International Institute of
Information Technology Bangalore

Project Proposal
DS/NC/ESD 863 Machine Perception

Vehicle Driving Assistant

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March 9, 2017

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1 Brief Description

This project aims to provide a comprehensive set of assistance features to aid the driver (or autonomous vehicle) to drive safely. This includes a number of indicator and cues regarding the environment.

1.1 Problem Formulation

- Application/System (Driving Assistance)
  - MP Module (Obstacle detection)
    - ML task (Multiclass Classification)
      - Features, Models, Optimization algorithm (To be decided based on empirical observations)

2 Dataset

360p video of roads in and around Electronic City Phase was recorded by us. We used a Cannon 1300D to record the video.

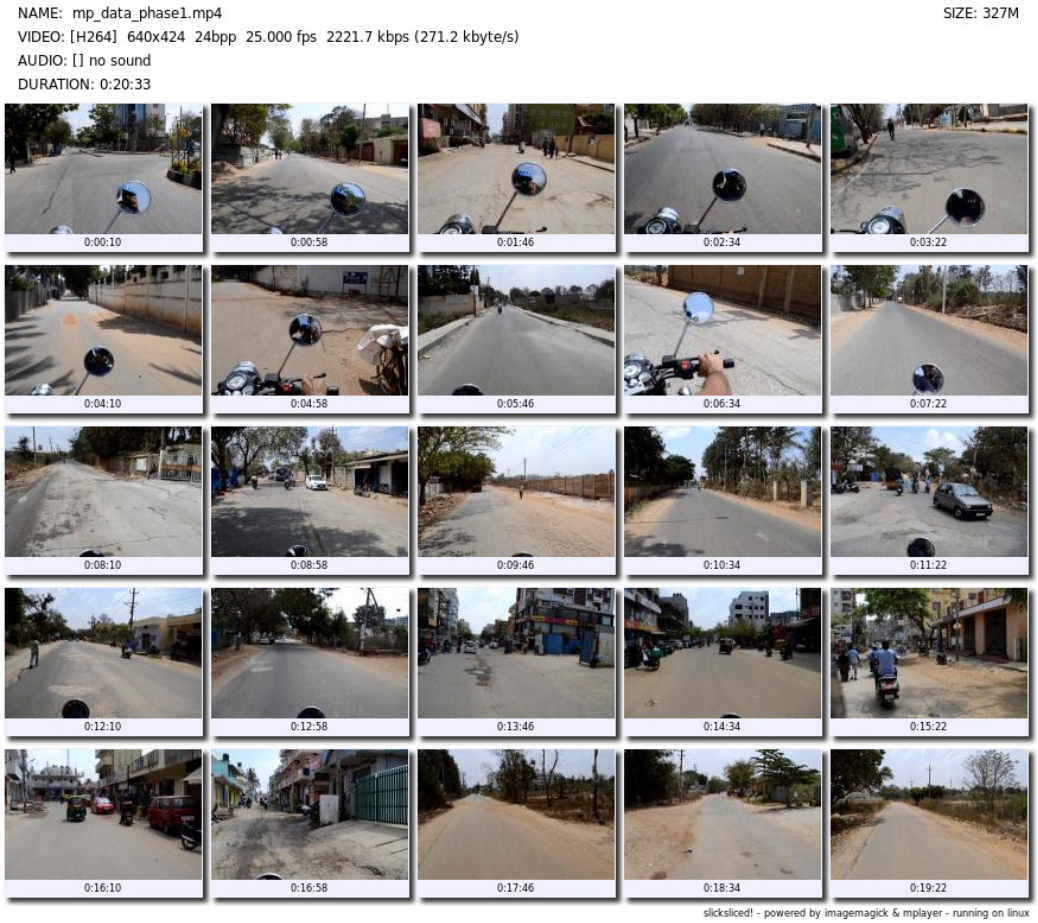

Figure 1: Dataset thumbnails

3 Proposed Plan of Execution

3.1 Phase 1

- Data collection and video pre-processing.

  Video of roads in Electronic City was collected manually with a DSLR camera held by a pillion rider on a moving motorcycle. About 20 minutes worth of video was collected for Phase 1 of the project. The video was pre-processed to reduce excessive jitter.

3.2 Phase 2

- Pothole detection in video frames.

3.3 Phase 3

- Improving accuracy of the current model.
- Comparing the result with alternate models.

3.4 Phase 4

- Detection of other obstacles (pedestrians, oncoming traffic etc).
- Provide driving cues based on detected entities.

4 Main Challenges

- Procuring large and varied data to work on.
- Presence of noise, shadows and excessive jitter in data.
- Diversity and non-uniformity among roads and potholes which makes it difficult to generalise.
- Detecting obstacles with an obstructed field of view.
- Consistency in object detection with increase in speeds.

5 Learning Objectives

- Finding a real world problem and formulating it as a machine perception problem.
- Get acquainted with different aspects of image analysis for feature extraction.
- Be able to extract appropriate features and apply machine learning algorithms to solve the problem.
- Be able to read current research papers and understand the issues discussed.
- Obtaining and cleaning data.