Classification of Pixel Data using a Support Vector Machine

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Chapter 1

Operational Information

To classify the picture as closely as possible to the desired result, it was necessary to review the details of the image for any features that could be extracted at an elementary level. The support vector machine implementation in Matlab allowed for as many classification parameters to be passed for generating the classification structure.
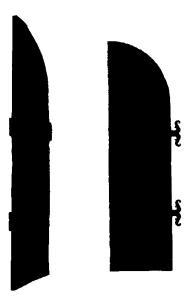

Figure 1.1: Classification Mask used to determine class of training points

When using the class mask, as seen in 1.1, it was necessary to generate a set of points to apply to the mask which maximized the positive effect

on the support vector machine while reducing the requirement for an overly high number of required points.

As explained by Dr. Haykin, the support vector machine internally tries to maximize the distance between the points it is currently training against and the desired hyperplane. (Haykin, 2008) Randomly generating points from the entire images with no concern for position doesn't benefit the areas in the image where the distinction between both classes is quite complex.

Figure 1.2: Mask relating desired point density to position

1.1 Process Decision and Details

Chapter 2

Choice of Parameters

When choosing the parameters to train the support vector machine, we decided to expand on the data available from the image. By applying certain filters to the image, it is possible to expand on the features of the image without requiring manual editing of the image.

2.1 Testing & Results of Support Vector Classification

Chapter 3

Classification of Testing Data

To determine optimal performance, we wanted to test the system setup with different numbers of training points.

Chapter 4

Overall Effect

Over the numerous types of parameters we could specify for the support vector machine to operate on, the order of effectiveness can be determined by the relative accuracy increase through its inclusion into the training data.

1. L*ab (Direct Pixel Value)

2. L*ab (Radial Blur Pixel Value)

3. XY (Pixel Location)

The pixel location had a surprisingly opposite reaction to the effectiveness of the system upon adding its values to the training data.

Chapter 5

Outcome

By limiting the data sent to the training set for the support vector machine, it was possible to maximize the

Bibliography

Haykin, S. (2008). Neural networks and learning machines (3rd edition).