Predicting a cars velocity using dashcam footage and dense optical flow

Florian Wolf
Department of Mathematics and Statistics, University Konstanz
Konstanz, Germany
florian.2.wolf@uni-konstanz.de

Franz Herbst
Department of Physics, University Konstanz
Konstanz, Germany
franz.herbst@uni-konstanz.de

Abstract—In this report bla bla bla
Index Terms—deep learning, computer vision, velocity prediction, dense optical flow

I. Introduction

II. Data collection, analysis and preprocessing

For our data set, we used the comma ai speedchallenge[1] data base. This data set provides two dashcam videos: a training video, (20400 frames, shoot at 20 frames per second) including ground truths and a testing video (10798 frames, shoot at 20 frames per second) without labels, which they use for applications to check how well a submitted model is able to generalize.

A. Data analysis

As we only have access to the labels of the test video frames, we decided to split the data by the 80/20 principle into training and testing subsets. Here we did not shuffle the data randomly, as we needed to always have two consecutive frames, to be able to calculate the optical flow and we wanted to test our model on unseen data, to measure how good our model is able to generalize.

To analyse the velocity distribution in the two subsets, we rounded down the given velocities and plotted the distribution in a histogram in figure REFERENCE MISSING.
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B. Preprocessing

Each of the provided frames has a size of $(640, 480, 3)$ pixels. Due to computational limitations, we decided to cut off the last 60 pixels from the lower border, to remove a black frame inside the car, which did not have any effect on the optical flow. Furthermore, we cut the frame size in half and calculated the optical flow using the Farneback pyramid REFERENCE TO THE PAPER MISSING method with the following parameters

$$\text{EQUATION WITH MISSING PARAMETERS}$$

To decrease the training duration, we halved the size of the optical flow image again, resulting in a resolution of $(160, 105, 3)$ pixels per frame. The preprocessing pipeline is shown in figure REFERENCE MISSING

III. Method selection and architecture

IV. Results and comparison

V. Further work

Acknowledgment

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g". Avoid the stilted expression "one of us (R. B. G.) thanks ...". Instead, try "R. B. G. thanks...". Put sponsor acknowledgments in the unnumbered footnote on the first page.

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[1] https://github.com/commaai/speedchallenge