RAJALAKSHMI
ENGINEERING COLLEGE
An AUTONOMOUS Institution
Affiliated to ANNA UNIVERSITY, Chennai

25 years OF ACADEMIC EXCELLENCE

Department of Computer Science and Engineering

NUMBER PLATE DETECTION

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Problem Statement and Motivation

The increasing number of vehicles on roads demands efficient, automated systems for monitoring and identification. Manual tracking of vehicle number plates is slow, error-prone, and unsuitable for real-time applications. This project addresses the challenge of accurately detecting and reading number plates under varying lighting, angles, and noise conditions using classical image processing and OCR techniques.

Existing System

Current number plate recognition systems rely heavily on deep learning models such as YOLO, SSD, and CNN-based OCR techniques. These systems offer high accuracy but require powerful hardware, large datasets, and significant computational resources. They perform well under ideal conditions but often struggle with non-standard plates, motion blur, and low-light environments.

Objectives

- To develop an automated system that accurately detects and reads vehicle number plates from images.
- To implement Optical Character Recognition (OCR) for extracting alphanumeric characters from number plates.
- To ensure the system performs well in varied lighting and noise conditions.

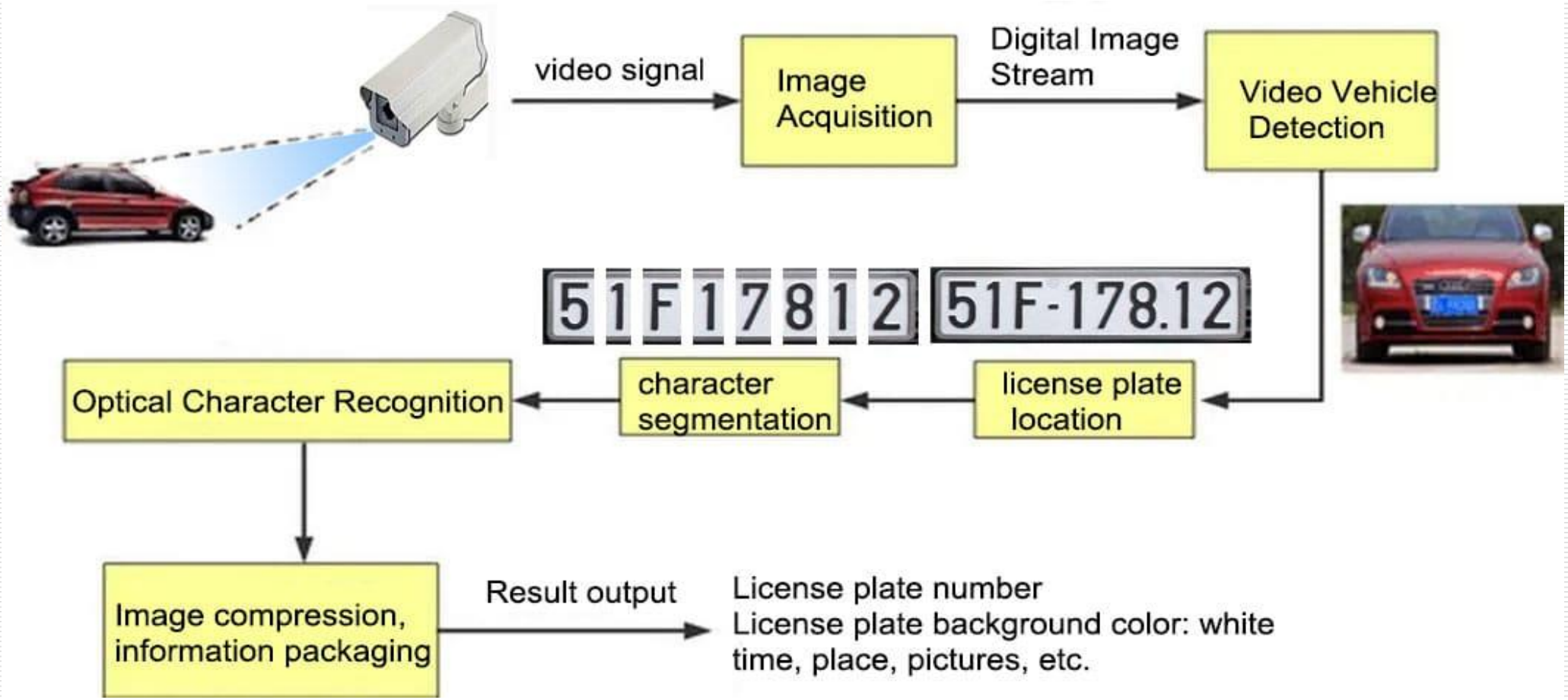
Abstract

- Developed a number plate detection system using OpenCV for image processing and Tesseract for OCR.
- Efficiently detects and extracts text from vehicle number plates under varied image conditions.
- Offers a lightweight and cost-effective solution for real-time traffic and security applications.

Proposed System

- Utilizes classical image processing techniques (grayscale conversion, filtering, edge detection) to locate number plates.
- Applies contour detection to isolate the plate region from vehicle images.
- Uses Tesseract OCR for accurate extraction of alphanumeric characters from the cropped plate area.
- Stores recognized number plate data with timestamps in a CSV log for tracking.

System Architecture



List of Modules

Bilateral Filtering – for noise reduction while preserving edges.

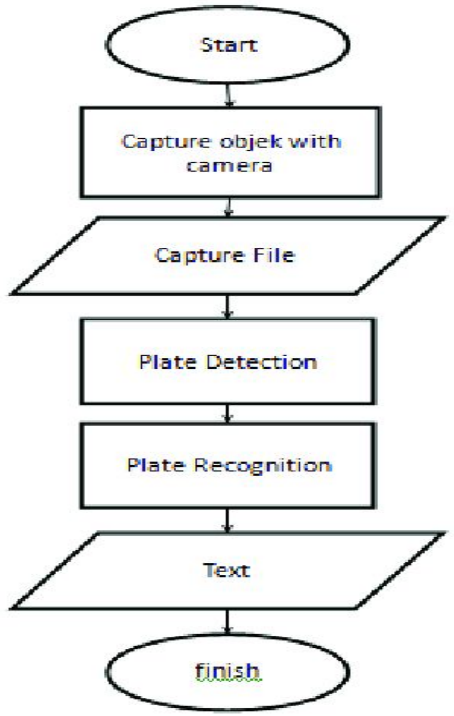
Canny Edge Detection – for detecting edges in the image.

Contour Detection – to find the shape of the number plate.

Tesseract OCR – an open-source Optical Character Recognition engine used to extract text.

Functional Description for each modules with DFD and Activity Diagram

- Image Preprocessing Module
- Contour Detection & Number Plate Extraction Module
- OCR & Data Storage Module



Implementation & Results of Module

Implementation: Converts the image to grayscale using `cv2.cvtColor()`, applies bilateral filter for noise reduction using `cv2.bilateralFilter()`, and performs edge detection using `cv2.Canny()`.

Results: The image is preprocessed for clearer contours and edges, making the number plate more identifiable for the next steps.

Conclusion & Future Work

- The system successfully detects and extracts vehicle number plates using image processing and OCR.
- Preprocessing steps like edge detection and contour extraction enhance accuracy in plate recognition.
- Integrating real-time vehicle number plate detection for live surveillance systems.
- Enhancing OCR accuracy with deep learning-based models for complex plate designs.

References

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Thank You