Project Presentation

SOLVING PUZZLE USING MATLAB

A MATLAB Approach to Image Reconstruction

The Team

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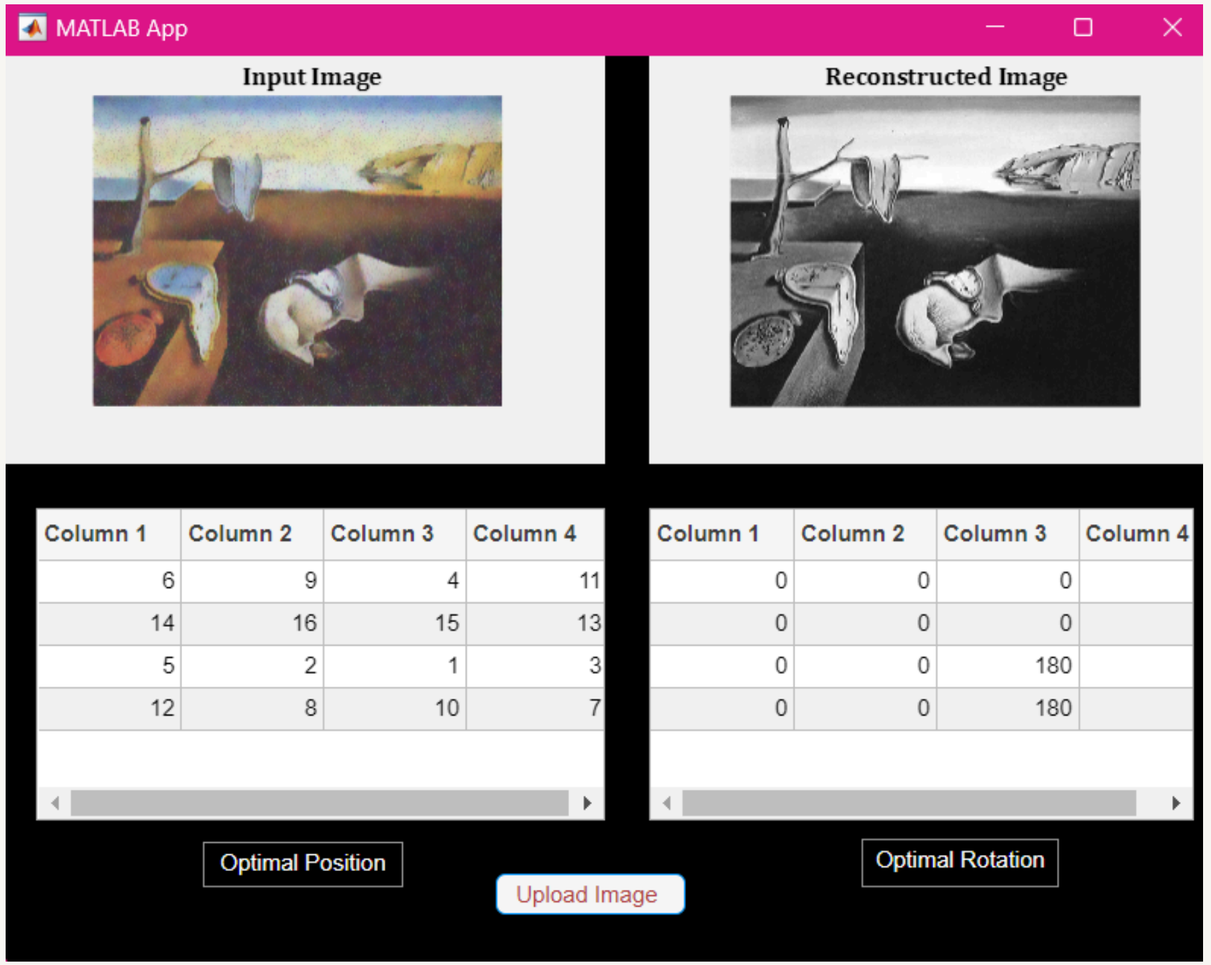
Graphical User Interface



How it Works?

Preprocess the Noisy Image

- The noisy colorful image is extracted to RGB channels
- Noise reduction filter is applied
- Denoised colored image is reconstructed
- The image is converted to grayscale

Split the Image into Blocks

- Image dimension is determined, block size is determined accordingly
- The image is sliced into 4x4 blocks as a cell array

Resize, Rotate and Match

- In a loop, all puzzle pieces are-
  - resized to block size
  - rotated by 0, 90, 180 and 270 degrees
  - each time, matched with all blocks
- The best match is considered the optimal position and rotation

Reconstruction and Display

- Best matched pieces with best matched rotation are used to reconstruct the image
- The reconstructed image is displayed

Step 1: Preprocessing

Why?

- Noise is removed to enhance image quality
- Converted to grayscale for convenience in comparison

How?

- Noise removal: Image is extracted in RGB channels and *imnlmfilt* (denoise filter) is applied
- *rgb2gray* converts image to grayscale

Step 2: Split Image

Why?

- To enable comparison with the 16 puzzle pieces

How?

- According to image size, block size is determined
- Matrix slicing is performed to slice the image

Step 3: Matching Pieces

Why?

- That’s the whole point of the project...

How?

- Each puzzle piece is resized to match block size
- Pieces are rotated in 0, 90, 180 and 270 degrees and each time matched with all blocks with a secret formula to find the best match.

The Secret Formula

```
error = sum(sum(abs(double(resizedPiece) - double(blockResized))));
```

Step 4: Reconstruction

Why?

- To complete the puzzle and verify

How?

- The pieces are rotated according to best match
- Each piece is assigned to the determined best position in a matrix

The Puzzle is Solved!