

# OMR MCQ Automated Grading System

# Introduction

- Simplifies and streamlines MCQ grading process
  - Uses image processing techniques and computer vision algorithms
- Automatically detects and extracts MCQ grids from scanned answer sheets
  - Recognizes and marks correct and incorrect answers
- Handles multiple crosses and empty rows
- Saves time, reduces human errors, and increases efficiency

# Features

## 1. Automatic detection and extraction of MCQ grids

	A	B	C	D
1	X			
2		X		
3		X		
4	X			
5			X	
6		X		
7			X	
8	X			
9		X		
10				X

*Original*

	A	B	C	D
1	X			
2		X		
3		X		
4	X			
5			X	
6		X		
7			X	
8	X			
9		X		
10				X

*Detected Grid*

# Features

## 2. Recognition and marking of correct and incorrect answers

	A	B	C	D
1	X			
2		X		
3		X		
4	X			
5			X	
6		X		
7			X	
8	X			
9		X		
10				X

*Original*

	A	B	C	D
1	X			
2		X		
3		X		
4	X			
5			X	
6		X		
7			X	
8	X			
9		X		
10				X

*Checked*

# Features

## 3. Handling multiple crosses and empty rows

	A	B	C	D
1	+			
2			+	
3	+			
4		+		+
5			+	
6		+		
7		+		
8		+		
9			+	
10		+		

*Multiple Crosses*

	A	B	C	D
1	X			
2		X		
3			X	
4				
5		X		
6			X	
7			X	
8				
9		X		
10			X	

*Empty Row*

# Features

## 4. Exporting results as marked images and .csv

Image ID	Total Questions Answered	Correct	Wrong	Empty	Percentage
0	10	7	3	0	70.0
1	10	2	8	0	20.0
2	10	3	7	0	30.0
3	10	4	6	0	40.0
4	8	2	6	2	20.0
5	10	2	8	0	20.0
6	8	2	6	2	20.0
7	10	5	5	0	50.0
8	10	2	8	0	20.0
9	10	3	7	0	30.0
10	...	...	...	...	...

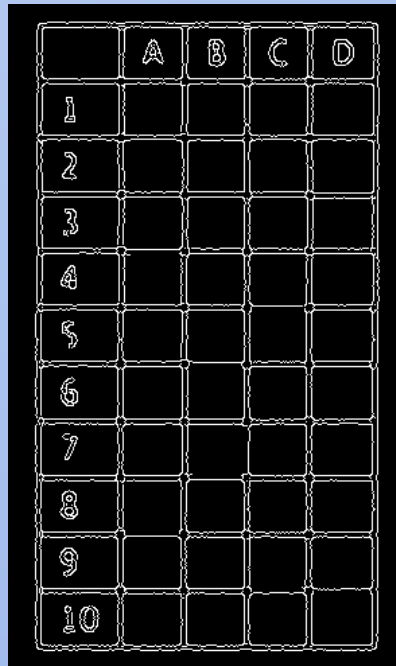
# Workflow

## 1. Image preprocessing

- Grayscale conversion
  - `cv.cvtColor(image, cv.COLOR_BGR2GRAY)`
- Thresholding
  - `cv.threshold(gray_doc, lower_bound, 255, cv.THRESH_BINARY_INV)`
- Contour detection
  - `cv.findContours(threshold, cv.RETR_EXTERNAL, cv.CHAIN_APPROX_SIMPLE)`
  - Filtering horizontal and vertical contours

# Workflow

## 1. Image preprocessing



	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

*Preprocessed*



# Workflow

## 2. Cell extraction from the Grid

- Looping through contours and calculating the bounding rectangle
- Creating the grid using horizontal and vertical contours
- Extracting cells using contour coordinates



*Extracted Cell*

# Workflow

## 3. Answer marking

- Cross detection using threshold and ratio of white to black pixels
- Coloring cells based on answer correctness
  - Green: Correct
  - Red: Incorrect
  - Blue: Multiple crosses

**Demo**

Thank you for your attention!