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Synopsis Report
&
Justification Report

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Synopsis Report

Real Time Driver Assistance System

Introduction

Vision-based driving assistants have been developed for decades. Their results are almost ready to be equipped in conventional vehicles. Most existing methods are targeted at the embedded market, but not mobile platforms. Mobile technology has been improving dramatically in recent years, such that applications that could once perform in real-time only on PC are now ready to be ported on mobile devices. However, there are still barriers in terms of processing power or memory compared to a PC environment.

The project is divided into 7 major phases as follows:

- Classification
- Lane marking detection and Road Sign
- Corner detection and obstacle detection
- Ego vehicle position estimation
- Obstacle detection on three detection ranges
- Lane departure warning
- Indication of driving area and direction for hazard obstacles

The proposed solution can also parse a real-time video in the format of (.mp4) and extract info about all the moving and non-vehicular objects present in the video feed.

The software can run on any platform, including Windows, macOS, Linux and making it portable to Android.

Tools to be Used:

- Java/Kotlin
- FastCV/OpenCV
- Qualcomm HetCompute SDK
- Android Studio

Rationale: Justification, why needed?

According to the 2020 Traffic Safety Facts Research Note by the Ministry of Road Transport and Highways (MORTH) “The Nation lost 1,31,714 people in crashes on Indian roadways during 2020. An analysis revealed that about 94% of those accidents were caused by human error, and the rest by the environment and mechanical failures.

The opportunity to reduce fatal accidents is making assistance system even more critical. Pedestrian detection, Traffic Sign, Lane Change Detection and Ego vehicle position detection

are among the many applications that assist drivers with safety-critical functionality to reduce fatal accidents and save lives.

Methodology/ Planning of work

- Image Acquisition using the phone's primary camera.
- Image Enhancement and pre-processing to improve the quality of the image and convert the image to binary scale so as to use it in contour extraction.
- Extract the region of interest from the binary image and display it separately or highlight it.
- Give user the necessary detail on-screen or via notifications.

Working of the Proposed Methodology

- The primary camera of the device is accessed and a real time image stream is given as input.
- The input image is then fed in the system, for further processing.
- This first step is used to classify each pixel in the image as sky, road or background area and further steps such as Lane marking, traffic signs, corner detection and obstacle detection is done.
- The final step involves showing the relevant information to user.

Facilities required for proposed work

- Disk space: 10 GB
- Operating systems: Android
- Development Environment: Android St
- Java versions: Java 8 or above
- Compatible tools: Microsoft Visual Studio, IntelliJ
- Included Packages: MARE, OpenCV
- Processors: Snapdragon or Mediatek

Expected outcomes:

This project performs mainly four tasks. The first task is to input an image of the surronding and this will happen with help of the camera of the phone for the prototype. When the image is fed the image is enhanced in quality. The enhancement is done in the resolution and the thresholding. The image is constrained to a fixed image frame size. After the enhancement, the image is processed to segment the necessary details from the full image. The extracted detail is shown to user on screen or as notification. The project is designed so that we can understand the technology used nowadays. Moreover we provide a real-time application that is able to run on both single core platforms and multicore ones by parallelizing heavy computation parts.

References:

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