

Brief Report

HAI, Assignment 2

Modal-Based SVM Model:

I use 8 features for the SVM classification. Vector features include 1D feature as magnitude and length, and 2D features by combining them.

A cross validation approach of 5 folds shows that the accuracy is 90% for the given set, and 81.8% for my own gesture set. The confusion matrix is as below:

<pre>[[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 0 0] [0 0 0 0 1 0 0 0 0 0] [0 0 0 0 0 1 0 0 0 0] [0 0 0 0 0 0 1 0 0 0] [0 0 0 0 0 0 1 0 0 0] [0 0 0 0 0 0 0 1 0 0] [0 0 0 0 0 0 0 0 1 0] [0 0 0 0 0 0 0 0 0 1]]</pre>	<pre>[[1 0 0 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 0 0] [0 0 0 0 1 0 0 0 0 0] [0 0 0 0 0 1 0 0 0 0] [0 0 0 0 0 0 1 0 0 0] [0 0 0 0 0 0 1 0 0 0] [0 0 0 0 0 0 0 1 0 0] [0 0 0 0 0 0 0 0 1 0] [0 0 0 0 0 0 0 0 0 1]]</pre>
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Overall, the assignment is very challenging for me. I spent quite a lot time understanding the frequency analysis, and eventually chose to visualize Fourier transform. Another problem is the integration of multi-feature into SVM. The data structure of SVM input is complicated to me. I spent several hours on debugging the training data structure, testing data structure, and feature inputs.

Since I have no experience with machine learning, or data science before, I learned a lot from the basics to high level concepts. For instance, how data visualization works in python and what kinds of visualization should we choose are basic but useful - since data is becoming a common design material nowadays.

I also gained practical understanding of model based machine learning - how they train and test, how to perform cross validation evaluations on them.

Link to work:

<https://github.com/ZFengyi/HAI>