

**TECNOLÓGICO
DE MONTERREY®**

Mexico City Campus
Engineering and Science School
Mechatronics Engineering Department



IEEE

ADMAS

Speed Control Alert

Mechatronics Engineering Project
IMT Javier Alberto de la Tejera de la Peña A01271048

ADVISORS:

Dr. Martín Rogelio Bustamante Bello

Eng. Javier Izquierdo Reyes

Eng. Luis Alberto Curiel Ramírez

SYNODALS:

Dr. José de Jesús Barajas Cid

Dr. Adalberto Hernández Llarena

November 2017



EMOTIONAL ENGINEERING MULTIDISCIPLINARY
RESEARCH GROUP



CENTRO DE INVESTIGACIÓN EN MICROSISTEMAS Y BIODISEÑO

Problematic

Nowadays, a lot of car accidents are caused by human mistakes. Between these, can be found the accidents in which the velocity was a factor of it.

1 out of 3 deaths in car accidents are due to the excessive or inadequate velocity.

From: Organización Mundial de la Salud, "Control de velocidad", 2017.

Development

Data base

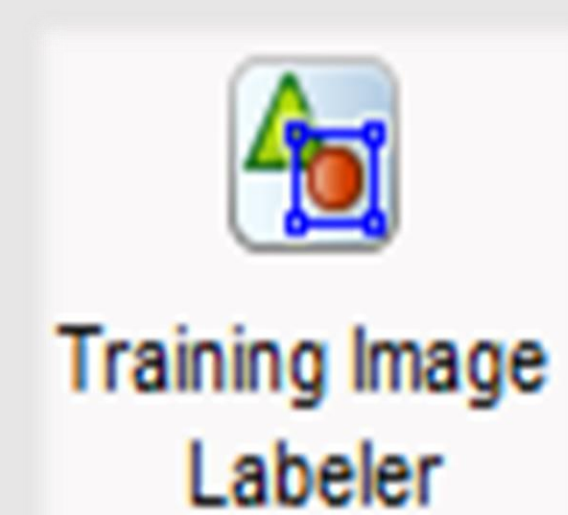
Obtain and modify 1000 images for the creation of the data base



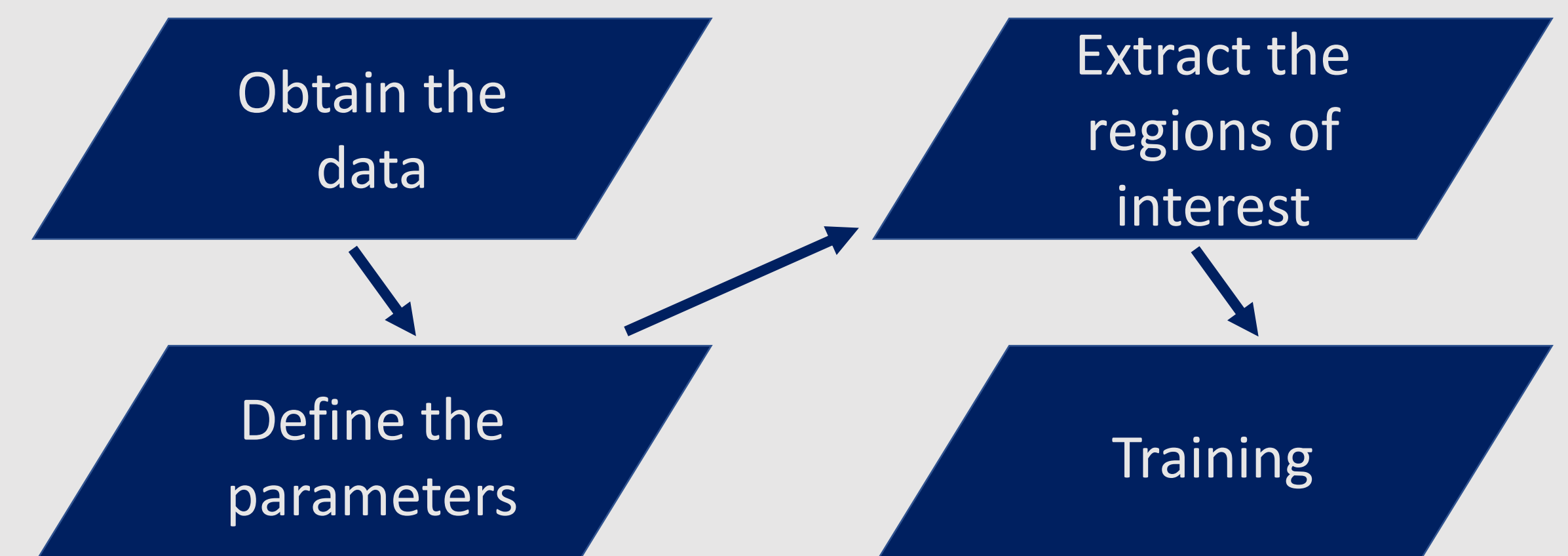
Softwares



Regions of Interest Selection (ROI's)



Neural Network Training



Objetivos

GENERAL OBJECTIVE

The general objective of this project is the recognition of the velocity transit signs in real time, then compare the results with the data acquired of a car. Once the comparison is complete, send an alert to the user of the car.

SPECIFIC OBJECTIVES

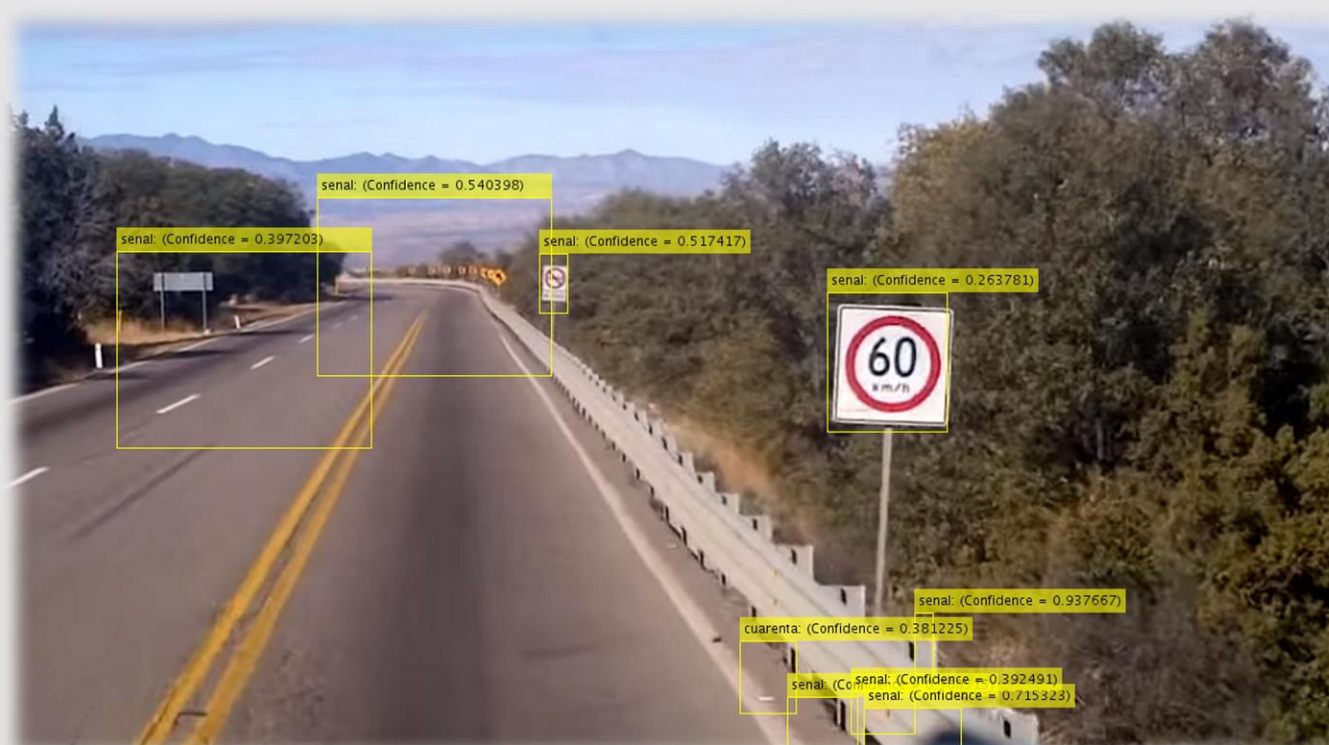
- Generate a data base of the transit signs and make the preprocessing of the images.
- Make the neural network training with the data base for the detection of the transit signs by cameras.

Conclusions

- It was successfully the obtainment and modification of the data base with the 1000 images in different circumstances.
- It was correctly selected the regions of interest.
- It was achieved a significate number of neural network trainings.
- The best convolutional neural network detected a 78% of the times correctly.

Results

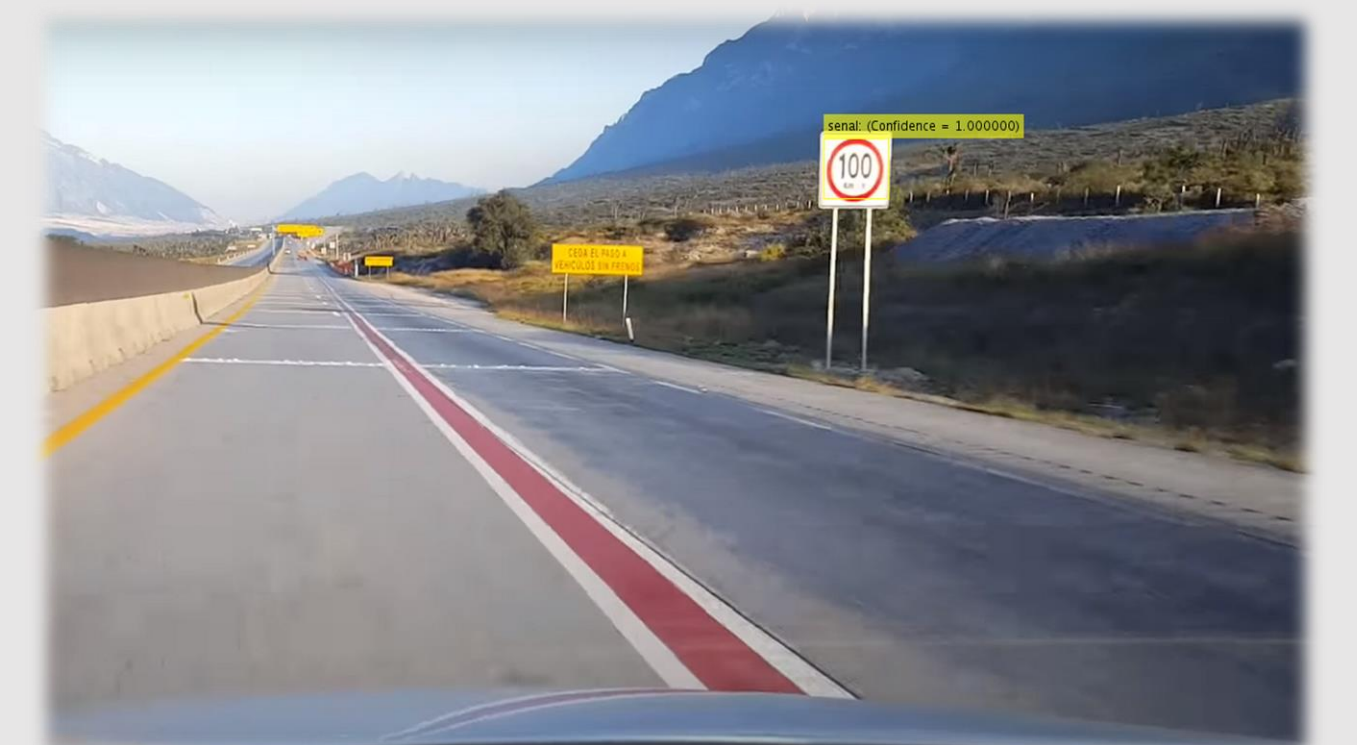
RCNN 1



RCNN 16



RCNN 26



The evolution of the different neural networks trained and their results. Detailing the progress of the different trainings of the neural networks. The result of the training led for the networks a final accuracy of 75%, 83.33% and 84.38% respectively. While, the effectiveness of the detection was none for the first network, and 62.50% and 78% for the others.

Future work

- ❖ Increase the number of images in the data base, having a minimum number of images for each of the different velocity signs.
- ❖ Create neural networks that can detect only a certain velocity sign.
- ❖ Detect in real time the velocity of the vehicle.
- ❖ Create an alarm system that compares the maximum speed sign detected with the actual speed.