



Maestría en Ingeniería en Sistemas y Computo Inteligente

Title

**Automatic detection of drivers with fatigue
deep learning**

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Automatic detection of drivers with fatigue using deep learning

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1. Introduction

Fatigue is a dangerous condition for any driver. This condition could be a risk not only to the driver but to any person on the public road. Actually, if the people drive with fatigue, it is considered the same as driving drunk [1].

We propose a system using a new focus named deep learning in the machine learning area; whose functionality will be to detect some fatigue agents in real time in order to prevent accidents caused by driving in this condition[4],[5].

2. Objectives

2.1. General objective

To develop a system for detection of drivers with fatigue using deep learning to prevent automobile accidents.

2.2. Specific objectives

- To characterize images that show signs of people with fatigue using deep learning.
- To develop models to recognize at least three manifestations of tired drivers.
- To build an interface to manage the recognition system of tired drivers.

3. Method

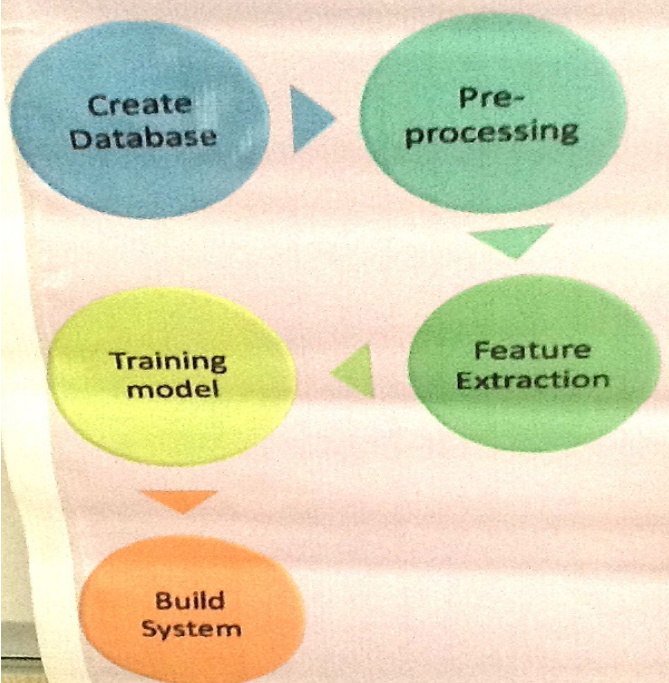


Figure 4. Methodology used in this research

Create database



Figure 2. Methodology utilized in this research

Feature extraction

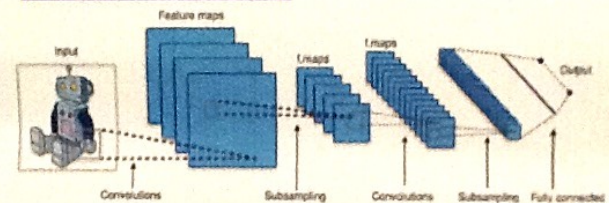
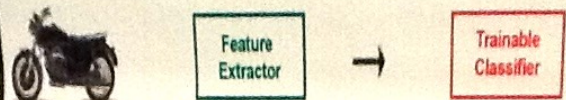


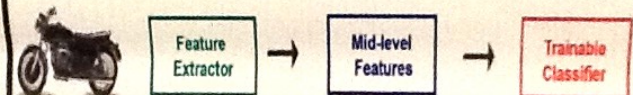
Figure 3. Architecture utilized for feature extraction: CNN[5]

Deep learning

Traditional pattern recognition



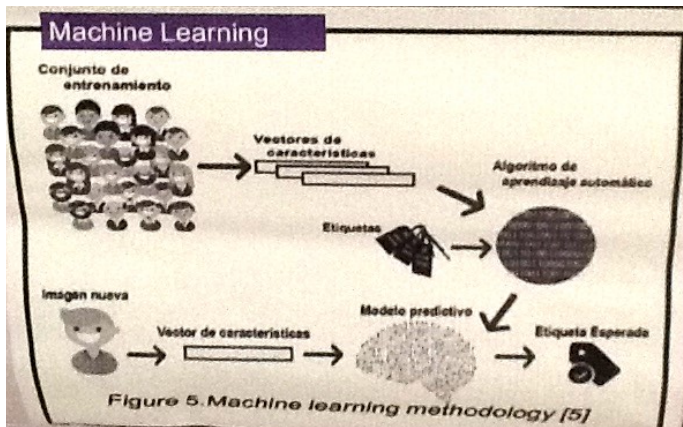
Mainstream modern pattern recognition



Deep Learning



Figure 4. Difference between oldest pattern recognition and deep learning[5]



4. Results

Some examples of the images obtained by different pages are:

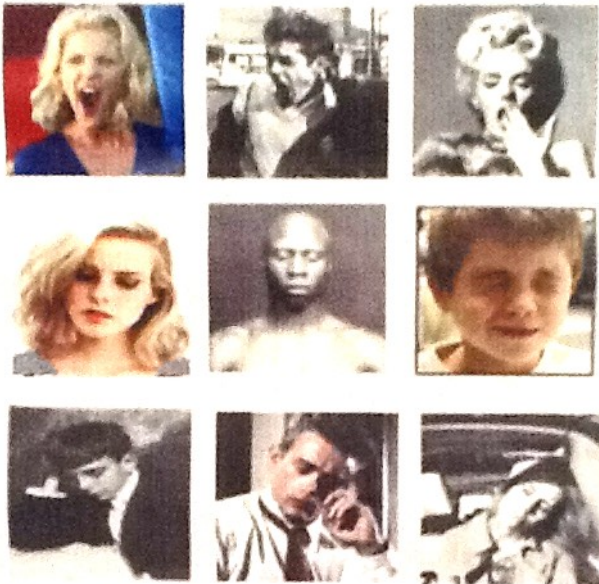


Figure 6. The images obtained of the search in web pages.



It ist'n yawning It's yawning

Figure 8. Testing the connection the model with a vision computer algorithm

System for monitoring of fatigue persons

UPPue

Yawning	1	<input type="button" value="Configure camera"/> <input type="button" value="Start"/> <input type="button" value="Stop"/>
Closed eyes	0	
Noddig off	0	

Figure 9. The prototype detecting a person yawning

5. Conclusion

In conclusion, we can determine that looking for images in the web could be a good way to create a complete database. The possibility of obtaining a True-False result is higher in a real time system that if we use images. But in general, the system works well.

5. References

- [1] Fundación CEA, "El sueño y la fatiga en la conducción: ¿Cuáles son los hábitos de los conductores españoles?", Fundación Comisariado Europeo del Automóvil, 2014.
- [2] T. M. Mitchell, *Machine Learning*. McGraw-Hill, 1997.
- [3] Y. Bengio and G. Hinton Y. LeCun, "Deep learning," *Review Insight*, Mayo 2015.

Acknowledgements

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