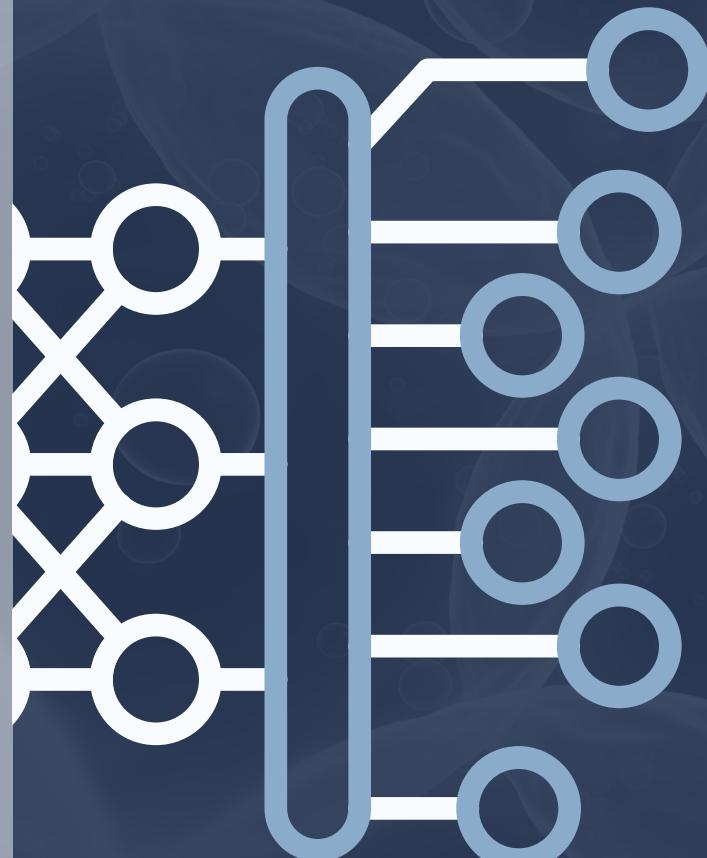




Tecnológico  
de Monterrey



# VIDEO RETRIEVAL VIA KEYFRAME EXTRACTION IN A CLASSROOM RECORDING ENVIRONMENT

Intelligent video detection and interpretation  
using distributed robust deep learning

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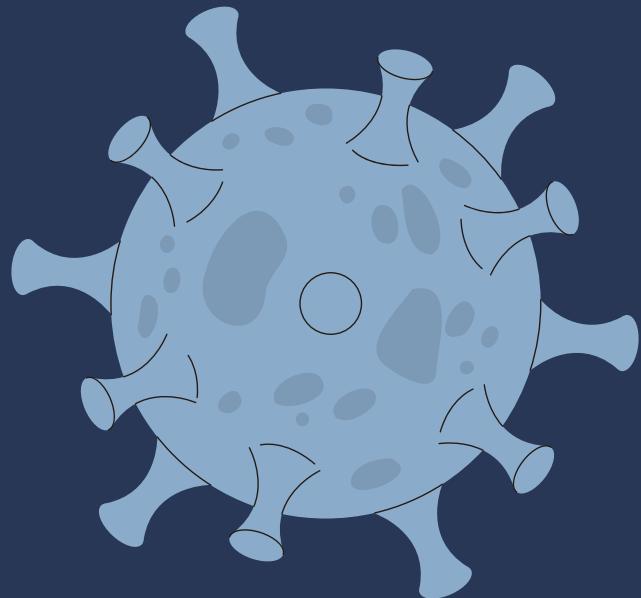
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Research Stay 2022

# HOW DID THIS NEED ORIGINATE?

"TEACHING WITH TECHNOLOGY IS NOT A ONE SIZE FITS ALL"

CONTEXT



PROBLEM



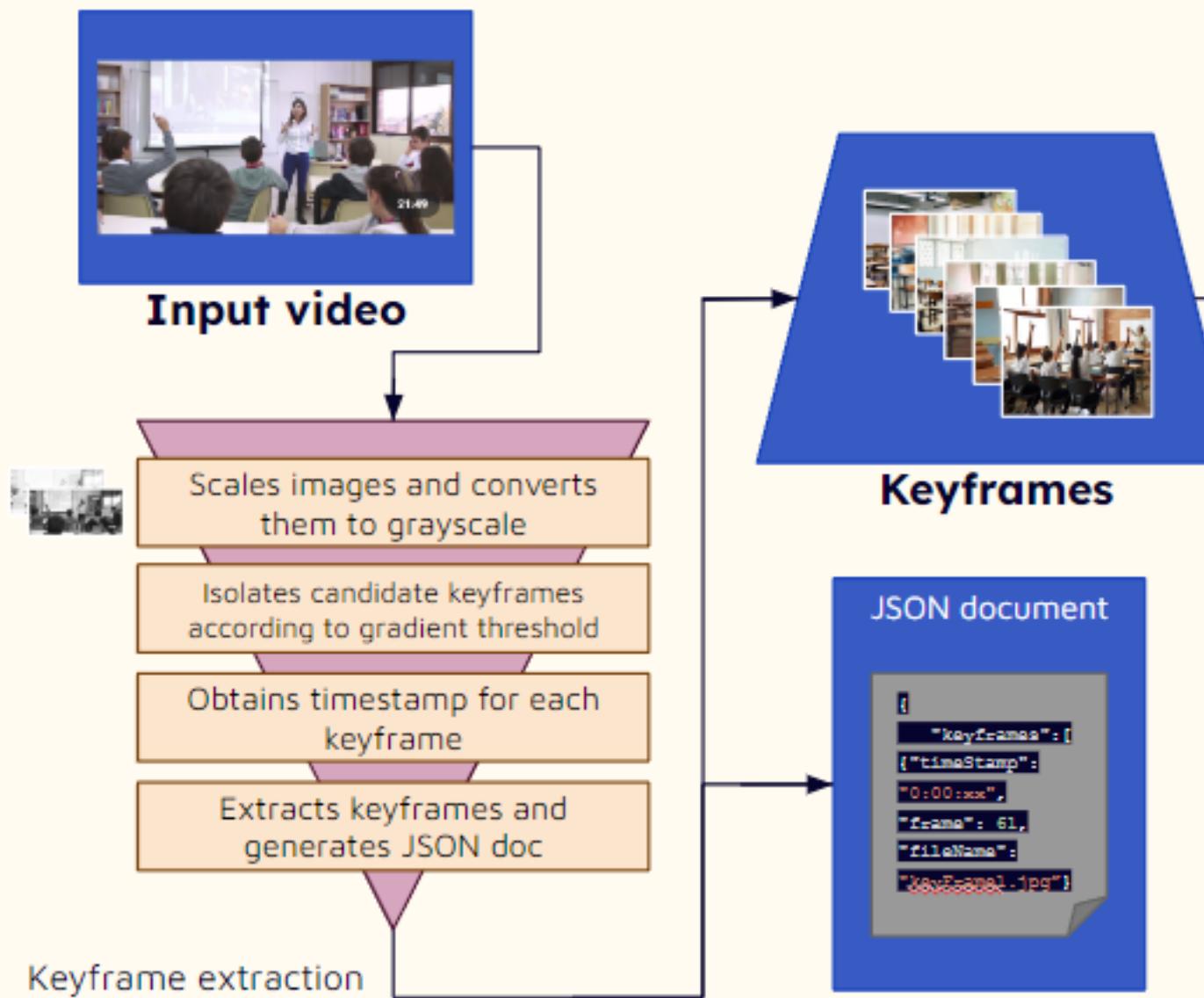
OBJECTIVE



# SOLUTION MODEL

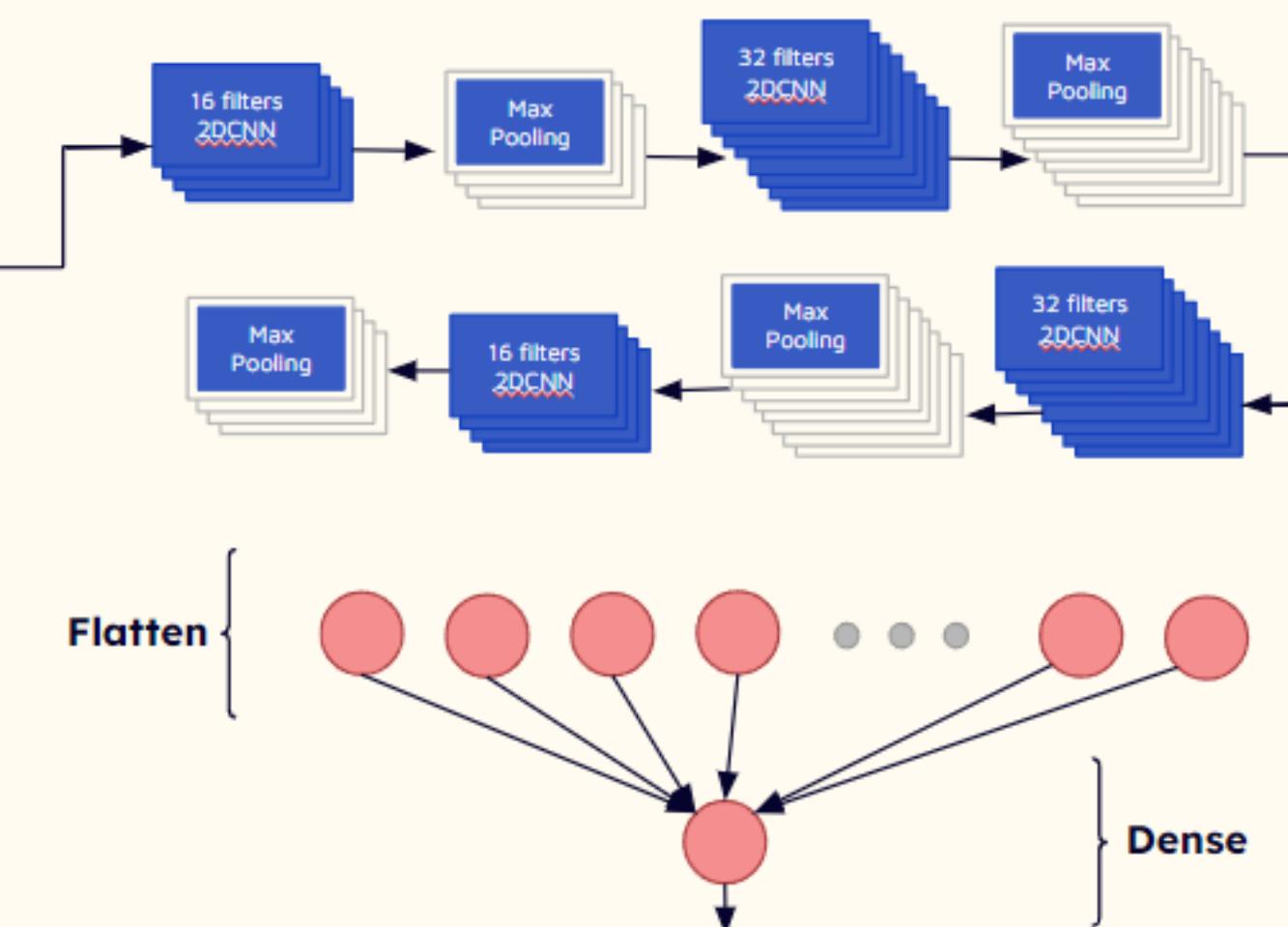
## 1. VIDEO SUMMARIZATION

This process focuses on identifying the most relevant frames that can be extracted from the video according to the gradient perceived from the changes between them. The resulting keyframes are stored locally and a JSON dictionary is created for further implementation.



## 2. IMAGE CLASSIFICATION

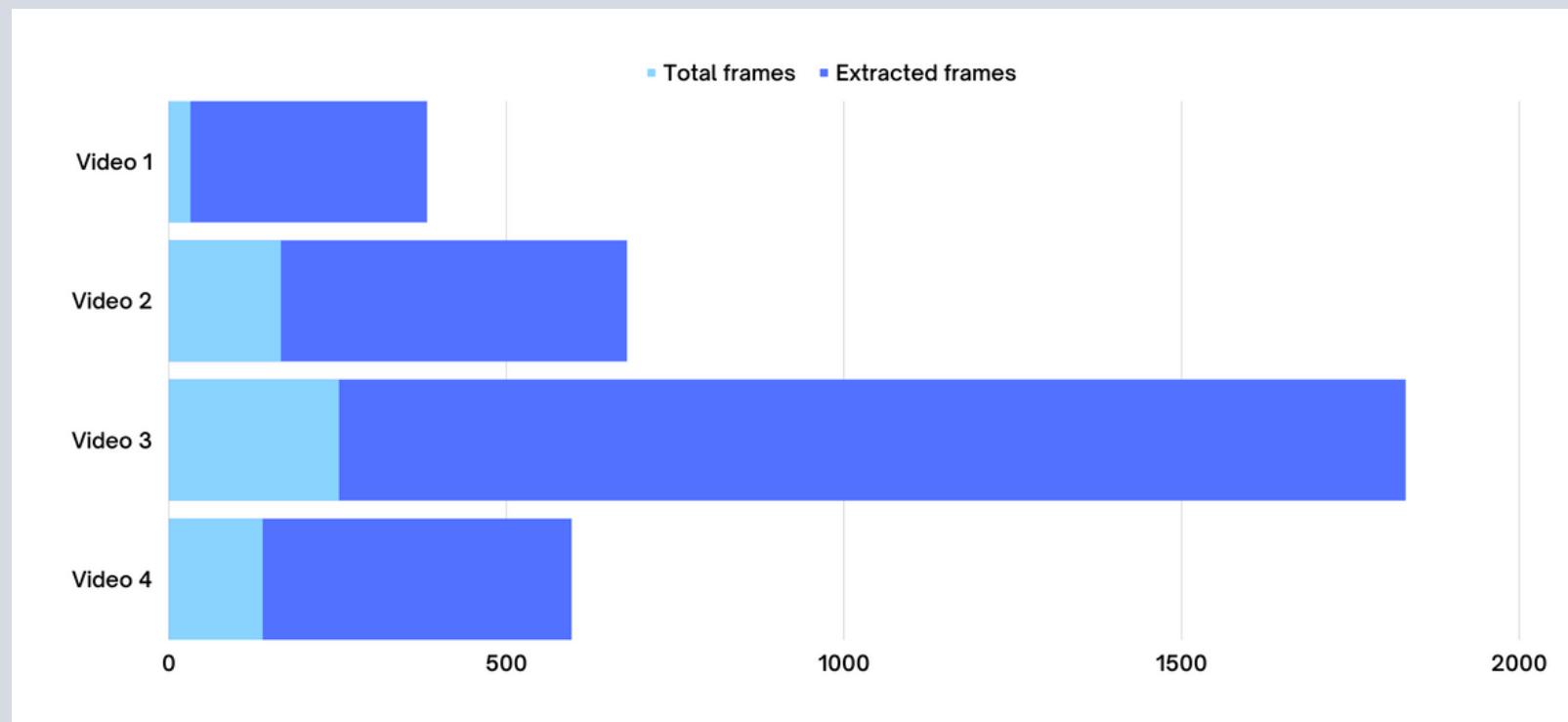
These keyframes go through an image classification model, which is designed to predict the category of the frames according to the state of the classroom. On this phase, we obtain an analysis of the activity observed during the class recording.



# PHASE 1

Different thresholds for summarization were tested, finding that 0.15 allows to reduce data without losing relevant information.

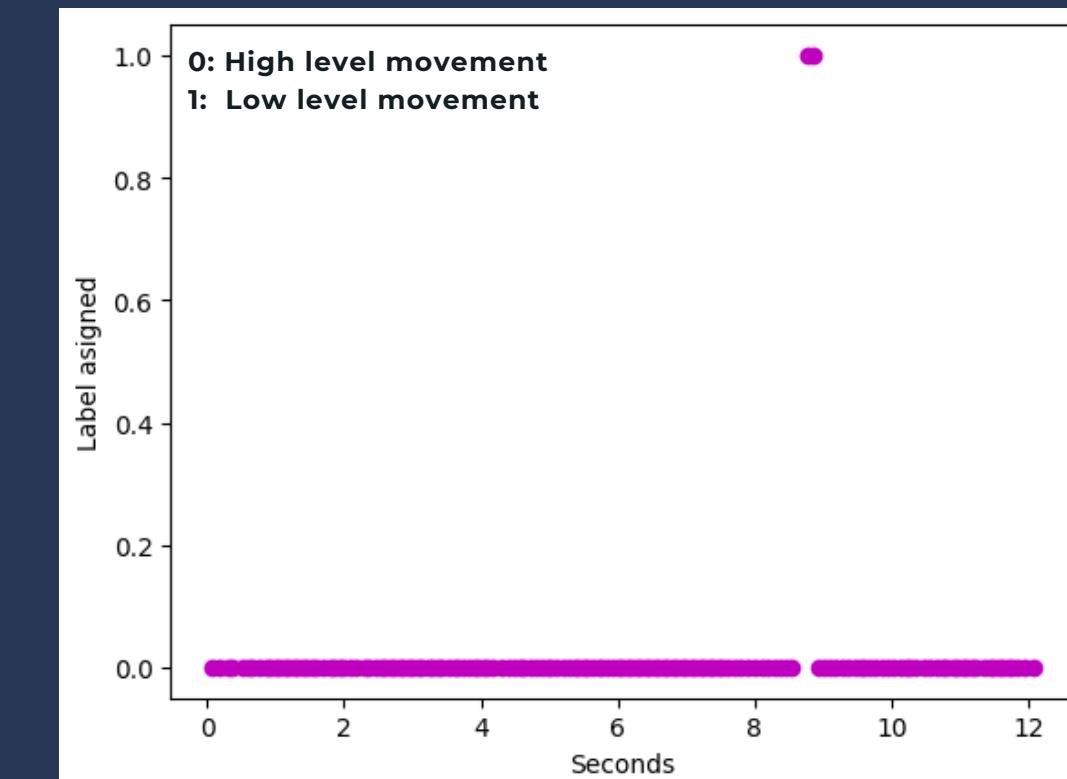
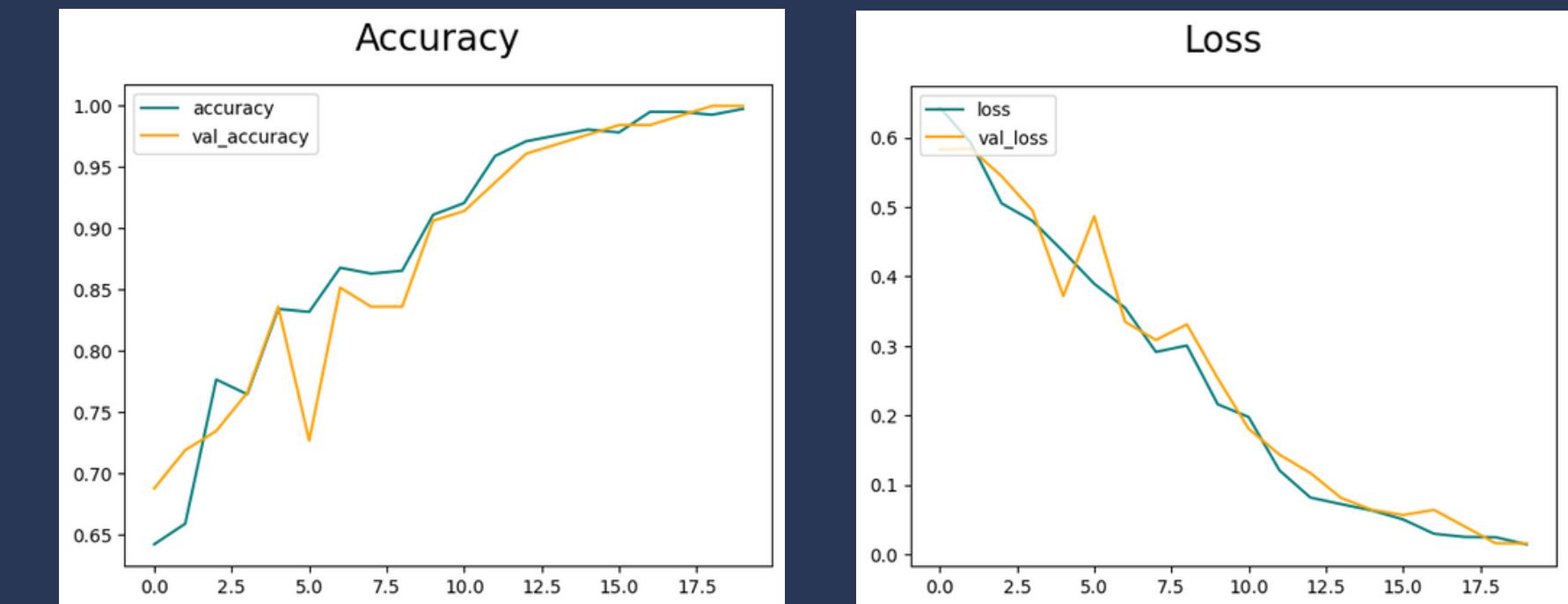
Threshold	0.05	0.12	0.14	0.2	0.25	0.5
Total frames per video				350		
Number of keyframes extracted	115	59	42	8	7	5
Percentage of keyframes extracted	32.86%	16.86%	12.0%	2.29%	2.0%	1.43%



We obtained a video summarization that goes from 9% to 31% of the total length, reducing both processing times and costs.

The accuracy and loss results obtained during training were optimal.

# PHASE 2



Once the keyframes went through the second phase, we obtained a visual analysis of the activity shown in the video.

THANK YOU FOR YOUR  
ATTENTION

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