

Detection of Pedestrians in Images using SVM

Project Proposal

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I. PROJECT STRUCTURE

A. Project Team

I will be the sole team member.

B. Project Type

I will be doing a regular project.

II. PROJECT SCOPE

The scope will be to construct a classifier using a Support Vector Machine (SVM) that can classify a street image as one containing or not containing a pedestrian. This could have multiple uses like a driverless car avoiding pedestrians and search and rescue assistance by robots that can identify places that have people who need help. The primary use in the case of this project would be to help me in better understanding SVMs.

III. WHY IT IS INTERESTING

The main reason why it is interesting to me is that it is one of those problems that can be easily explained to a human, while being extremely difficult to program using traditional methods. Also at the present moment I am not sure how SVMs work, and this makes it more interesting.

Based on my current and somewhat incomplete understanding of how SVMs work, I have gathered that they can classify pictures by first converting a pixel array into a long vector. The problem then becomes one where you train the SVM on a dataset of images that are used as long vectors of pixel values. SVMs work by converting the input to a higher dimension where the datasets can be linearly separated.

Although there may be many separating boundaries as shown in figure 1, the linear separation is achieved by selecting a boundary that maximizes the separation between the classes. The vectors that lie on the separating band are called support vectors. These are shown as the solid squares and circle in figure 2.

IV. STRATEGY

I plan to split the project into the following parts:

- 1) Understand the working of SVMs
- 2) Understand the working of Kernels
- 3) Research on how to obtain a bit array from a JPEG image
- 4) Choose a programming language based on the amount of computation that will be needed

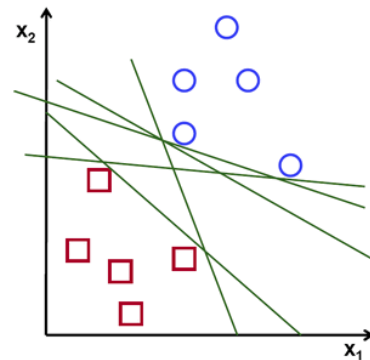


Fig. 1. Many possible separating boundaries[1]

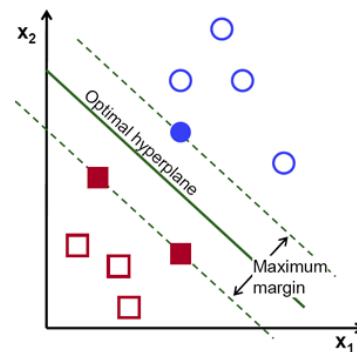


Fig. 2. Separation with maximum margin[1]

- 5) Collect pedestrian images from the internet
- 6) Build and test

V. RELEVANCE

I wanted to choose a topic that was related to the course material that we plan to cover. I saw that SVMs are going to be covered and that influenced my choice of project. I wanted to do a project on a topic that was part of the syllabus. Plus this was listed in the project ideas on the class web page.

REFERENCES

- [1] "Introduction to Support Vector Machines." *Introduction to Support Vector Machines* - OpenCV 2.4.13.1 Documentation. N.p., n.d. Web. 27 Sept. 2016.