

HW2

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Confusion matrix of SVC on features generated by VGG:

```
[[25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
 [0 21 0 1 0 1 0 1 0 0 0 0 0 0 0 0 1 0 0 0]
 [0 0 22 0 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0]
 [0 0 0 22 0 0 1 0 0 0 0 0 0 0 0 0 0 0 2 0]
 [0 0 0 0 23 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
 [0 0 0 0 0 24 0 0 0 0 0 0 0 0 0 0 1 0 0 0]
 [0 0 0 0 1 0 20 0 0 0 0 0 0 0 2 0 2 0 0 0]
 [0 0 2 0 0 0 0 18 0 1 0 1 0 0 2 0 1 0 0 0]
 [0 0 0 0 0 0 0 0 17 0 0 0 0 0 0 0 0 0 0 0]
 [0 0 2 0 0 0 2 0 0 21 0 0 0 0 0 0 0 0 0 0]
 [0 0 0 0 0 0 0 0 0 0 25 0 0 0 0 0 0 0 0 0]
 [0 1 1 1 0 0 0 0 0 0 0 18 0 0 2 0 0 1 1 0]
 [0 0 0 0 0 0 0 0 0 0 0 0 25 0 0 0 0 0 0 0]
 [0 0 0 0 0 0 0 0 0 0 0 0 0 25 0 0 0 0 0 0]
 [0 0 1 1 0 0 1 0 0 1 0 0 0 0 18 0 0 0 3 0]
 [0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 19 1 0 0 0]
 [1 1 0 2 0 1 1 0 0 0 0 0 0 0 0 0 19 0 0 0]
 [0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 23 1 0]
 [0 0 4 0 0 0 2 0 0 0 0 0 0 0 4 0 1 0 14 0]
 [0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 14]]
```

Accuracy : 0.8676470588235294

Hw2_train

Model1:

layer.trainable = False

optimizer = Adam(lr = 1e-4)

confusion matrix

```
[[17 0 2 1 0 0 4 0 1 0 0 0 0 0 0 0 0 0 0 0]
 [1 2 0 0 0 2 10 0 2 0 0 1 2 1 3 0 1 0 0 0]
 [0 0 13 3 0 0 1 1 0 0 1 3 0 0 0 0 1 0 2 0]
 [2 1 0 12 0 0 4 0 3 0 0 0 0 0 0 0 1 0 2 0]
 [0 0 0 0 0 0 4 0 4 0 1 1 3 0 8 0 0 0 0 4]
 [0 0 0 1 0 5 10 0 0 0 0 0 0 0 0 0 0 0 3 2]
 [0 0 0 3 0 1 13 0 1 0 0 0 2 1 1 0 0 0 3 0]
 [0 0 3 0 0 0 0 10 3 0 0 8 0 0 0 0 0 0 0 1]
 [1 0 0 0 0 0 2 0 12 0 0 1 0 0 5 0 0 0 1 3]
 [0 1 0 1 0 0 1 0 1 1 0 2 2 0 1 0 5 0 0 0]
 [0 0 0 0 0 0 2 0 8 0 3 0 0 0 12 0 0 0 0 0]]
```

```
[0 0 2 0 0 0 0 0 1 0 0 16 2 0 2 0 2 0 0 0]
[2 0 1 1 0 0 4 0 0 0 0 4 11 0 0 0 0 0 0 0]
[0 1 1 0 0 1 3 0 3 0 0 0 1 9 2 0 2 0 1 1]
[0 0 3 1 0 0 4 0 4 0 0 2 1 0 8 0 0 0 0 2]
[0 1 0 0 0 0 2 0 14 0 1 1 0 0 3 0 0 0 1 2]
[1 0 1 0 0 0 1 0 0 0 0 3 1 0 2 0 6 0 2 0]
[0 0 1 0 0 0 1 0 13 0 0 2 0 0 3 0 0 2 0 3]
[0 0 0 2 0 0 7 0 1 0 1 0 0 0 0 0 0 0 14 0]
[0 0 0 0 0 0 1 0 11 0 0 0 0 0 1 0 0 0 0 12]]
```

Accuracy: 0.3487

Model2:

HyperParams:

layer.trainable = False

optimizer = Adam(lr = 1e-5)

confusion matrix

```
[[15 0 0 6 0 1 0 1 0 0 0 1 0 0 0 0 0 0 1 0]
 [2 1 0 6 0 1 1 1 0 0 1 1 3 4 0 2 0 0 2 0]
 [5 0 3 3 0 0 0 6 0 0 1 2 2 0 0 0 1 0 2 0]
 [2 0 0 16 1 1 1 1 0 0 0 0 0 0 0 1 0 0 2 0]
 [0 0 1 2 0 2 1 3 0 0 3 0 2 0 2 2 0 1 3 3]
 [0 0 0 4 0 12 2 0 0 0 0 0 0 0 0 1 0 0 1 1]
 [2 0 0 4 0 2 2 1 0 0 0 0 0 6 1 0 0 0 7 0]
 [0 0 0 2 0 0 0 17 0 0 0 2 1 0 0 1 0 0 0 2]
 [1 0 0 2 0 1 0 6 1 0 4 0 1 0 1 3 0 1 2 2]
 [0 0 1 2 0 0 0 2 0 0 0 0 7 0 0 0 2 0 1 0]
 [0 0 0 1 2 0 0 4 0 0 7 0 2 0 3 1 0 1 1 3]
 [0 0 2 1 0 0 1 9 0 0 0 3 5 0 2 0 1 0 1 0]
 [3 0 0 6 0 0 0 0 0 0 0 1 12 0 0 0 0 0 1 0]
 [0 0 2 1 0 1 0 2 0 0 0 0 1 13 0 0 1 0 2 2]
 [0 0 0 3 1 1 1 8 0 0 0 0 3 1 1 1 0 0 2 3]
 [0 0 0 2 0 3 0 2 0 0 5 0 1 0 1 1 0 3 5 2]
 [1 0 0 2 0 0 0 3 0 0 0 0 6 0 1 0 1 0 3 0]
 [0 0 0 2 0 2 0 4 1 0 4 0 1 0 0 0 0 9 0 2]
 [2 0 0 4 0 4 0 0 0 0 0 0 0 0 0 1 0 0 14 0]
 [0 0 0 2 0 2 2 0 1 0 1 0 0 0 1 0 0 3 1 12]]
```

Accuracy=0.29411

Model3:

HyperParams:

#allowing training the fc2 layer

for layer in transfered_model.layers:

if 'fc2' in layer.name:

layer.trainable = True

else:

layer.trainable = False

optimizer = Adam(lr = 1e-4)

confusion matrix

```
[[20 0 1 0 0 1 0 2 0 0 0 0 0 0 0 0 0 0 1 0]
 [ 4 4 0 0 0 3 2 1 0 0 0 2 5 1 0 0 2 0 0 1]
 [ 1 0 13 1 0 0 0 4 0 0 0 1 0 0 0 1 4 0 0 0]
 [ 7 0 1 4 0 0 1 3 0 0 0 2 2 0 0 1 3 0 0 1]
 [ 1 0 0 0 3 0 0 3 0 0 2 2 4 0 0 0 0 0 0 10]
 [ 3 0 0 0 0 11 1 0 0 0 0 0 0 0 0 0 0 0 3 3]
 [ 3 0 0 1 0 2 9 1 0 0 0 2 2 0 0 2 1 1 1 0]
 [ 0 0 0 0 0 0 0 21 0 0 0 4 0 0 0 0 0 0 0 0]
 [ 2 0 0 0 0 1 0 6 0 0 1 2 0 0 0 1 0 4 0 8]
 [ 0 0 0 0 0 0 0 3 0 0 0 3 2 0 0 0 7 0 0 0]
 [ 0 0 0 0 0 0 1 3 0 0 8 1 0 0 0 3 0 5 0 4]
 [ 0 0 0 0 0 0 0 8 0 0 0 12 1 0 0 1 2 0 0 1]
 [ 2 0 0 0 0 0 1 0 0 0 0 5 11 0 0 0 4 0 0 0]
 [ 0 1 1 0 0 1 0 1 0 0 0 0 3 12 0 2 3 0 0 1]
 [ 3 0 0 0 1 0 2 7 0 0 1 2 1 0 0 3 1 1 0 3]
 [ 0 1 0 0 0 0 0 4 0 0 1 2 0 0 0 4 0 3 1 9]
 [ 1 0 0 0 0 0 0 1 0 0 0 4 0 0 0 1 8 0 2 0]
 [ 0 0 0 0 0 0 0 6 0 0 0 1 0 0 0 0 0 12 0 6]
 [ 6 0 0 0 0 4 1 1 0 0 1 0 0 0 0 0 1 0 10 1]
 [ 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 3 0 20]]
```

Accuracy= 0.38235