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Automated MadLibs Completion Using Image Processing Techniques

Abstract

This project automates the classic MadLibs game using image processing. It takes a worksheet image with blank lines, detects those blanks automatically using OpenCV, prompts the user for input words, and overlays those words on the image using Pillow. The result is a fully filled-in MadLibs worksheet image. This project integrates image analysis and interactive input to demonstrate practical multimedia processing.

Objectives

- Automatically detect blank lines (underscores) in the worksheet using Hough Line Transform.

- Prompt the user to enter words (noun, verb, adjective, etc.) for each blank.

- Overlay the user's words cleanly above the detected blanks.

- Generate a final image with all blanks filled.

Assumptions

- The worksheet contains clear horizontal blanks (underscores).

- The image is clean and high-contrast; not heavily decorated or stylized.

- The font file used (Arial Bold) is available on the system.

- The system works on static images, not video or dynamic input.

System Architecture

Block Diagram

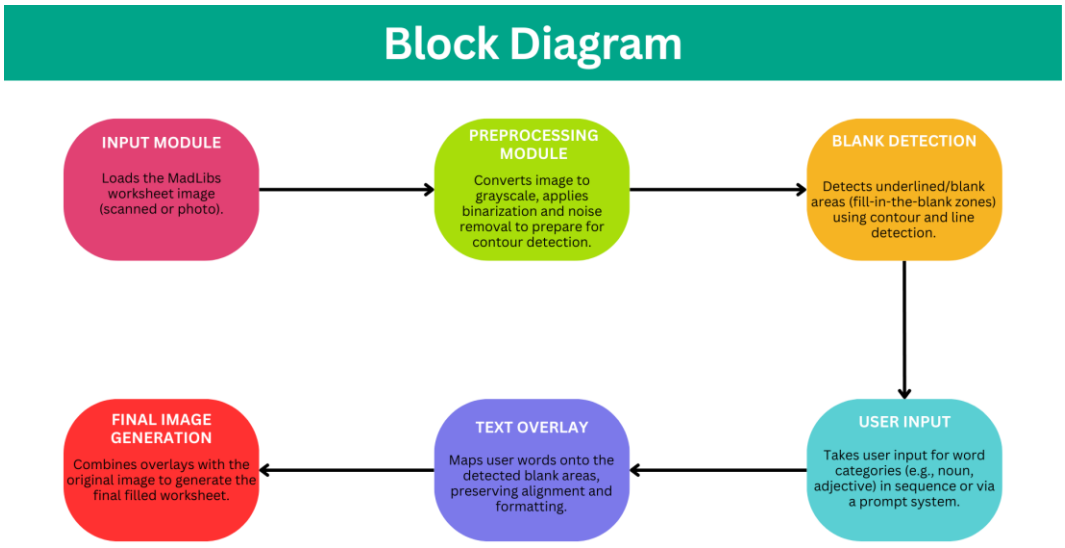


Image Processing Modules

1. Preprocessing (Grayscale + Canny Edge Detection): To prepare the image for line detection, the image is converted to grayscale and edges are detected using Canny.

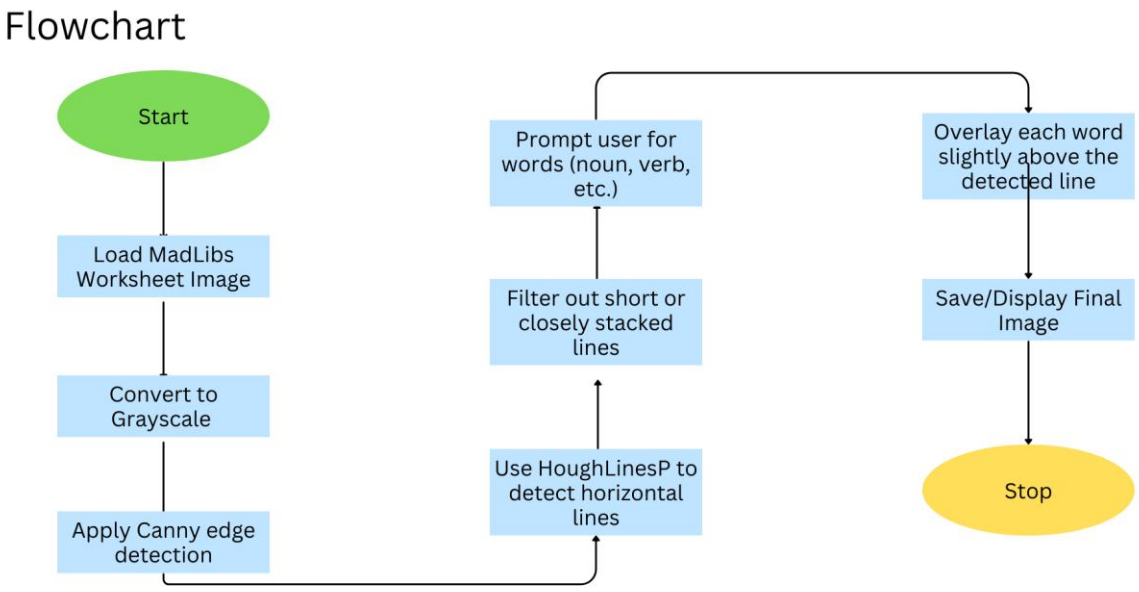
2. Blank Detection (Hough Line Transform): Hough Line Transform is used to detect horizontal lines, which correspond to the blanks.

3. Overlay (Pillow Text Drawing): The user inputs words that are drawn slightly above the blank using Pillow.

Why These Algorithms?

- Hough Transform is efficient for structured line detection, ideal for printed blanks.
- Pillow offers flexible text rendering with font styling and position control.

Flowchart



Contribution of Each Member

Sarin Krishna: Implemented the image preprocessing pipeline using OpenCV. Implemented the grayscale conversion, edge detection (Canny), and horizontal line detection using the Hough Line Transform. Tuned parameters to filter and isolate accurate blank positions on the worksheet.

Sai Niranjan: Handled the text overlay process using the Pillow library. Aligned text above the detected lines, chose appropriate fonts and positioning to prevent overlap with the blanks. Improved font styling by integrating bold type and dynamic text centering to ensure a clean visual output.

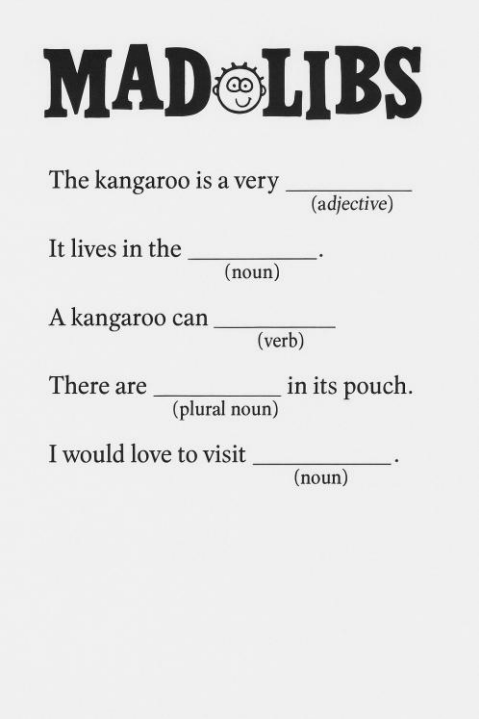
Input to the System

- Input Type: Image file (PNG/JPG)

- Format: Worksheet-style MadLibs template with clear underscores

- Limitations: No support for curved lines or handwritten forms

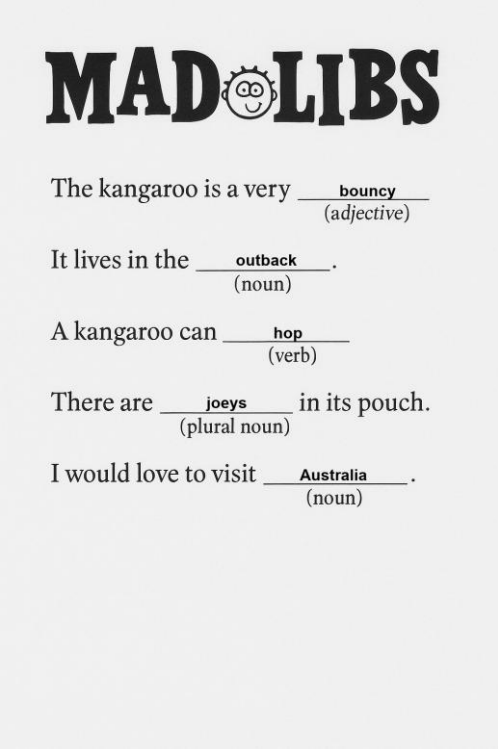
Template Image



Output

- Output Type: Completed MadLibs image (madlib_completed.png)

- Description: All blank lines are filled with user-supplied words, overlaid above the blanks.



Terminal output

```
PS C:\Users\sarin\Desktop\Multimedia project> python madlibs_auto_detect.py
Working directory: C:\Users\sarin\Desktop\Multimedia project
Files: ['madlibs_auto_detect.py', 'madlib_completed.png', 'madlib_template.png', 'Play_MadLibs_Report.pdf']
✅ Detected 5 blanks.
Enter word for blank 1: bouncy
Enter word for blank 2: outback
Enter word for blank 3: hop
Enter word for blank 4: joeys
Enter word for blank 5: Australia
🎉 MadLibs completed! Saved as 'C:\Users\sarin\Desktop\Multimedia project\madlib_completed.png'
```