

Assignment 01 – DA5401

Report

1. Data Acquisition

- **Objective:** We convert a hand-drawn sketch into a dataset of X-Y coordinates.
- **Process:**
Created a sketch on paper or download from browser and captured a square photo.
 - Uploaded the image to [Starrydata](#) .
 - Defined X and Y axes using fiducial points {X1, X2, Y1, Y2} with a range of $X = [1, 100]$, $Y = [1, 100]$.
 - Converted the sketch into a dataset and downloaded the CSV file containing X-Y coordinates.

2. Data Cleansing & Loading

- **Objective:** We clean and transform the dataset into a 2D sparse matrix.
- **Process:**
 - Loaded the CSV file into a pandas Data Frame.
 - Cleaned the data to retain valid X-Y coordinates.
 - Discretized the data to create a 1000x1000 Boolean matrix using NumPy.

3. Transformation

- **Objective:** We perform matrix operations to rotate and flip the image.
- **Process:**
 - Rotated the 2D matrix by 90 degrees using NumPy.
 - Flipped the 2D matrix horizontally using NumPy.
 - Converted the transformed matrices back into X-Y coordinates.

4. Visualization

- **Objective:** We visualize the rotated and flipped images using scatter plots.
- **Process:**
 - Generated scatter plots of the transformed X-Y coordinates using matplotlib.
 - Ensured image clarity by using a 1000x1000 matrix.

5. Conclusion

- Through this assignment, I learned how to convert a real-world sketch into a digital dataset using X-Y coordinates and gained hands-on experience with data cleansing and transformation techniques.
- I analyzed the impact of matrix operations, such as rotation and flipping, on image representation and successfully visualized these transformations using scatter plots.
- This exercise deepened my understanding of the practical applications of matrix algebra in data science, enhancing my ability to manipulate and analyze data programmatically.