Short Paper

Alice Anonymous[*,a], Bob Security[b]

[a]*Department, Street, City, State, Zip*
[b]*Department, Street, City, State, Zip*

Abstract

This is the abstract.

It consists of two paragraphs.

Introduction

The primary objective of this paper is to develop a low-cost system that can record and categorize track flows through residential neighborhoods.

Methods

To motivate this we provide an example of using repeat photography to classify images of a roadway for the presence of FedEx trucks and buses using TensorFlow, and then demonstrate ways to analyze traffic based on labeled images.

AOI Selection

Although not critical for sucess in this case, many classification tasks can be improved by restricting the field of view to the area of interest (AOI) that contains the most informative components of an image. In this case any components of the image above the roadway provide no substantive information for the classification task and might throw off the classifier through uninformative changes in lighting, phenology across seasons, or changes in camera placement.

To minimize these issues we apply a multi-stage process to first identify the roadway, then mask out unnessesary image elements. In the first stage, we identify and isolate the yellow road centerline using color selection.

yellow line image

Then yellow lines are then coverted to greyscale, and smoothed. These smoothed lines can then be used with a Canny Edge Detector [@ reference].

grey scale smoothed image

Edges can be defined as the boundary between an object and its background. In its most basic form edge detectors, like Sobel filters, use kernals (moving

*Corresponding Author

Email addresses: alice@example.com (Alice Anonymous), bob@example.com (Bob Security)

windows) to calculate the difference between adjacent pixels in both the X and Y axis. High gradient values can be treated as lines, and low gradient values are dropped from consideration. Canny edge detection [@ 1986] goes a few steps further to try to isolate the strongest and most continuous lines. In canny, edges detected by the Sobel kernals are then thinned to be one pixel wide, and then filtered by histeresis thresholding. Each line is scored by its strength relative to neighboring lines. Then to avoid noise or non-continuous edges, Histeresis thresholding is applied to return only the most prominent and continuous lines. Thresholds are chosen between the values of zero (no edge) and two fifty five (sharp edge). Two thresholds are chosen manually, the first, where all edges with values less than the minimum threshold are dropped completely from consideration. The second upper threshold is more complex, edges with values above the upper threshold are always included, but edges with thresholds between the minimum and maximum thresholds are only included if they touch a line that is above the maximum threshold. As result canny edge detection flexibly identifies strong and continuous lines, while removing ones that are potenitally the result of noise or are weak and non-continuous. https://www.youtube.com/watch?v=sRFM5IEqR2w

canny example

Tensor Classifier

Results

Discussion

Text based on elsarticle sample manuscript, see http://www.elsevier.com/author-schemas/latex-instructions#elsarticle

The Elsevier article class

Installation. If the document class *elsarticle* is not available on your computer, you can download and install the system package *texlive-publishers* (Linux) or install the LaTeX package *elsarticle* using the package manager of your TeX installation, which is typically TeX Live or MikTeX.

Usage. Once the package is properly installed, you can use the document class *elsarticle* to create a manuscript. Please make sure that your manuscript follows the guidelines in the Guide for Authors of the relevant journal. It is not necessary to typeset your manuscript in exactly the same way as an article, unless you are submitting to a camera-ready copy (CRC) journal.

Functionality. The Elsevier article class is based on the standard article class and supports almost all of the functionality of that class. In addition, it features commands and options to format the

- document style

- baselineskip
- front matter
- keywords and MSC codes
- theorems, definitions and proofs
- lables of enumerations
- citation style and labeling.

Front matter

The author names and affiliations could be formatted in two ways:

(1) Group the authors per affiliation.
(2) Use footnotes to indicate the affiliations.

See the front matter of this document for examples. You are recommended to conform your choice to the journal you are submitting to.

Bibliography styles

There are various bibliography styles available. You can select the style of your choice in the preamble of this document. These styles are Elsevier styles based on standard styles like Harvard and Vancouver. Please use BibTeXÂ to generate your bibliography and include DOIs whenever available.

Here are two sample references: Feynman and Vernon Jr. (1963; Dirac 1953).

References

Dirac, P.A.M. 1953. "The Lorentz Transformation and Absolute Time." *Physica* 19 (1—12): 888–96. doi:10.1016/S0031-8914(53)80099-6.

Feynman, R.P, and F.L Vernon Jr. 1963. "The Theory of a General Quantum System Interacting with a Linear Dissipative System." *Annals of Physics* 24: 118–73. doi:10.1016/0003-4916(63)90068-X.