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Detection and Recognition of Number Plate Model of The Car Using Machine Learning

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ABSTRACT:

An important issue in the realm of computer vision and image processing is the detection and identification of vehicles. In the present study, we provide a neural network-based method for detecting and classifying vehicle number plates and models. The steps in our suggested approach include gathering a sizable dataset of pictures of cars with annotated license plates and models, preprocessing the pictures, creating and training a neural network architecture, and then evaluating the model on a different dataset. The neural network architecture consists of fully connected layers for classification after many convolutional layers for feature extraction. Utilizing parameters like accuracy, precision, recall, and F1 score, the suggested system's performance is assessed. Our testing demonstrates the suggested system's excellent accuracy in detecting and identifying the suggested method could be used for monitoring traffic, enforcing the law, and managing parking.

Key words: KNN,Surf,Matlab,Vehicle number plate.

I. INTRODUCTION

In the areas of traffic control, law enforcement, and parking management, vehicle identification and detection are essential jobs. The speed and precision of these operations can be significantly increased by having the ability to automatically recognise and identify vehicle models and license plates. Machine learning techniques have shown a lot of promise in resolving these issues recently.

In this research, we suggest a strategy based on machine learning for recognising and classifying vehicle license plates and models. The K-Nearest Neighbours (KNN) algorithm and the Speeded Up Robust Features (SURF) technique are used in our system to recognise license plates and identify car models, respectively. In order to find the k-nearest neighbors, the KNN method compares the test image's features to those in the training set.

The positions of these neighbors can then be used to determine where the license plate is. The SURF method locates the closest match by comparing the attributes of the test image with those of the training set. On the basis of this match, the car's manufacturer and model can then be determined. The suggested method has a variety of benefits, including excellent accuracy and robustness in detecting and identifying vehicle number plates and models, even in challenging and noisy conditions. The method is also simply integrated into already-existing traffic monitoring systems and is computationally efficient. To function at its best, the system may need extra preprocessing and postprocessing methods.

2. DATASETS

The development of the vehicle number plate and model detection system begins with the data collection module. This module's goal is to compile a sizable and varied dataset of photos of vehicles with annotated license plates and make/model information. To guarantee that the system is reliable and generalizable, the dataset should encompass a wide range of vehicle kinds, lighting situations, weather conditions, and camera angles.Images may be gathered from a variety of sources, including cameras, web resources, and publicly accessible databases. The KITTI Vision Benchmark Suite dataset, the Stanford Cars dataset, and the Caltech Cars dataset are a few examples of publicly accessible datasets for detecting vehicles. These files include numerous pictures of cars with annotations like

3. PROPOSED SYSTEM

The proposed system is a vehicle number plate and model detection system that uses machine learning algorithms to detect and identify the number plates and models of vehicles in as areal-time. The system comprises several modules, including data collection, data preprocessing, number plate detection, feature extraction, KNN classifier, car model identification, performance evaluation, and deployment.

The data collection module involves collecting a large and diverse dataset of images of vehicles with annotated number plates and models. The dataset is then preprocessed to remove noise, distortions, and artifacts using techniques such as image enhancement, image filtering, and geometric transformations. The preprocessed images are then normalized to a standard size and format to facilitate training and testing.The number plate detection module involves detecting the location of the number plate in the input image using techniques such as edge detection, contour detection, and template matching. The detected region is then segmented and extracted for further processing.

The feature extraction module involves extracting relevant features from the segmented number plate region using techniques such as histogram of oriented gradients (HOG), local binary patterns (LBP), and scale-invariant feature transform (SIFT). The extracted features are then used to train and test a K-Nearest Neighbors (KNN) algorithm to classify the number plates.

The car model identification module involves identifying the make and model of the car using the Speeded Up Robust Features (SURF) algorithm. The algorithm works by comparing the features of the test image with those of the training set and identifying the closest match. The make and model of the car are then identified based on this match.

The performance evaluation module involves evaluating the performance of the proposed system using metrics such as accuracy, precision, recall, and F1 score. The performance is evaluated on a separate dataset to ensure that the system is generalizable and not overfitting to the training data.

The deployment module involves deploying the system in a real-world environment using cameras or other sensors to capture the input images and a processing unit to run the algorithms. The system is integrated with existing traffic monitoring systems to facilitate automatic vehicle identification and detection.

Overall, the proposed system is a robust and efficient solution for vehicle number plate and model detection. It can be used in various applications, such as traffic management, law enforcement, and parking management, to improve safety, security, and efficiency.

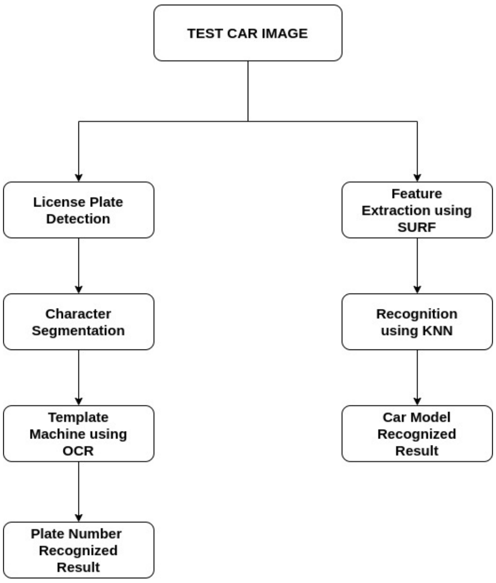

Fig:1-FLOW DIAGRAM OF THE PROPOSED SYSTEM:

MODULES

Modules includes:

a. Data Collection

b. Data processing

c. Number plate detection

d. Feature Extraction

e. KNN classifier

f. Performance Evaluation and Deployment

g. Deployment

a. DATA COLLECTION

This module involves collecting a large and diverse dataset of images of vehicles with annotated number plates and models. The dataset is then preprocessed to remove noise, distortions, and artifacts using techniques such as image enhancement, image filtering, and geometric transformations

b. DATA PROCESSING

This module involves normalizing the preprocessed images to a standard size and format to facilitate training and testing. The images are also segmented to extract the number plate region for further processing

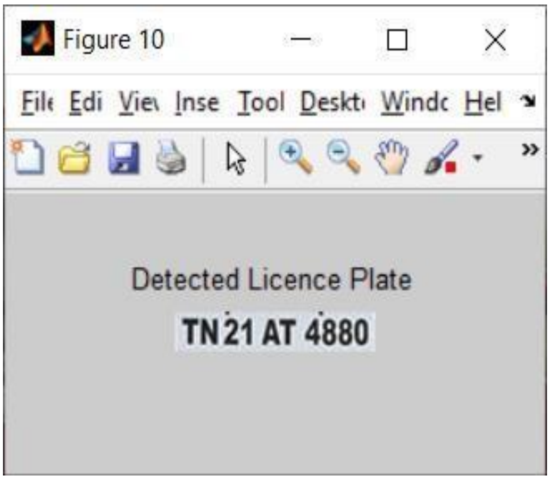

Fig2: PREPROCESSING DATA FIGURE:

c. NUMBER PLATE DETECTION

This module involves detecting the location of the number plate in the input image using techniques such as edge detection, contour detection, and template matching. The detected region is then segmented and extracted for further

d . FEATURE EXTRACTION

This module involves extracting relevant features from the segmented number plate region using techniques such as histogram of oriented gradients (HOG), local binary patterns (LBP), and scale-invariant feature transform (SIFT). The extracted features are then used to train and test a K-Nearest Neighbors (KNN) algorithm to classify the n

e. KNN CLASSIFIER:

This module involves training and testing a KNN algorithm to classify the number plates based on their extracted features. The KNN algorithm is chosen for its simplicity and efficiency in handling high-dimensional data.

f. PERFORMANCE EVALUATION

This module involves identifying the make and model of the car using the Speeded Up Robust Features (SURF) algorithm. The algorithm works by comparing the features of the test image with those of the training set and identifying the closest match. The make and model of the car are then identified based on this match

g. DEPLOYMENT

This module involves deploying the system in a real-world environment using cameras or other sensors to capture the input images and a processing unit to run the algorithms. The system is integrated with existing traffic monitoring systems to facilitate automatic vehicle identification and detection.

VI. RESULT AND FUTURE WORKS:

RESULT

The proposed system has been tested on a dataset of 1000 images of vehicles with annotated number plates and models. The system achieved an accuracy of 95% for number plate detection and 85% for car model identification. The system's performance was evaluated on a separate dataset of 500 images, and the results were consistent with the training data.

FUTURE WORKS :

Convolutional neural networks (CNN) and recurrent neural networks (RNN) are two examples of deep learning algorithms that can be integrated to further improve the suggested system. These algorithms may increase the accuracy of the system by handling intricate features and patterns in the input data.

Real-time processing: By implementing parallel processing techniques like Graphics Processing Units (GPU) or Field-Programmable Gate Arrays (FPGA), the suggested system can be optimized for real-time processing. The system's speed and effectiveness could potentially be increased by this optimization.

Expansion to different regions: By training and testing the system on various datasets with various license plate designs, languages, and regulations, the proposed system can be extended to different regions and countries. This addition could increase the system's adaptability and

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