

Cake Classification

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1 Introduction

Crunk, mhmm, crunk... Oh sorry! Gulp, in a minute! Glu glu.. After all this work I really needed a piece of cake. So, in this paper we're going to talk about cakes, not how to cook them but how to classify them. Starting from the low features extraction, we trained a MLP with single and combination of low features. After that we switched to extract neural features from the hidden layers of a pre-trained PVMLNet (CNN) in order to train MLPs on them. Eventually we perform transfer-learning on the PVMLNet using the MLP trained with the last PVMLNet hidden layer and fine tuned it.

2 Results

Single features don't work very well, so we tried combinations of them and all of them together Fig.(2d). We reach the best test accuracy with all the features combined together, about 25%.

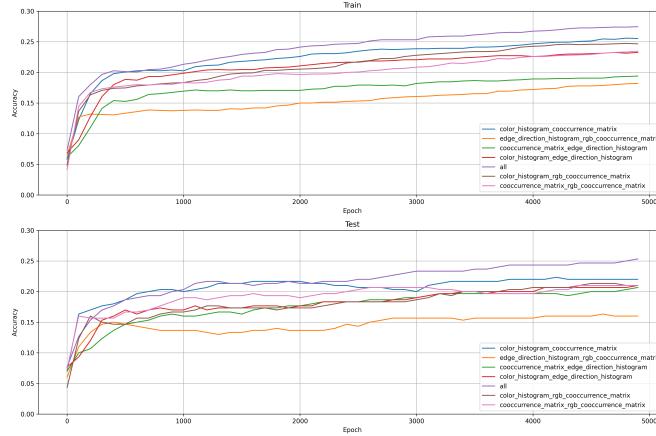


Figure 1: Low level features MLP accuracy

So we switch to neural features extracted from the last 4 pre-trained PVMLNet hidden layers. Fig.(2) shows a really good accuracy on the test with hidden layer -4, 86.7%.

Fixed the MLP with the maximum accuracy on the test we performed analysis plotting the confusion matrix Fig.(3a) where the red percentages denotes the highest miss-classification between the two classes. We also plotted the top 10 miss-classified images predicted with the highest confidence Fig.(3b).

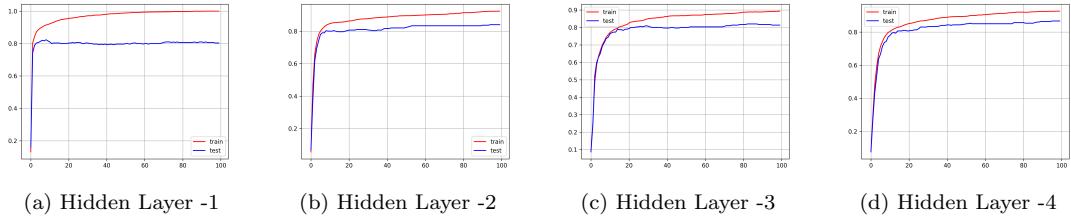
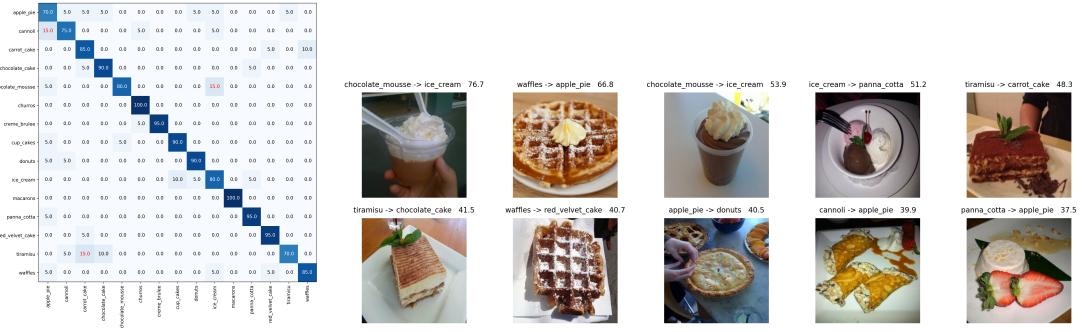


Figure 2

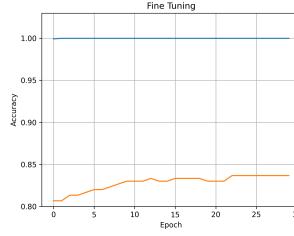


(a) Confusion Matrix

(b) Top 10 Miss Classified Images

Figure 3

Eventually we use the MLP trained with the last PVMLNet hidden layer to perform transfer-learning and fine tuned it for 30 epochs with a $lr = 10^{-5}$ and batches of 50 images. The test accuracy went from 80.6% to 83.7%



(a) Confusion Matrix

Figure 4: Fine Tuning



I affirm that this report is the result of my own work and that I did not share any part of it with anyone else except the teacher.