Road Semantic Segmentation

Mechatronics Engineering Project

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IEEE

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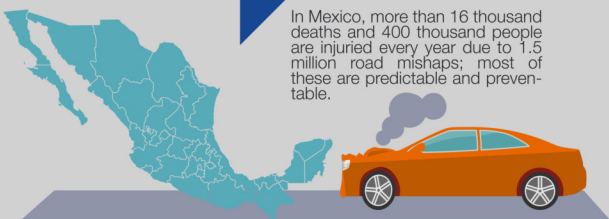
A.D.M.A.S. Advanced Driver Monitoring for Assistance System

CIMB
CENTRO DE INVESTIGACIÓN EN MICROSISTEMAS Y BIODISEÑO

1 PROBLEM STATEMENT



In Mexico, more than 16 thousand deaths and 400 thousand people are injuried every year due to 1.5 million road mishaps; most of these are predictable and preventable.

Source: Ramón, J.A. (2017). Accidentes viales en México ocasionan 16 mil muertes y 400 mil heridos al año. Comisión Nacional De Seguridad. (S/A). Accidentes y sus Factores

From the main causes of vehicular accidents on federal highways, the National Security Commission indicates:

- 80% Vehicle driver
- 9% Natural agents
- 4% Road conditions
- 7% Vehicle failures

2 OBJECTIVES

General Objective

Develop an algorithm capable of identifying vehicular lanes through computer vision applications and machine learning architectures.

Specific Objectives

1. Obtain a video database of the roads of Mexico City.
2. Use computer vision tools for vehicular lane detection.
3. Create a database of vehicle lane labels from the videos.
4. Train a Convolutional Neural Network capable of segmenting pixels of a vehicular lane.

3 DEVELOPMENT

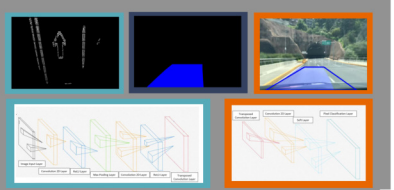
Software Used

OpenCV Python

MATLAB

OpenCV Algorithm

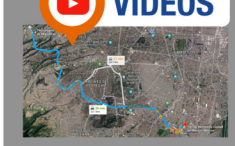
Vehicular lane identification through the tools of Python, taking the lines of the road as a reference.



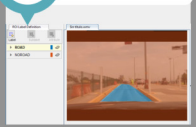
Convolutional Neural Network Architecture
MATLAB

DATABASE DEVELOPMENT

VIDEOS

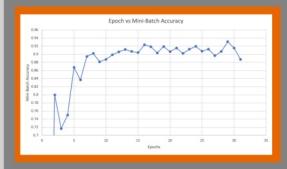


LABELS



4 RESULTS

4.1 Neural Network Training



4.2 Results Comparison

1
2
3

5 CONCLUSION

It was possible to complement the tools of image analysis with the processes of neural networks, to develop a video and labels database, their respective procedures, as well as results of vehicle lane segmentation for future projects oriented to autonomus vehicles systems.

6 FUTURE WORKS

1. Increase the number of videos and frames labeled.
2. Increase the number of items labeled: Cars, signs, lines, pedestrians, etc.
3. Improve the architecture of the neural network.
4. Use a computer with better processing capabilities, which does not limit the architecture of the neural network.