

BBM406 Report

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Part I: Identifying the Problem

1. What is the problem?

The problem is to identify different kind of birds.

2. How can the problem be solved?

The problem can be solved using some kind of machine learning approach.

Part II: Solving the Problem

1. What is my approach?

My approach is to first break the data in two pieces, and use one of them for training, and the other for testing. With those 2 sets of data in my hand, I trained the machine with the training data. I calculated histogram and used the attributes which were given with the assignment. I saved these data in individual instances of "Image" class that I created specially for this occasion. After that, I did the same operation on the other data set.

Having those trained data sets, I calculated distances for every single data-test pair, and put them in a dictionary. After that, I calculated kNN distance, and multiplied the histogram and attributes with their weights. Then, after getting nearest neighbors I found the appropriate training image for the test image.

Part III: How to Use the Program?

For running the program, "python3 main.py" should be written. Weights, k of kNN, and distance type should be changed inside the code. They are just above "main()".

Program has 2 parts, and one of them should be de-activated. The purpose for doing it is to use it for different type of tests.

Program take approximately 2 minutes to run, for 5000 images.

Part IV: Analyzing different weights

The settings I found to work best are;

Distance type = "l2"

Weight of Attribute = 0.5

Weight of Histogram = 1e-4

Number of Nearest Neighbors = 5

I got 49.0566% accuracy with the test group I used, with these settings. And while decreasing histogram doesn't change accuracy, changing others changes the outcome. And the accuracy is around %44 when I don't use weights, with making them 1 simply. Using only histogram to calculate kNN ended up with 6% accuracy. And attributes only gave the result of 40%. For getting the best combination, I could have plotted a graph and find derivative of it. But it could have taken a lot of time.

Using the right combination makes everything better.

Part V: How to Improve the Program?

Program has a lot of room for improvement. It has a lot of re-used codes. They can be put in functions. For increasing the accuracy, we can use a better distance method, or may be even a weight function. Using another machine learning approach will also help.

And after doing all that, the program can be modified to be used just from command line, without changing anything from inside.

Part VI: What I Learned?

In this assignment I learnt the basics of machine learning, and implementing kNN.