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Abstract

This project consists of a program written in python that runs through a command-line interface(CLI).

The program aims to correct and grade automatically assessment papers using OpenCV and Google's Cloud Vision API.

The program scans the images of the assessment papers and outputs a graded version of the previously scanned image. Every paper has a unique QR Code that contains the data of the student that filled the paper.

After scanning every image, it creates an excel sheet with the data of each student and the grade they got.

1 Introduction

For the multimedia system project, we decided to create an automatic test assessment tool. It analyzes the images and grades automatically assessment papers.

The program can analyze only a custom pre-generated assessment paper (Figure1).

CANDIDATE ANSWER SHEET

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PART 1 :

	A	B	C	D
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PART 2 :

9	
10	
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14	
15	
16	
17	

GRADE :

Figure 1: Pre-generated assessment paper

2 Methods

The program takes as input an image (Figure 2) from the input folders, analyzes it with openCV to find the answers that were given by students and checks the answers with a predefined set of answers given by the professor.

The first thing it does is to find the corner points to divide the image to create specific areas of the original image. Then the program analyzes these areas to correct the answers given by students or to retrieve data.

The first part (the multiple-choice questions) is analyzed using OpenCV. Specifically, a thresholded version of the original image is passed to OpenCV, in this way we can find which are the boxes filled by the student. Subsequently, the program checks if the answer given by the student is the correct one.


The QR code is analyzed using the Pyzbar library.

For the written part of the assessment paper, the program generates an image of the answer for every written answer and puts it in a temporary folder. This image is then

passed to Google Cloud Vision API. The result returned by the API is then compared to the predefined answers given by the professor to find the final grade.

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PART 1 :					PART 2 :	
	A	B	C	D		
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9	TALENTED
2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10	REPORT
3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11	FIRE
4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	12	PARADISE
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13	ROOF
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14	TEA
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15	SAFARI TRUCK
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	16	NEEDLE
					17	ORANGE

GRADE :


Figure 2: Filled assessment paper

3 Results

The program outputs the graded version of the papers (Figure 3 and Figure 4). The program generates also an excel sheet (Figure 5). The images and the report are saved in the output folder.

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PART 1 : **PART 2 :**


	A	B	C	D	
1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9 TALENTED
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 REPORT
3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11 PARADISE
4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	12 ROOF
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13 FIRE
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14 TEA
7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15 SAFARI TRUCK
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	16 NEEDLE
					17 ORANGE

GRADE : 58

Figure 3: Graded version of the paper

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PART 1 : **PART 2 :**

	A	B	C	D	
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9 TALENTED
2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10 REPORT
3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11 FIRE
4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	12 PARADISE
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13 ROOF
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14 TEA
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15 SAFARI TRUCK
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	16 NEEDLE
					17 ORANGE

GRADE : 100

Figure 4: Graded version of the paper

	A	B	C	D	E	F	G
1	Student ID	Name	Surname	Date of Birth	Faculty	Mark	
2	17890	Roberta	Ferrari	6/10/1999	Design and Art	100	
3	12609	Giulia	Bianchi	23/01/1997	Computer Scie	47.06	
4	15346	Mario	Rossi	3/05/1998	Economics and	58.82	
5							
6							
7							
8							
9							
10							

Figure 5: Generated excel sheet

4 How to run the program

First of all install all the dependencies:

```
pip install -r .\requirements.txt
```

To run the program please type:

```
python .\init.py
```