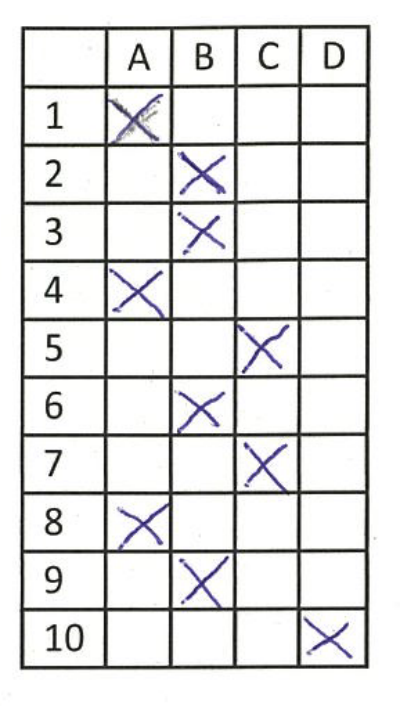
OMR MCQ Automated Grading System

Introduction

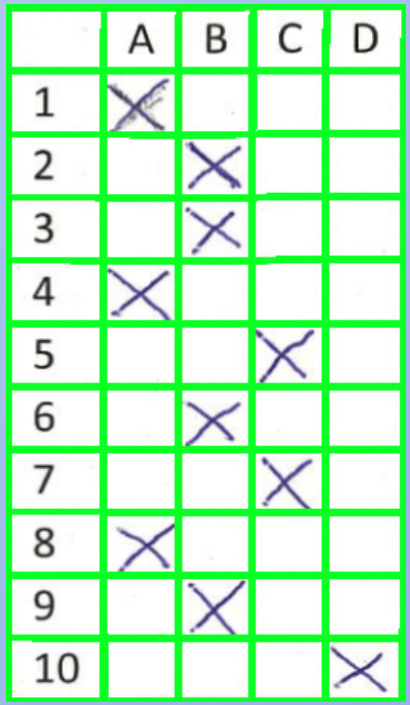
- Simplifies and streamlines MCQ grading process
  - Uses image processing techniques and computer vision algorithms
- Automatically detects and extracts MCQ grids from scanned answer sheets
  - Recognizes and marks correct and incorrect answers
- Handles multiple crosses and empty rows
- Saves time,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

Features

1. Automatic detection and extraction of MCQ grids



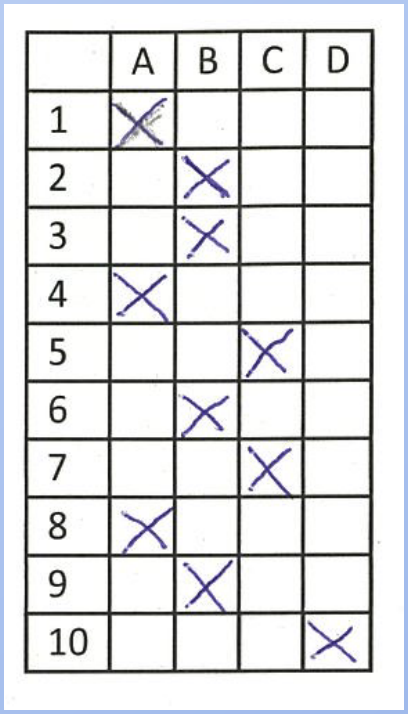
Original



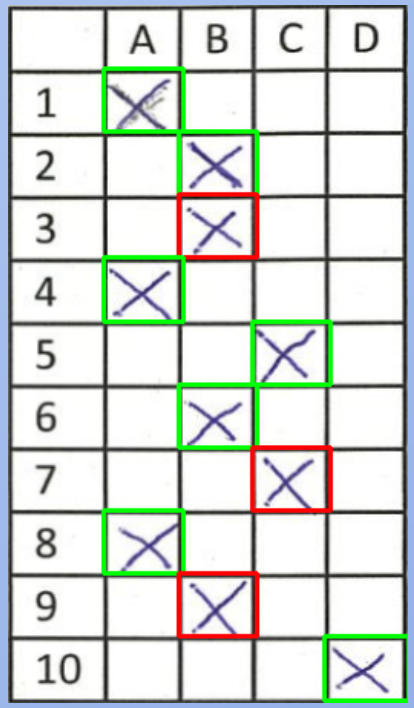
Detected Grid

Features

2. Recognition and marking of correct and incorrect answers



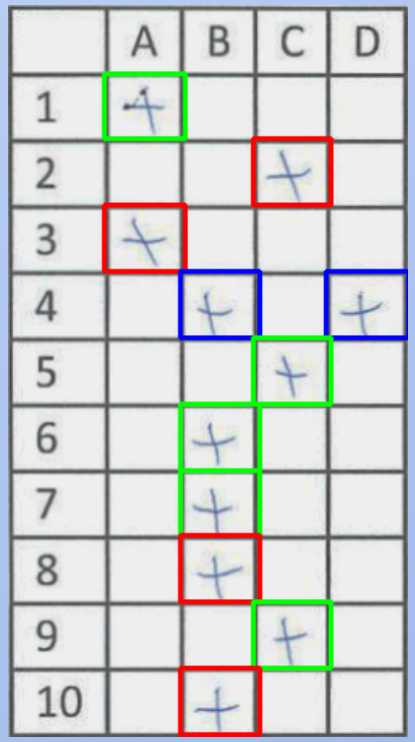
Original



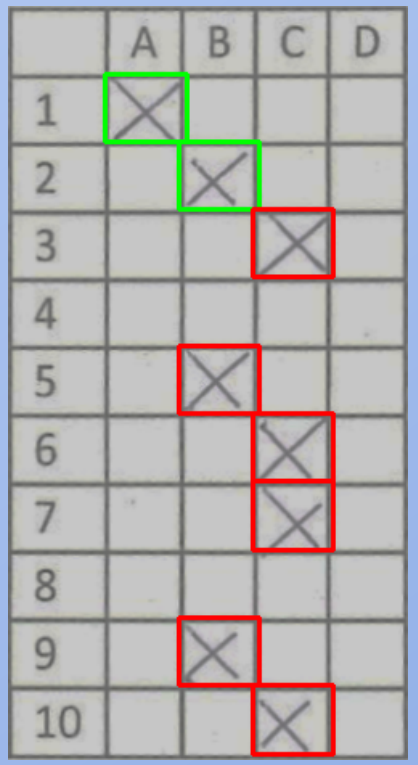
Checked

Features

3. Handling multiple crosses and empty rows



Multiple Crosses



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	...	...	...	...	...

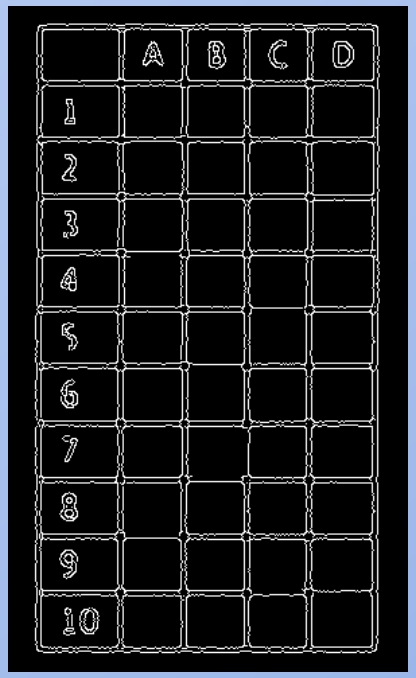
Workflow

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



Preprocessed

Workflow

2. Grid extraction

- 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 contour area and aspect ratio
- Coloring cells based on answer correctness
  - Green: Correct
  - Red: Incorrect
  - Blue: Multiple crosses

Demo

Thank you for your attention!