Maestría en Ingeniería en sistemas y cómputo inteligente

Automatic recognition of human actions, applied to video surveillance tasks

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1. Introduction

Video surveillance systems are especially useful in the identification of intruders and their subsequent location, but that is not their only function, since as its name says its main function is to monitor.

Subsequently appeared the quadrant generators in order to be able to view several cameras at once on the same monitor. The first recorders with videotape recording were followed by the recording ones on digital disc. At the same time the cameras also evolved, leaving aside the b / n and focusing on the color, significantly improving the resolutions.[1]

In the same way there are different types of behaviors like:[2]

- Verbs like "scream"
- Corporals like "Running"
- Psychological like "Blinking"
- Intellectuals such as "Perform mathematical operations"

This document describes the process for the development of a system that automatically recognizes actions such as "running" or "smoking" applied to the use of video surveillance cameras.

2. Objectives

2.1. General objective

Develop a software system for the real-time analysis of human behavior, applying computer vision and automatic learning for video surveillance tasks.

2.2. Specific objectives

- Design and develop an interface for the monitoring system and the database for positive events.
- Investigate and test the most efficient algorithms and techniques for the classification of videos.

3. Methodology

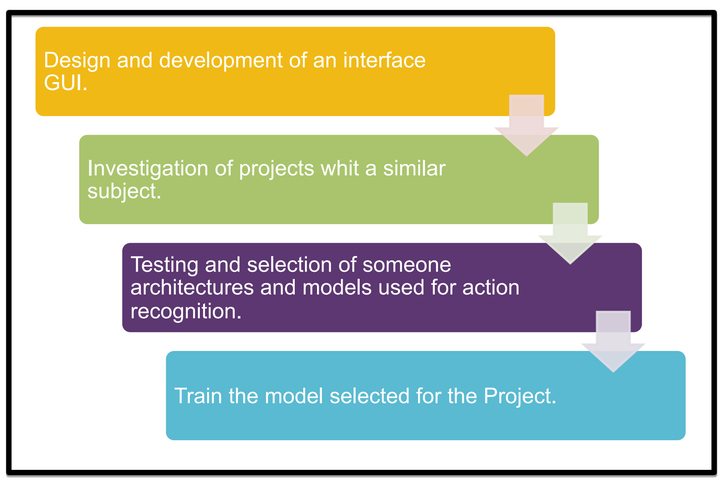


Figure 1. Methodology for the development for the human actions recognition system

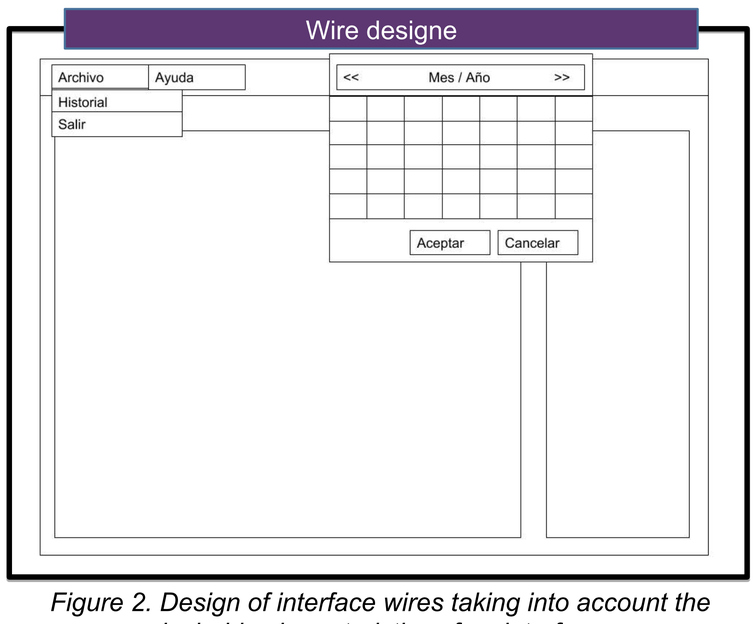


Figure 2. Design of interface wires taking into account the desirable characteristics of an interface.

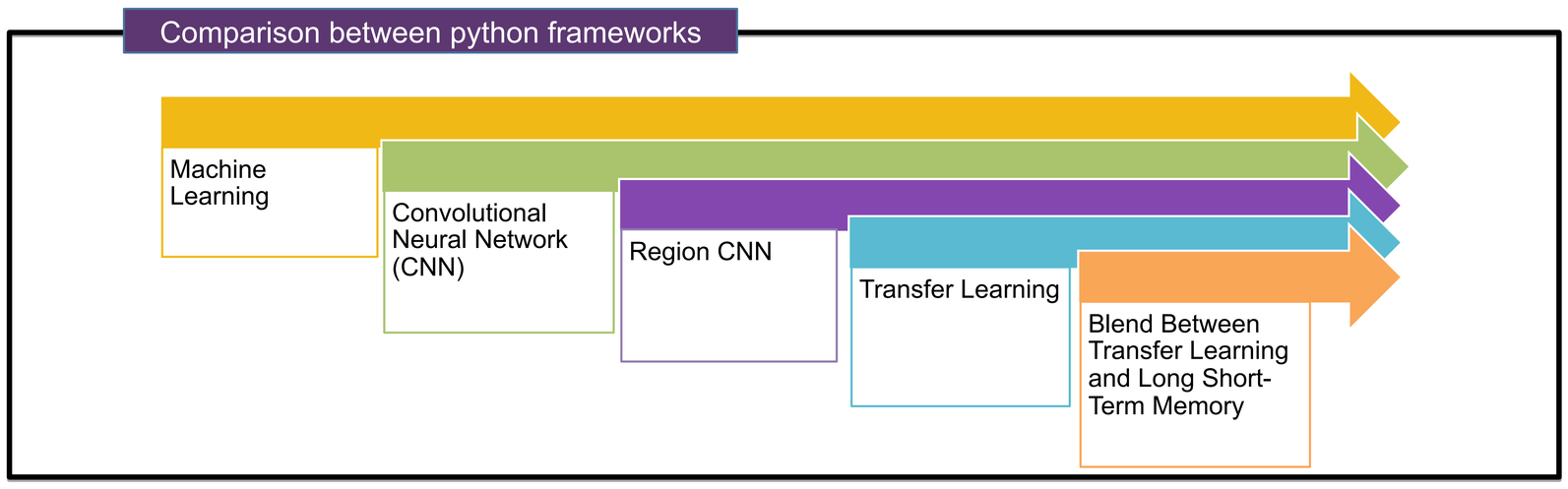


Figure 3. Selection process for the used architecture.

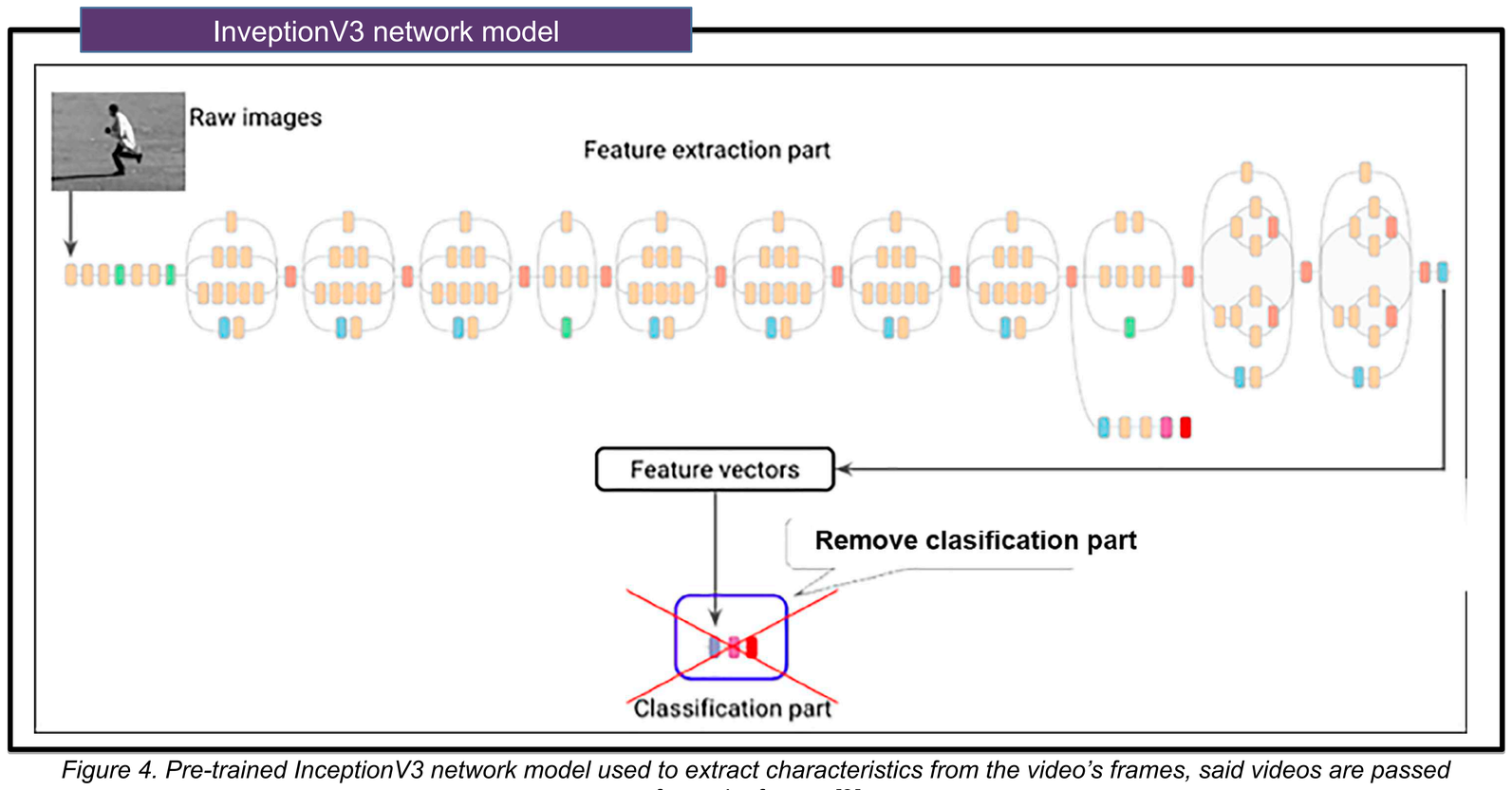


Figure 4. Pre-trained InceptionV3 network model used to extract characteristics from the video's frames, said videos are passed frame by frame. [3]

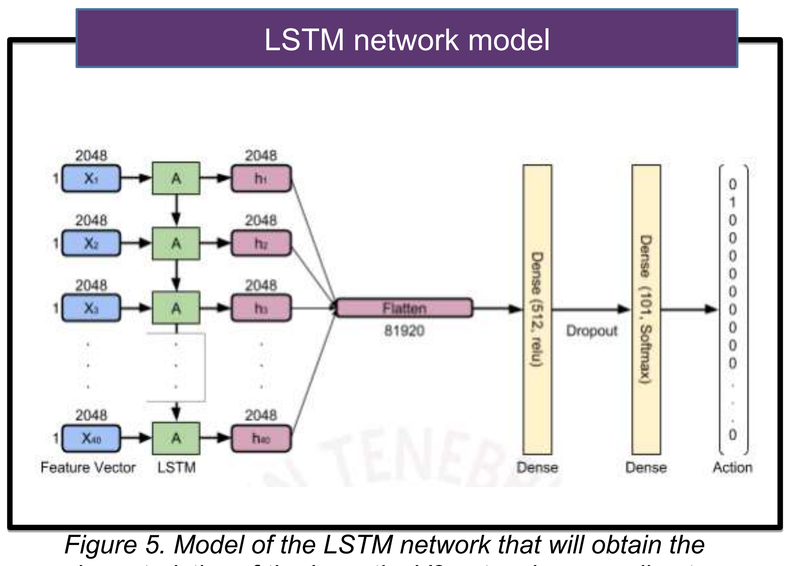
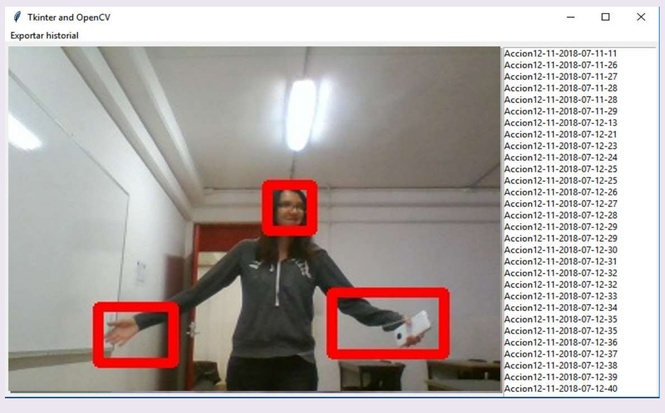


Figure 5. Model of the LSTM network that will obtain the characteristics of the InceptionV3 network proceeding to perform the classification. [3]

4. Results

The previous methodology has resulted in the creation of the graphical interface(GUI), the video database for the training of the models of the network architecture obtained (inspectionV3 and LSTM) selected for the video classification according to the action taken by the people on this case Run.



5. Conclusions

An interface was created that complies with the minimum desirable characteristics for the monitoring of video surveillance events and videos, awaiting integration with both the InceptionV3 feature extraction models and the LSTM network responsible for classification.
The architecture that best adapts to the automatic action recognition obtained based on the investigation, trial, and error, taking into account the limitations that each of them has
The steps to follow are the tests and adjustments of the models for the classification with continuous videos obtained from a camera as close as possible to the real time.

Acknowledgements

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References

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[2]Aspectos básicos del comportamiento humano. https://psicologiayempresa.com/aspectos-basicos-del-comportamiento-humano.html

[3] Fernández M. L. C, Dr. Beltrán C. C. A , "Identificación automática de acciones humanas en secuencias de video para soporte de videovigilancia", Pontificia Universidad Católica del Perú.

- Sturdiness
  Graphical interfaces must be able to respond to any unexpected situation.
- Functionality
  You must allow more than one task at a time, have keyboard shortcuts and react quickly to the user's actions.
- Effectiveness
  The user must be able to complete the tasks he needs to perform with compliance in his actions.
- Consistency
  Coherence for every element, in its format, sizes and what each one represents.
- vocabulary
  The messages shown must be understandable for all types of users.

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