
E9-241 DIGITAL IMAGE PROCESSING

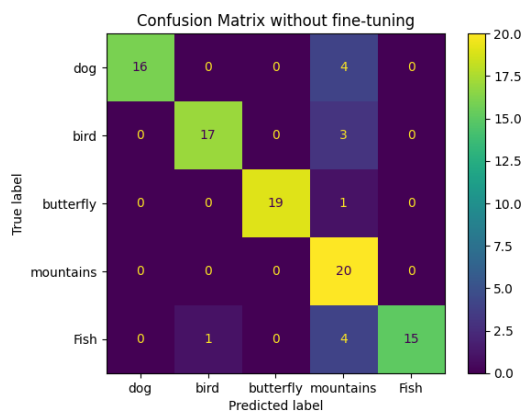
Assignment #5

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Run the main.py file to generate the results file.

1 KNN Classifier with deep features

- Used ResNet-50 pre-trained model for extracting features for every image from the last fully connected layer which is then passed to KNN classifier ($k=3$) for the predictions.
- We obtain an accuracy value of 87% on the test data.
- Fig 1a shows the confusion matrix of the predictions. Class mountains has no mispredictions in this case.

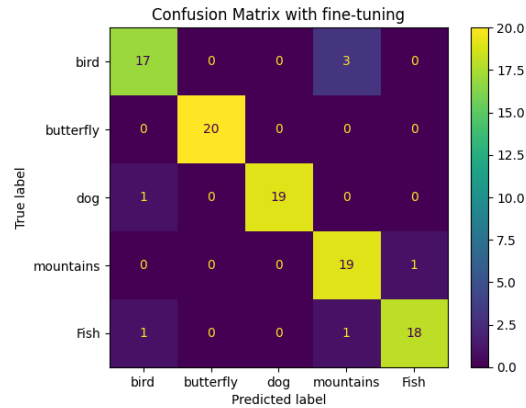


(a) Confusion Matrix for the pre-trained ResNet-50 model

Figure 1

2 Fine-tuning

- Fine-tuned the ResNet-50 pre-trained model by replacing the final layer of 1000-class with 5-class and softmax activation. Trained it on the provided data with an learning rate of 0.00001
- We are able to achieve train and validation accuracy of 100% within 7 epochs, while we can observe the loss is still decreasing. This is most likely the model trying to overfit on the limited amount of data that it has been provided with.
- We obtain an accuracy value of 91.5% (average of 3 different runs) on the test data.
- Fig 2a shows the confusion matrix of the predictions. Comparing this to figure 1a, we see that due to fine-tuning of the model it's able to correct few mispredicitons like in the case of dog, butterfly, fish classes. While it remains same or mis-predicts for other classes.



(a) Confusion Matrix for the fine-tuned ResNet-50 model

Figure 2