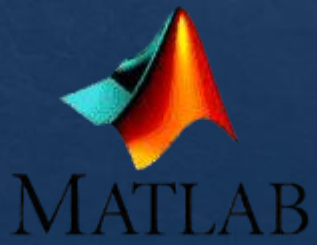
Theme for Mini Projects :

USER FRIENDLY SOFTWARE TOOL FOR ANSWER SCRIPT EVALUATION

TOPIC :

OMR SHEET EVALUATION SOFTWARE USING IMAGE PROCESSING IN MATLAB



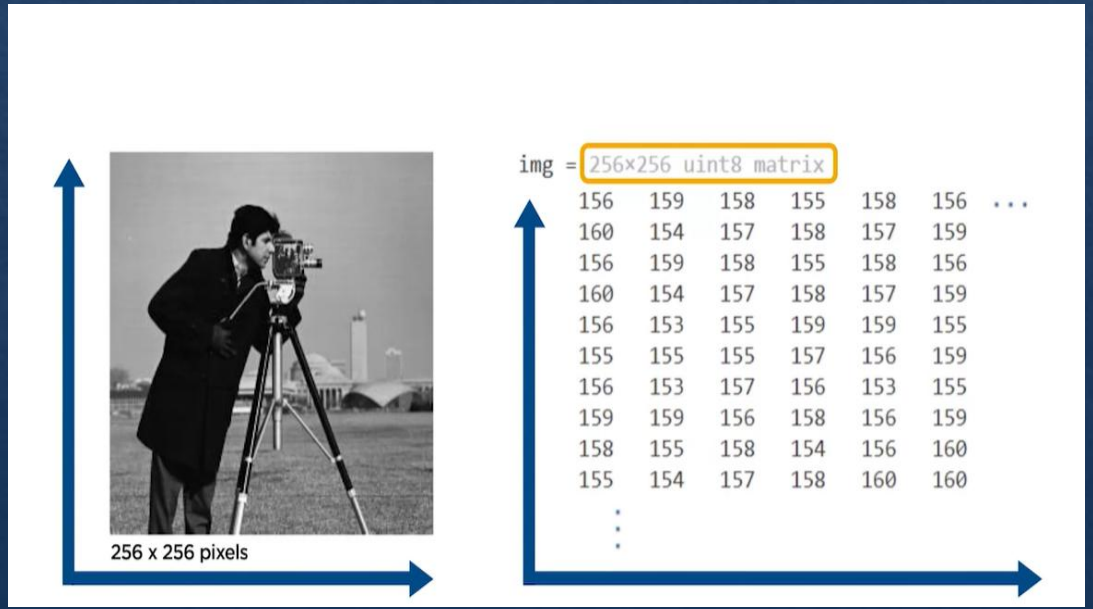
WHAT IS OMR ?

Optical Mark Recognition (OMR) is a technology that uses a scanner to read and interpret data from specially designed forms where users mark their answers by filling in designated areas, like bubbles or checkboxes, allowing for automated data capture and analysis, most commonly used in multiple-choice exams to quickly grade large volumes of answer sheets.

IMAGE?

An image is a visual representation of objects, scenes, or concepts captured or created through photography, drawing, or digital rendering. It is composed of pixels (in digital images) elements that display colors, shapes, and textures.

Images are stored as matrices in terms of numerical data, where each element of the matrix corresponds to a pixel in the image.

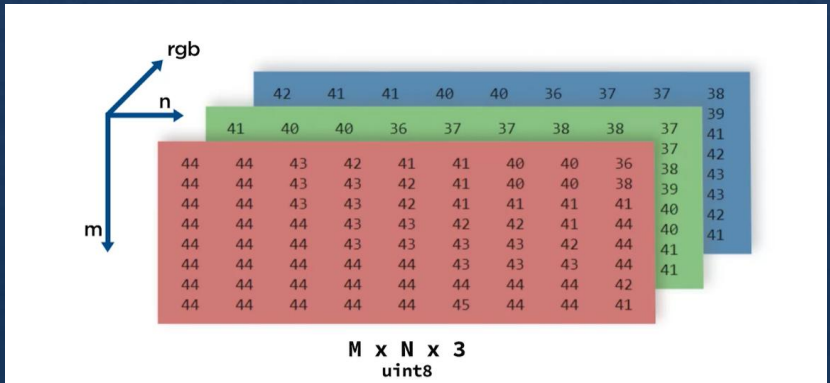


TYPES OF IMAGE:

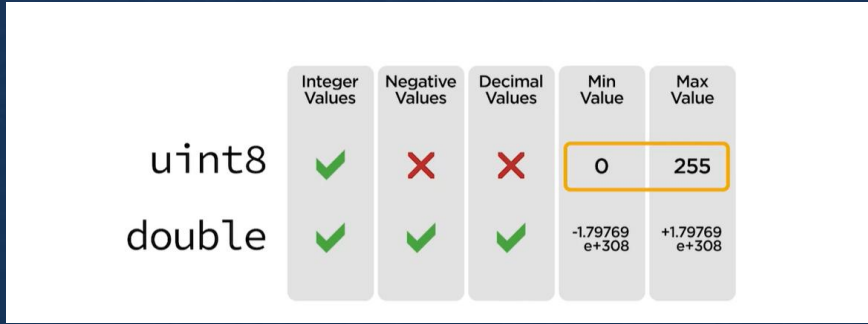
1.Grayscale Images:
Stored as a 2D matrix, where each element represents the intensity of a pixel, typically ranging from 0 (black) to 255 (white) for 8-bit images.

2.RGB Color Images:
Stored as a 3D matrix, with dimensions corresponding to height, width, and three color channels (Red, Green, Blue). Each channel contains intensity values for that specific color.

3.Binary Images:
Represented as a 2D matrix with only 0s and 1s, where 0 represents black and 1 represents white.



DATA TYPE FOR IMAGE:

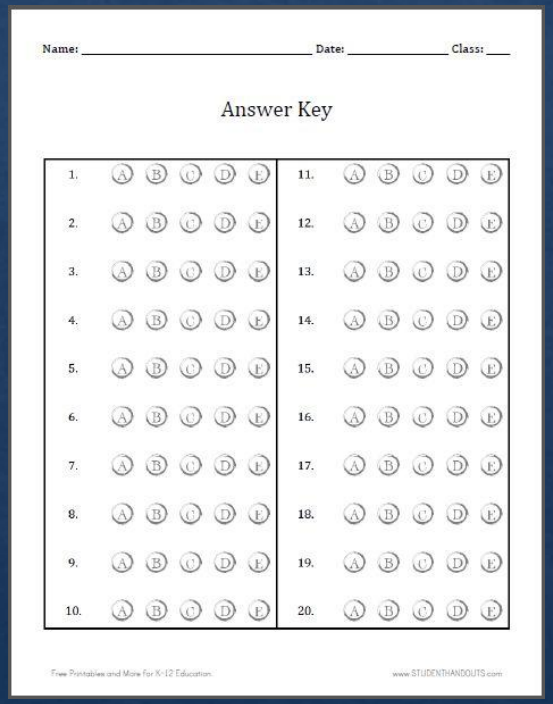


HOW IT WORKS:

OMR Sheet Design

The OMR sheet is designed with specific regions to mark responses (e.g., bubbles, boxes, or circles) and alignment marks for precise detection.

Each response area corresponds to a question or input field.



DESIGN USED IN CURRENT PROJECT

IMAGE PROCESSING TECHNIQUE USED:

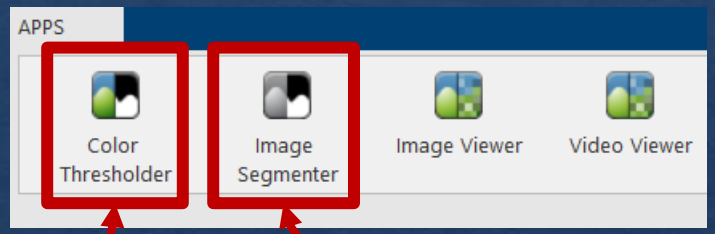
1.Preprocessing:
- •Image reading .
- •Thresholding for mask creation.

2.Feature Extraction:
- •Circle detection to identify markings on the OMR sheet.

3.Segmentation:
- •Isolating regions of interest using segmentation techniques.

4.Analysis and Visualization:
- •Overlaying results on the original image for analysis.

TOOLS:



FOR IMAGE THRESHOLD

FOR IMAGE SEGMENTATION

PROCESS OF DETECTION

(A)

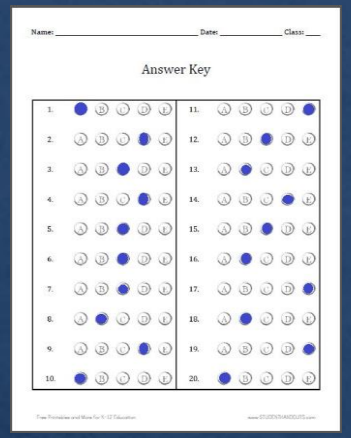


IMAGE with correct answer

(B)

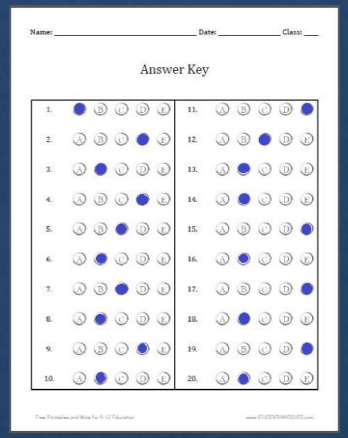
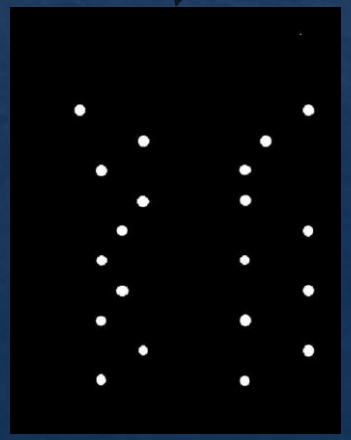
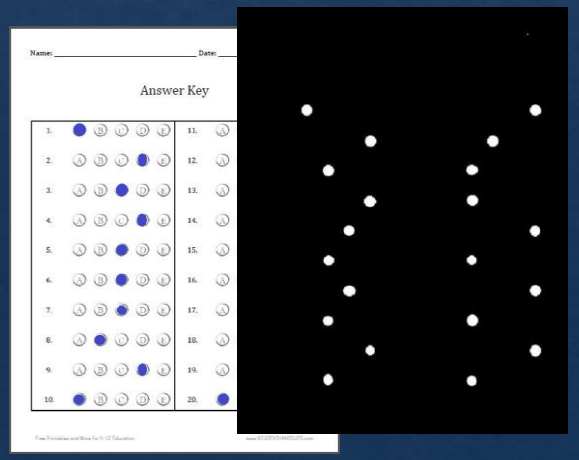


IMAGE of students answer

CREATE MASK OF THE IMAGE (B)



OVERLAY THE MASK ON IMAGE (A)



OUTPUT IMAGE (C)

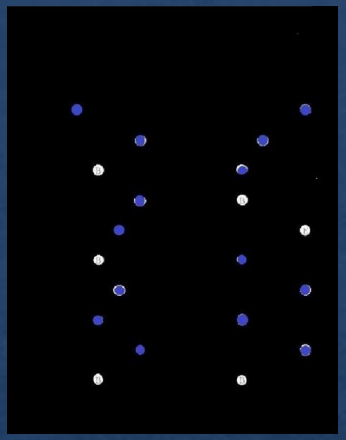
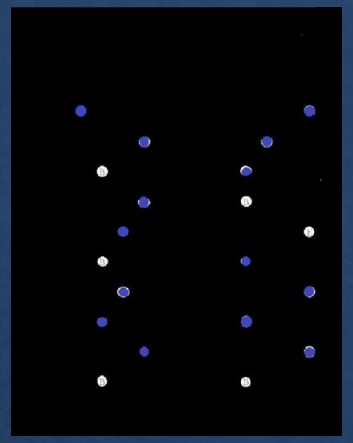


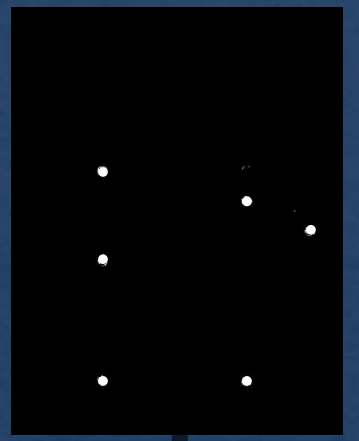
IMAGE (C)



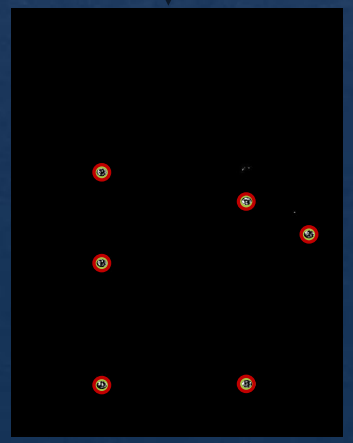
USING SEGMENTATION TECHNIQUE

SEGMENT IMAGE (C) TO GET ONLY UNCORRECT CIRCLES

IMAGE (D)



DETECT CIRCLE IN IMAGE (D)



STORE CENTERS AND RADII

OF ALL DETECTED CIRCLES (wrong answers)

CENTERS		RADII
X	Y	
12	23	12
12	23	12
12	23	12
12	23	23
12	23	12
12	23	12

CENTERS	
X	Y
12	23
12	23
12	23
12	23
12	23
12	23

RADII
12
12
12
23
12
12

USE THIS STORED POSITION OF DETECTED CIRCLE

TO FILL WRONG ANSWERS BUBBLE WITH SOME COLOR

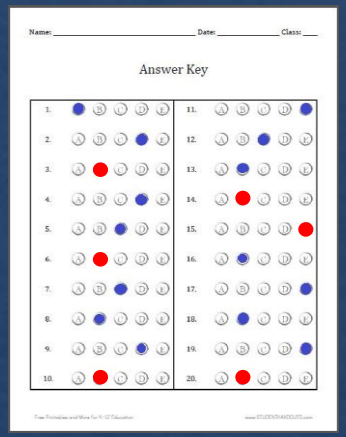
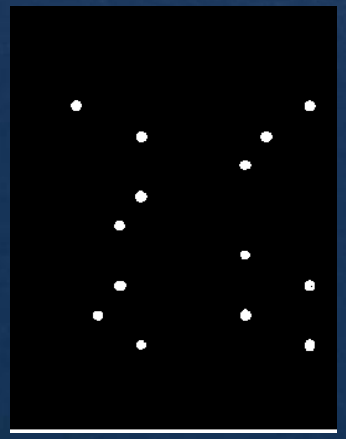


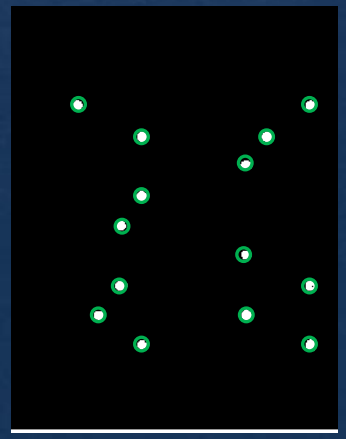
IMAGE (E)

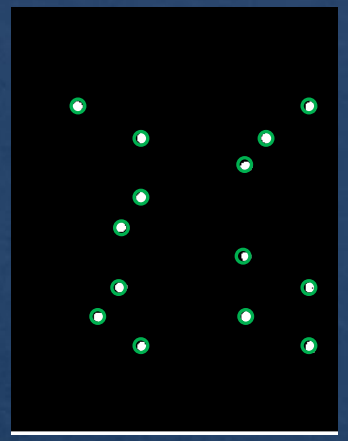
APPLY THRESHOLD ON IMAGE (E) TO EXTRACT ONLY BLUE MARKED ANSWER BUBBLES AND CONVERT IMAGE TO BINARY IMAGE



DETECT CIRCLES

CORRECT ANSWER BUBBLES





STORE CENTERS OF ALL DETECTED CIRCLES (correct answers)

RADII
12
12
12
23
12
12

ARRAY OF RADII OF DETECTED CIRCLES

RESULT

CALCULATE NUMBER OF ROWS IN CENTERS MATRIX

PRINT NUMBER OF CORRECT ANSWER

CONCLUSION:

- Automated the process of reading and scoring OMR sheets, reducing manual effort and human error.
- Significant improvement in speed and reliability compared to manual evaluation methods.
- The project demonstrates the power of automation in streamlining traditional processes and has the potential to be scaled up for widespread usage.