
   3193 - val_accuracy: 0.7958
37 Epoch 18/50
38 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0561 - accuracy: 0.9844 - val_loss: 1.
   3197 - val_accuracy: 0.8028
39 Epoch 19/50
40 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1026 - accuracy: 0.9781 - val_loss: 1.
   1346 - val_accuracy: 0.8038
41 Epoch 20/50
42 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0709 - accuracy: 0.9816 - val_loss: 1.
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42 1950 - val_accuracy: 0.7857
43 Epoch 21/50
44 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0518 - accuracy: 0.9852 - val_loss: 1.
   4017 - val_accuracy: 0.8028
45 Epoch 22/50
46 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1090 - accuracy: 0.9774 - val_loss: 1.
   5869 - val_accuracy: 0.7928
47 Epoch 23/50
48 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1113 - accuracy: 0.9801 - val_loss: 1.
   6442 - val_accuracy: 0.7968
49 Epoch 24/50
50 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0658 - accuracy: 0.9864 - val_loss: 1.
   8065 - val_accuracy: 0.7988
51 Epoch 25/50
52 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1395 - accuracy: 0.9751 - val_loss: 1.
   4911 - val_accuracy: 0.7948
53 Epoch 26/50
54 125/125 [==============================] - 8s 61ms/
   step - loss: 0.1060 - accuracy: 0.9764 - val_loss: 1.
   5743 - val_accuracy: 0.7767
55 Epoch 27/50
56 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0740 - accuracy: 0.9826 - val_loss: 1.
   7810 - val_accuracy: 0.7938
57 Epoch 28/50
58 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0523 - accuracy: 0.9882 - val_loss: 1.
   5027 - val_accuracy: 0.7958
59 Epoch 29/50
60 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0529 - accuracy: 0.9902 - val_loss: 1.
   6321 - val_accuracy: 0.7907
61 Epoch 30/50
62 125/125 [==============================] - 8s 61ms/
   step - loss: 0.0292 - accuracy: 0.9925 - val_loss: 1.
   4271 - val_accuracy: 0.7968
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Epoch 31/50
125/125 [==============================] - 8s 61ms/step - loss: 0.0357 - accuracy: 0.9927 - val_loss: 1.4507 - val_accuracy: 0.8038
Epoch 32/50
125/125 [==============================] - 8s 61ms/step - loss: 0.0395 - accuracy: 0.9902 - val_loss: 1.8062 - val_accuracy: 0.8008
Epoch 33/50
125/125 [==============================] - 8s 61ms/step - loss: 0.0765 - accuracy: 0.9867 - val_loss: 1.7245 - val_accuracy: 0.7958
Epoch 34/50
125/125 [==============================] - 8s 61ms/step - loss: 0.0536 - accuracy: 0.9877 - val_loss: 1.8858 - val_accuracy: 0.8109
Epoch 35/50
125/125 [==============================] - 8s 61ms/step - loss: 0.1052 - accuracy: 0.9912 - val_loss: 2.0115 - val_accuracy: 0.8078
Epoch 36/50
125/125 [==============================] - 8s 61ms/step - loss: 0.0887 - accuracy: 0.9849 - val_loss: 3.2937 - val_accuracy: 0.7787
Epoch 37/50
125/125 [==============================] - 8s 61ms/step - loss: 0.1281 - accuracy: 0.9791 - val_loss: 1.7786 - val_accuracy: 0.8058
Epoch 38/50
125/125 [==============================] - 8s 61ms/step - loss: 0.0841 - accuracy: 0.9874 - val_loss: 1.9320 - val_accuracy: 0.7767
Epoch 39/50
125/125 [==============================] - 8s 61ms/step - loss: 0.0871 - accuracy: 0.9849 - val_loss: 1.8215 - val_accuracy: 0.7958
Epoch 40/50
125/125 [==============================] - 8s 61ms/step - loss: 0.0497 - accuracy: 0.9919 - val_loss: 1.8313 - val_accuracy: 0.7716
Epoch 41/50
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 84 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0137 - accuracy: 0.9962 - val_loss: 1
    .9837 - val_accuracy: 0.8008
 85 Epoch 42/50
 86 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0155 - accuracy: 0.9942 - val_loss: 1
    .9524 - val_accuracy: 0.7978
 87 Epoch 43/50
 88 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0350 - accuracy: 0.9927 - val_loss: 1
    .9258 - val_accuracy: 0.7807
 89 Epoch 44/50
 90 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0359 - accuracy: 0.9945 - val_loss: 1
    .8427 - val_accuracy: 0.7928
 91 Epoch 45/50
 92 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0268 - accuracy: 0.9955 - val_loss: 2
    .1800 - val_accuracy: 0.7897
 93 Epoch 46/50
 94 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0243 - accuracy: 0.9957 - val_loss: 2
    .2580 - val_accuracy: 0.8018
 95 Epoch 47/50
 96 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0154 - accuracy: 0.9967 - val_loss: 2
    .3807 - val_accuracy: 0.8048
 97 Epoch 48/50
 98 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0330 - accuracy: 0.9930 - val_loss: 1
    .9701 - val_accuracy: 0.7968
 99 Epoch 49/50
100 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0513 - accuracy: 0.9857 - val_loss: 1
    .9831 - val_accuracy: 0.7887
101 Epoch 50/50
102 125/125 [==============================] - 8s 61ms/
    step - loss: 0.0349 - accuracy: 0.9945 - val_loss: 2
    .0742 - val_accuracy: 0.8038
103 Model: "xception"
104 _________________________________________________
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104 _________________________________________________________________
105  Layer (type)                 Output Shape              Param #
106 =================================================================
107  xception (Functional)        (None, 3, 3, 2048)        20861480
108
109  flatten (Flatten)            multiple                  0
110
111  dense (Dense)                multiple                  37750784
112
113  dense_1 (Dense)              multiple                  2573544
114
115  dropout_1 (Dropout)          multiple                  0
116
117  dense_2 (Dense)              multiple                  8799
118
119 =================================================================
120 Total params: 61,194,607
121 Trainable params: 40,333,127
122 Non-trainable params: 20,861,480
123 _________________________________________________________________
124 None
125 125/125 [==============================] - 5s 39ms/step - loss: 0.0011 - accuracy: 0.9995
126 CNN for train: [0.0010533954482525587, 0.9994968771934509]
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39/39 [==============================] - 2s 48ms/step - loss: 2.0076 - accuracy: 0.7940
CNN for test: [2.0076427459716797, 0.7940466403961182]
125/125 [==============================] - 6s 38ms/step
32/32 [==============================] - 1s 38ms/step
39/39 [==============================] - 1s 38ms/step
KNN classification report for validation data:
              precision    recall  f1-score   support

           0       0.84      0.89      0.87       165
           1       0.50      0.09      0.15        22
           2       0.98      0.97      0.97       296
           3       0.86      0.93      0.90       161
           4       0.36      0.33      0.35        27
           5       0.57      0.61      0.59       161
           6       0.70      0.65      0.68       162

    accuracy                           0.80       994
   macro avg       0.69      0.64      0.64       994
weighted avg       0.80      0.80      0.80       994

KNN classification report for train data:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00
```

```
150 666
151             1       1.00      1.00      1.00
    73
152             2       1.00      1.00      1.00
    1136
153             3       1.00      1.00      1.00
    681
154             4       1.00      0.99      1.00
    130
155             5       1.00      1.00      1.00
    644
156             6       1.00      1.00      1.00
    645
157
158     accuracy                            1.00
    3975
159    macro avg       1.00      1.00      1.00
    3975
160 weighted avg       1.00      1.00      1.00
    3975
161
162 KNN classification report for test data:
163                precision    recall  f1-score
    support
164
165             0       0.87      0.90      0.89
    223
166             1       0.14      0.04      0.06
    26
167             2       0.96      0.96      0.96
    357
168             3       0.91      0.94      0.93
    193
169             4       0.17      0.13      0.15
    31
170             5       0.57      0.60      0.58
    210
171             6       0.64      0.65      0.64
    203
172
173     accuracy                            0.79
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173 1243
174    macro avg       0.61      0.60      0.60
    1243
175 weighted avg       0.78      0.79      0.79
    1243
176
177
178 Process finished with exit code 0
179
```