deti universidade de aveiro
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EXAMS EVALUATION
using Computer Vision

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01

Project Introduction

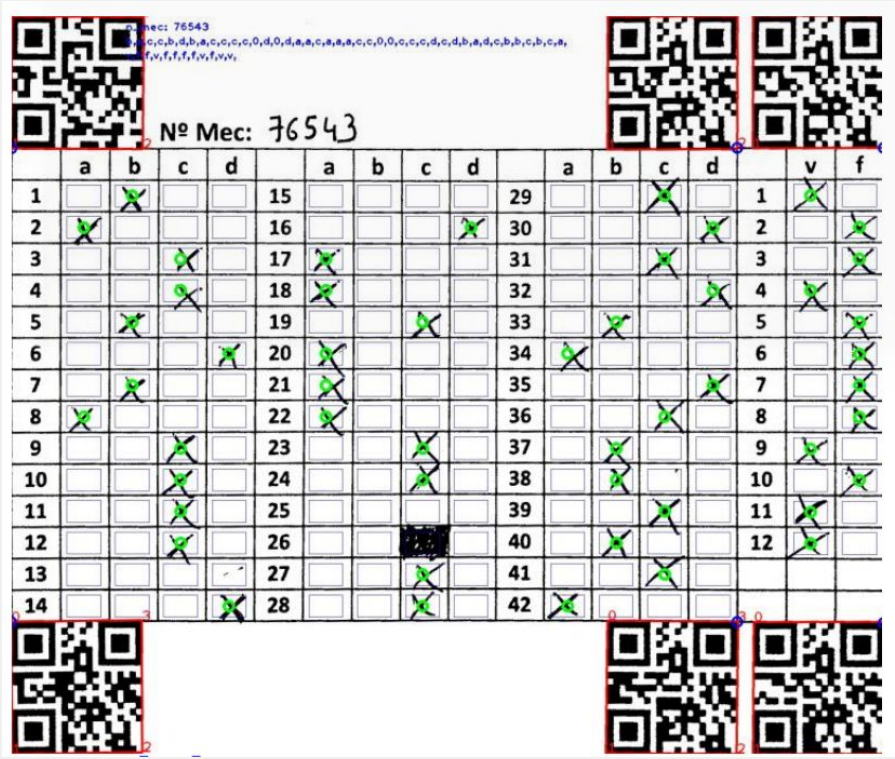
Description of the project

Exams Evaluation using Computer Vision

Read the QR Codes or Aruco to detect the borders of the exam.

Detecting the checkboxes and the crosses inside them.

At the end have the sequence of the student's answers.



02

Project Solutions

Ideas and solutions to solve the project

Project Solutions

Detect Aruco

Using OpenCV, cv2.aruco.detectMarkers() to get the start and end of the exam

Detect boxes

Detect vertical and horizontal lines with morphology operation

Detect an ‘x’ in the checkbox

For each box, detect the color of the pixels

Get the sequence of the answers

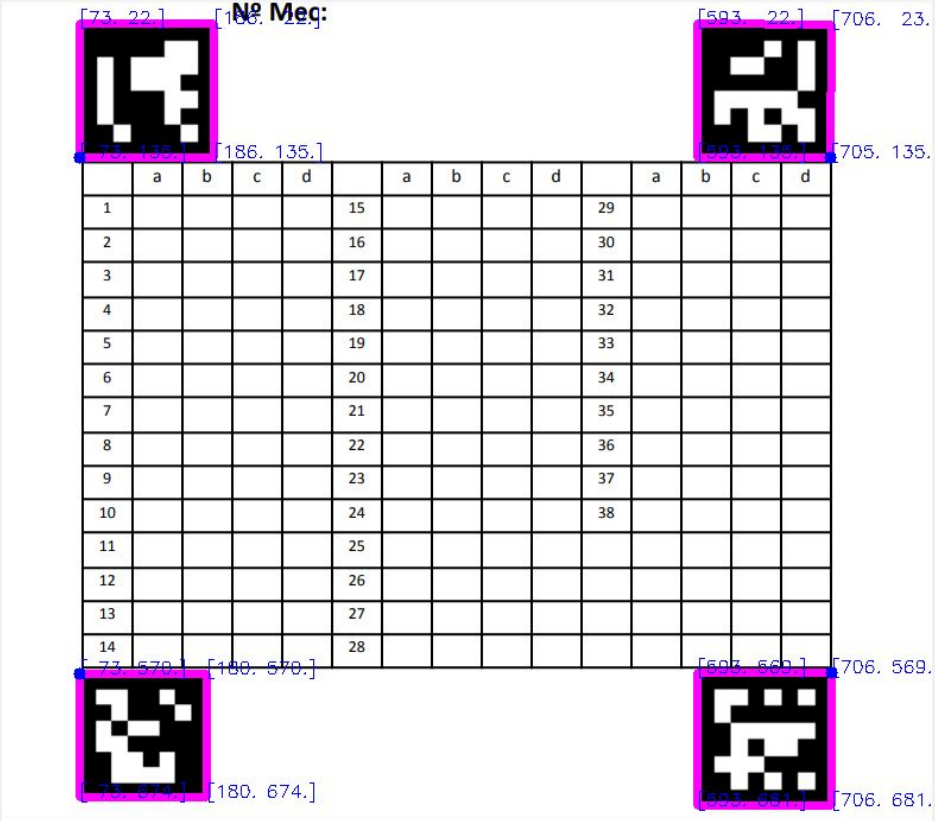
Iterate over each box, and for each cross get the number of the question and answer

03

Developed Work

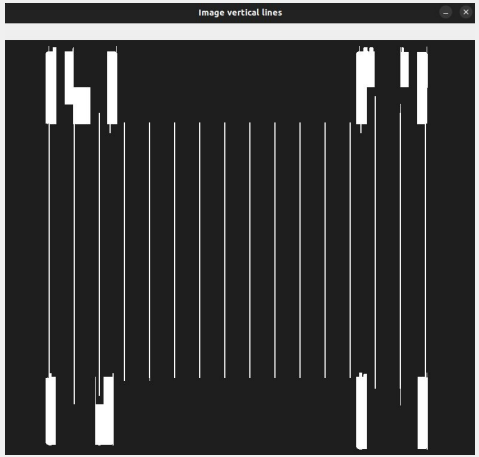
Libraries used and programs implemented

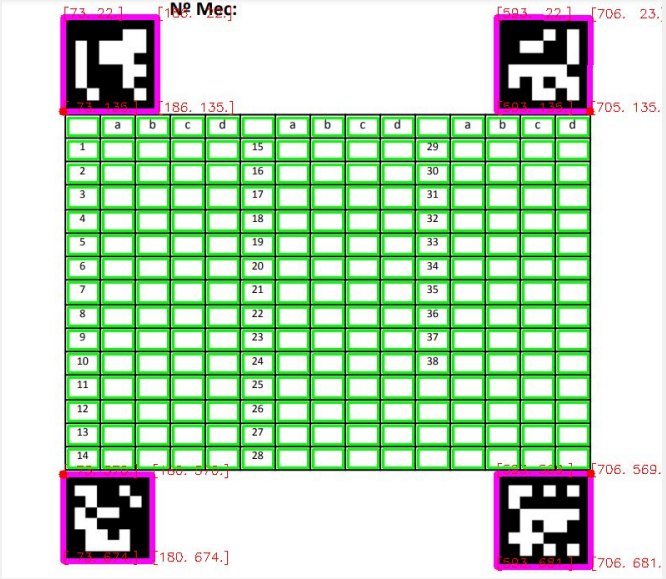
Detect Aruco



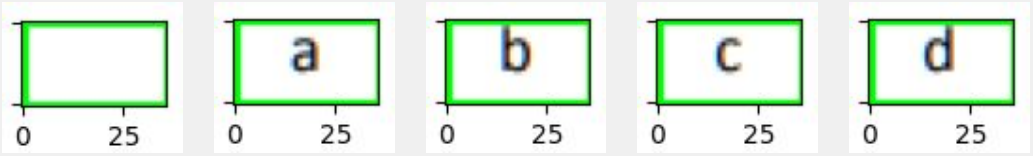
	a	b	c	d		a	b	c	d		a	b	c	d
1					15					29				
2					16					30				
3					17					31				
4					18					32				
5					19					33				
6					20					34				
7					21					35				
8					22					36				
9					23					37				
10					24					38				
11					25									
12					26									
13					27									
14					28									

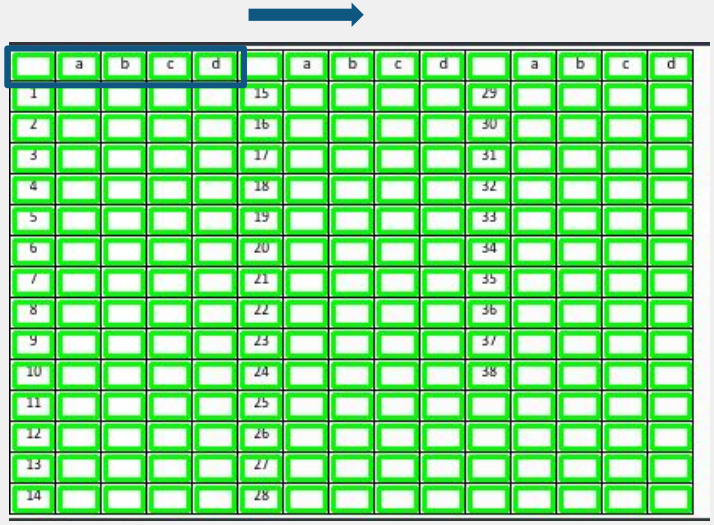
Detect Boxes





Detect an ‘x’ in the checkbox (Image)





[DONE] Detect each rectangle.

[TO DO] To detect the ‘x’, detect the pixels inside the rectangle and see if some of them are different from 255.

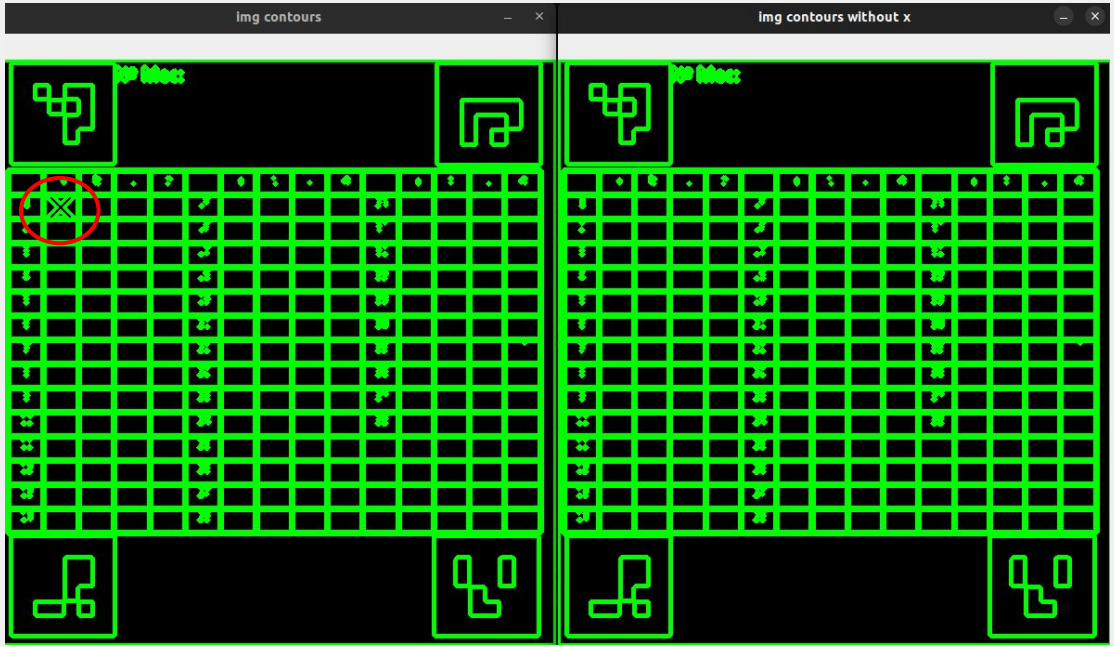
[TO DO] Detect what’s inside each rectangle, if it is the number of the question or the option discard, if it is an ‘x’ get the position.

Detect an ‘x’ in the checkbox (Webcam)

[TO DO] Use contours to check if there is an ‘x’ by counting the contours.

Number of contours with x = 452

Number of contours without x = 449



Get the sequence of the answers

Define the positions of a, b, c and d.

Check where is the position of ‘x’.

Compare the coordinates to know the number of the question and answer.

Get the sequence.

04

Next Steps

Future work

Next Steps

Use Webcam
Try the program using a webcam

Calibration
Calibrate the camera

Get the sequence
Read the ‘x’ and get the answers

T/F
Add True and False options

Detect filled box
Discard the filled boxes

Without Aruco
Remove Aruco Markers

Thanks!