PR PROJECT REPORT

Team- 21

VEHICLE NUMBER PLATE DETECTION

TEAM MEMBERS	ROLL NO
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Short Introduction:

In the contemporary landscape of technological progress, the Automated Vehicle Number Plate Detection System emerges as a solution poised to enhance efficiency in diverse sectors. This system addresses the challenges associated with existing methods of vehicle number plate detection, aiming to offer a robust and adaptable solution for tasks such as law enforcement, parking management, and traffic monitoring.

Problem Specifications:

Designing a vehicle number plate detection system involves addressing various technical and functional aspects. Here are some problem specifications to consider when developing such a system:

1. Requirement of proper dataset: Selecting an appropriate dataset for training and testing involves considering the characteristics and size of the dataset. Thus, our dataset is gathered from Kaggle named- License Plates.

2. Image Acquisition and Preprocessing: Defining the source of images (e.g., CCTV cameras, smartphone cameras, traffic surveillance cameras). Specifying the resolution and quality of the images. Considering various challenges such as varying lighting conditions, and weather conditions.

3. Feature Extraction: Detailing the techniques and algorithms for extracting relevant features from the number plates. This may include GLCM and Wavelet Transform. • Colour, texture, and shape features. • Font and character size variations.

4. Model Selection:

• Popular choices include SVM.

• Considering the balance between accuracy and computational efficiency based on the application requirements.

5. Model Training:

• Training the selected model using the annotated training dataset.

• Fine-tuning the model to improve performance on specific challenges in our dataset.

6. Testing and validation of Dataset: Keeping a separate testing dataset that the model has never seen during training or validation. This dataset is reserved for the final evaluation of the model's

performance. Cross-validation helps assess model performance across multiple folds of the data, providing a more robust evaluation.

7. Conclusion and Accuracy: Thus, as a final step, we can conclude and evaluate the accuracy of our model on the number plate recognition system.

Features and Classification Models:

Our proposed system incorporates advanced features and classification models to achieve optimal performance. Key features include:

1. GLCM Feature Extraction: Gray-level co-occurrence Matrix (GLCM) is a popular technique in image processing for texture analysis. GLCM is employed as a texture analysis technique. After preprocessing and converting the vehicle images to grayscale, GLCM is calculated to capture spatial relationships between pixel intensities. From the GLCM, statistical properties such as contrast, correlation, energy, homogeneity, and entropy are extracted to form a feature vector representing the texture characteristics of the image. The integration of GLCM provides robustness to lighting variations and image noise, contributing to improved accuracy in real-world scenarios.

2. Wavelet Transform: Haar wavelet is used for the license plate recognition system. A wavelet is a mathematical function used to divide a function or signal into different scale components. A wavelet transform is the representation of a function by wavelets. Wavelet transform decomposes images into different frequency components. Employing techniques like Discrete Wavelet Transform (DWT), the input images are transformed into a multi-resolution representation.

Expected Results:

Upon successful implementation, we anticipate the following outcomes:

• High Accuracy: Achieving a recognition accuracy rate exceeding 95%, ensuring reliable identification of vehicle license plates.

• Real-time Performance: Providing rapid and responsive results, enabling instantaneous processing and decision-making.

• User Satisfaction: Delivering a user-friendly interface that promotes ease of use, reducing the learning curve for operators and administrators.

Team Information and Planed Contributions:

1. *Arjit Avadhanam – S20210020257*: Feature Extraction – Using GLCM and wavelet transform.

2. *Mahan Bhimireddy – S20210020260*: Testing and training of dataset and fine-tuning the model to improve performance on specific challenges in the dataset.

3. *Gowtham N – S20210020277*: Selecting of appropriate dataset, collecting it, and obtaining its analysis and image pre-processing.