DIP assignment 2

Muhammad Saad Khan

October 2023

1 Problem 1: Determining the Current Time Shown by the Clock

1.1 Solution:

- The problem involves identifying the current time displayed on a clock face in an image.
- We preprocessed the image by resizing it, converting it to grayscale, and applying Gaussian blur to reduce noise.
- Edge detection using the Canny algorithm was performed to detect edges and contours in the image.
- We defined a function to calculate the angle between two points to identify clock hands based on their angles.
- After identifying the clock hands, we deduced the time and adjusted the hour hand based on the minute hand.
- Finally, we displayed the current time on the clock face.

1.2 Relevance:

This solution involves various fundamental image processing techniques, including resizing, grayscale conversion, edge detection, contour analysis, and angle calculations. These techniques are fundamental in image processing and computer vision.

2 Problem 2: Matching Input Characters in an Image

2.1 Solution:

- This problem aims to match a character in the upper section of an image with the corresponding character in the lower section.
- We used template matching to find and match the character by comparing similarity scores.
- The result is displayed with a green bounding box around the matched character if a match is found.

2.2 Relevance:

Template matching is a common image processing technique used for object recognition and detection, making it relevant to image processing and computer vision tasks.

3 Problem 3: Extracting Test Scores from an Image

3.1 Solution:

- This problem involves detecting and extracting test scores displayed as bars in an image.
- We used edge detection to find contours in the image.
- We defined criteria, such as the minimum length of a bar, to filter and identify bars representing test scores.
- Test scores were determined based on the length of the bars and displayed on the image.

3.2 Relevance:

Edge detection and contour analysis are fundamental techniques in image processing. Detecting and extracting information from images is a common task in various applications.

4 Problem 4: General Image Processing Script

4.1 Solution:

- We designed a Python script to perform various image processing operations.
- The script can load an image, adjust its brightness, perform logarithmic operations, color and grayscale thresholding, color conversion, drawing shapes, blurring, laplacian sharpening, and unsharp masking.
- The script allows users to specify parameters for these operations through command-line arguments.

4.2 Relevance:

The script covers a range of image processing operations commonly used in image analysis and manipulation. It demonstrates how to create a flexible tool for various image processing tasks.

This report summarizes the proposed solutions to the problems, emphasizing the relevance of the techniques and tools used in the field of image processing and computer vision. Each solution leverages fundamental and widely used methods for image analysis and manipulation.