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Multilayer License plate detection using video and Artificial Neural Network

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ABSTRACT :

Automatic license plate Recognition is one of the applications that hugely benefitted from Convolutional Neural Network (CNN). In this method Video is given as a Input and Frame Grabbing is done from this Video. Using Frame Grabbing we obtain a Vehicle Image and by using CNN we Capture and thus identify the Number Plate. In order to increase the Identification of Vehicle along with number plate Recognition we also include other factors such as Vehicle Type, Vehicle Color and Vehicle Symbol to identify the accurate Vehicle. Good performing models such as YOLOv3 in object detection and recognition tasks could be effectively transferred to the license plate detection . This Model helps Traffic Police to identify accurate vehicles in traffic management. It also helps policemen to identify the stolen vehicles.

Keywords: License Plate Recognition (LPR), Artificial Neural Network (ANN), Video-Based LPR, Deep Learning, Optical Char Character Recognition (OCR), Convolutional Neural Network (CNN), Preprocessing, Feature Extraction, Accuracy and Error Rate, Deep Learning Frameworks.

INTRODUCTION:

Multilayer License Plate Detection using Video and Artificial Neural Networks (ANN) is an advanced computer vision system that leverages deep learning techniques to automatically identify and extract license plate information from video streams. By employing multiple layers of neural networks, this technology enhances the accuracy and robustness of license plate recognition, making it suitable for a wide range of applications, including surveillance, traffic management, and security. In this approach, the video frames go through preprocessing, feature extraction, and post-processing stages to improve recognition accuracy, offering real-time capabilities and potential for various practical use cases.

OBJECTIVES:

The Motive of this project is to develop a efficient Multilayer License Plate Detection System that utilizes video input and leverages the power of Artificial Neural Networks (ANNs). The primary goal is to design and implement an i Multilayer License Plate Detection using Video and Artificial Neural Networks (ANN) is an advanced computer vision system that leverages deep learning techniques to automatically identify and extract license plate information from video streams. By employing multiple layers of neural networks, this technology enhances the accuracy and robustness of license plate recognition, making it suitable for a wide range of applications, including surveillance, traffic management, and security. In this approach, the video frames go through preprocessing, feature extraction, and post-processing stages to improve recognition accuracy, offering real-time capabilities and potential for various practical use cases. Intelligent system capable of accurately detecting license plates from complex and dynamic video scenes. The proposed solution aims to achieve high accuracy, real-time performance, and adaptability to various environmental conditions, contributing to enhanced vehicle surveillance and automated license plate recognition applications.

- -Multilayer Framework: Design a multilayer neural network framework for robust and precise license plate detection.
- -Video Input Processing: Implement preprocessing techniques to enhance video frames, ensuring the network's effectiveness.
- -License Plate Localization: Develop algorithms for accurately localizing license plates within video frames.
- -Character Segmentation: Segment characters from the detected plates to facilitate subsequent recognition.
- -Optical Character Recognition (OCR): Train the network for OCR to convert characters into readable text.
- -Real-Time Operation: Enable the system to perform detection and recognition in real-time for practical applications.

PROBLEM DEFINITION :

Develop a robust Multilayer License Plate Detection System using video streams and Artificial Neural Networks (ANNs) to accurately identify and locate license plates in real-time video footage, enabling applications in surveillance, traffic management and to develop an advanced system for real-

time identification of license plates in video streams.

A. Existing System

Consider using a powerful GPU, such as NVIDIA GeForce or Tesla cards, to accelerate model training and inference.
The existing system is manual-based, needs a lot of effort, and consumes enough time. In the existing system, we can apply for recognition by going through many steps, but the processes are done manually also currently the workforce of law enforcement has the problem of job crisis. The existing system does not deal with mess calculation or complaint registration.

B. Proposed System

Random Access Memory: The RAM you need depends on the size of your datasets and the complexity of your models. At least 16GB of RAM is advisable for medium-sized projects. Camera or Video Feeds: If you are using live video feeds, you'll need suitable cameras and video capture hardware to acquire the video input. Consider cameras The goal of this project is to provide a system for accuracy, offering real-time capabilities and potential recognizing and lowering manual efforts done by the for various practical use cases. enforcement. This approach may enhance the system's ability to handle diverse and complex scenarios. As this In the all the given papers the computational cost and deep learning machine model is faster it would provide the operational cost are correlated to speed, accuracy a stricter law enforcement and would be helpful for and high preprocessing time. Our aim is to strike a keeping law and order intact. The main goal is to balance between computational cost and the operational reduce human effort and human error. Therefore, this cost without lowering accuracy and speed. This is why model focuses on those parts of the scenario and also we attempt to build the network using an ANN. eliminated a lot of unnecessary steps that are currently taken.

LITERATURE REVIEW :

Multilayer License Plate Detection using Video and Artificial Neural Networks (ANN) is an advanced computer vision system that leverages deep learning techniques to automatically identify and extract license plate information from video streams. By employing multiple layers of neural networks, this technology enhances the accuracy and robustness of license plate recognition, making it suitable for a wide range of applications, including surveillance, traffic management, and security. In this approach, the video frames go through preprocessing, feature extraction, and post-Multilayer License Plate Detection using Video and Artificial Neural Networks (ANN) is an advanced computer vision system that leverages deep learning techniques to automatically identify and extract license plate information from video streams. By employing multiple layers of neural networks, this technology enhances the accuracy and robustness of license plate recognition, making it suitable for a wide range of applications, including surveillance, traffic management, and security. In this approach, the video frames go through preprocessing, feature extraction, and postprocessing stages to improve recognition accuracy, offering real-time capabilities and potential for various practical use cases. An advanced computer vision system that leverages deep learning techniques to automatically identify and extract license plate information from video streams. By employing multiple layers of neural networks, this technology enhances the accuracy and robustness of license plate recognition, making it favorable for maximum number of applications, which includes surveillance, traffic management, and security. In this approach, the video frames go through preprocessing, feature extraction, and post-processing stages to improve recognition

Hardware Requirements:

High-Performance GPU (Graphics Processing Unit): ANNs, especially deep learning models like Convolutional Neural Networks (CNNs), benefit significantly from GPUs.

REQUIREMENT ANALYSIS :

with good image quality and low-light performance. Network Connection: A high-speed internet connection is crucial if your system needs to communicate with remote servers or databases for additional information or updates. Real-Time Processing Hardware: For real-time applications (e.g., traffic management or security), you may need dedicated hardware for fast video input, processing, and output. This can include FPGA (Field-Programmable Gate Array) boards or ASIC (ApplicationSpecific Integrated Circuit) hardware for accelerated video processing.

Software Configuration ;

A key element in making a system is the part of compatible software, since the software on the market is experiencing geometric progression. Selected software should be acceptable to the firm and one user as well, and it should be feasible for the system. An extensive explanation of the software requirement specification is provided in this paper. The study of requirement specification is focused especially on the functioning of the system. It enables the analyst or developer to comprehend the system, the task at hand, the desired performance level, and the associated interfaces that need to be set up

Technology :

Implemented:

Frameworks, Keras, OpenCV, python.
2.Language Used: Python, Django.
3.Database: MySQL XAMPP Server Deep Learning
4.User Interface: HTML, AJAX, CSS, J-FRAME
5.Web browser: Internet Explorer 8 (or later), Mozilla, or Chrome
6.Software: MySQL Server and Jupyter notebook and/ or google collab.

OVERVIEW:

Input: Video feed from cameras.
Multilayer Processing: Preprocessing, feature extraction, ANN-based recognition.
ANN Types: May include Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs).
Tasks: Optical Character Recognition (OCR) for license plate characters.
Training Data: A labelled dataset for ANN training. RealTime
Processing: Capable of recognizing license plates in real-time.
Output: Extracted license plate information.
Applications: Surveillance, security, traffic ,management.
Accuracy: High accuracy and low error rate in recognition.

V. SYSTEM DESIGN :

A.Data Flow Diagram:

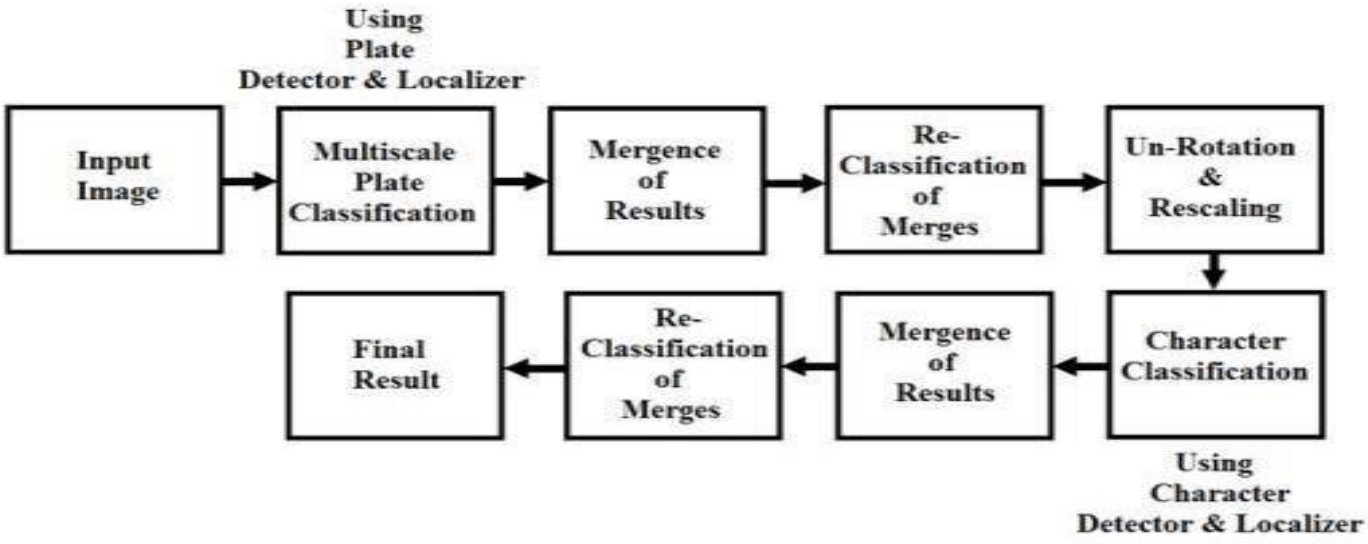

Fig.1. Data Flow Diagram

Data Flow Diagram illustrates how data moves within a system. It uses symbols and arrows to show the flow of data between processes, data stores, and external entities. DFDs help in understanding the data flow and processing in a system, making it easier to design and manage complex systems .

B.Activity Diagram :

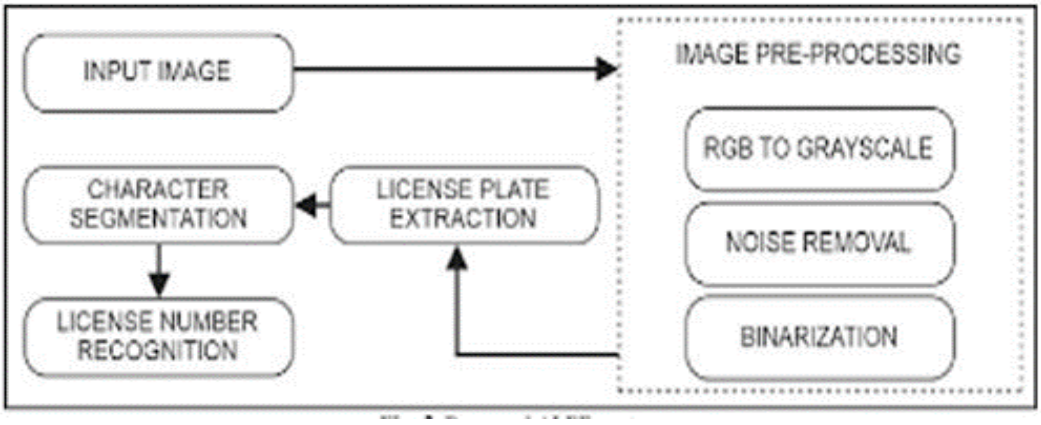

Fig.2.Comprehensive Activity Diagram Overview

This activity diagram provides a high-level overview of the steps involved in the Multilayer License Plate Detection System. It encompasses video input handling, neural network processing, post-processing, and visualization of results. The iterative process continues until all frames from the video source are process.

C.Use case Diagram:

The use case diagram is a graphic depiction of the interactions among the elements of the Multilayer License plate detection using video and Artificial Neural Network. It provides a high-level Summary of the interactions between different actors and the Multilayer License Plate Detection System. It emphasizes user interaction, video input processing, and the system's ability to detect license plates in real-time. This diagram serves as a blueprint for understanding the key functionalities and user interactions within the project.

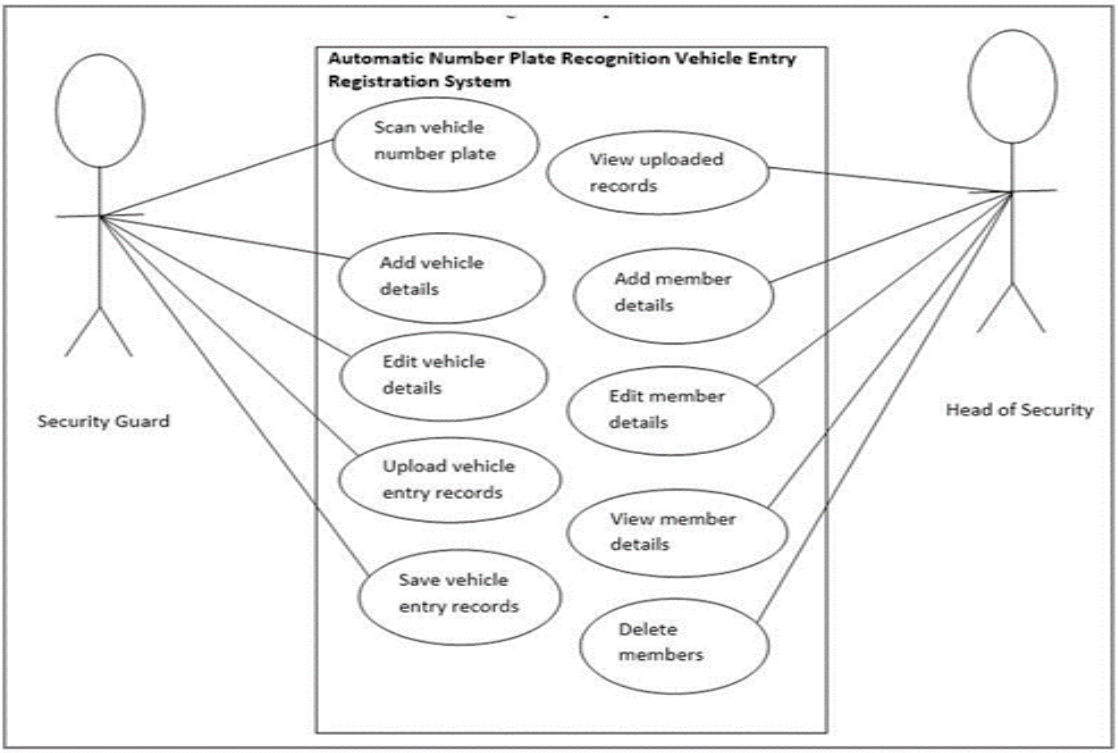

Fig.3.Use Case Diagram

FEASIBILITY STUDY :

A. Technical Feasibility

The system's technology is what determines if the proposed system is technically feasible. It deals with the hardware and software used in the system, if they are of the latest technology and if, after a system is prepared, when new technology develops, users need systems built around it. This system uses the Windows platform, an Jupyter notebook alongside google collab, MySQL for the database and HTML or XML as the user interface. As a result, Multilayer License plate detection using video and Artificial Neural Network is technically feasible.

B. Economic Feasibility

The approach most commonly employed to assess a new system's efficacy is economic analysis. More commonly known as cost-benefit analysis. Python, Keras, OpenCV and MySQL databases are easily available on the internet.

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CONCLUSION:

:In conclusion, multilayer license plate detection using video and Artificial Neural Networks (ANN) represents a powerful and versatile technology for automating license plate recognition in real-world scenarios. By leveraging deep learning techniques, such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), this approach can achieve high accuracy and real-time performance. It finds applications in areas like surveillance, traffic management, and security. However, it is essential to address privacy and legal concerns related to data collection and storage. Overall, this technology has the potential to
significantly enhance efficiency and accuracy in license plate recognition tasks.

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