A

Major Project On

**License Plate Image Analysis Empowered by Generative Adversarial Neural Networks (GANs)**

(Submitted in partial fulfillment of the requirements for the award of Degree)

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING

By

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Under the Guidance of

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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

**CMR TECHNICAL CAMPUS UGC AUTONOMOUS**

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**2018-2023**

# ABSTRACT

Although the majority of existing License Plate (LP) recognition techniques have significant improvements in accuracy, they are still limited to ideal situations in which training data is correctly annotated with restricted scenarios. Moreover, images or videos are frequently used in monitoring systems that have Low Resolution (LR) quality. In this work, the problem of LP detection in digital images is addressed in the images of a naturalistic environment. Single-stage character segmentation and recognition are combined with adversarial Super-Resolution (SR) approaches to improve the quality of the LP by processing the LR images into High-Resolution (HR) images. This work proposes effective changes to the SRGAN network regarding the number of layers, an activation function, and the appropriate loss regularization using Total Variation (TV) loss. The main paper contribution can be summarized into presenting an end-to-end deep learning framework based on generative adversarial networks (GAN), which is able to generate realistic super-resolution images. Also, proposed adding a TV regularization to the loss function to help the model enhance the resolution of images. The proposed SRGAN can handle tiny 72 × 72 images of LPs. The paper explores how SRGAN performed over different datasets from many aspects, such as visual analysis, PSNR, SSIM, and Optical Character Recognition (OCR). The experiments demonstrate that the suggested SRGAN can generate high-resolution images that improve the accuracy of the license plate recognition stage compared to other systems.

**EXISTING SYSTEM:**

In recent years, the majority of ALPR applications have been based on real-time detection or recognition of license plates. As a result, there are certain drawbacks since they depend on the vehicle’s availability within a short-range. Otherwise, non-real-time applications rely on improving the quality of images, including license plates, to improve the accuracy of object detection at large distances. Although ALPR systems are based on specific methodologies, it is still a particularly challenging task because some of the variables, such as high vehicle speed, and non-uniform vehicle registration plates, will significantly affect the overall rate of recognition and the expansion of the video camera deployment in every intersection under the Intelligent Transportation System will cause the production of an enormous number of video streams. The environmental conditions and the variety of registration plates are the primary concerns of the license plate recognition problem.

# DISADVANTAGES:

* They are still limited to ideal situations in which training data is correctly annotated with restricted scenarios.
* Less accuracy.

# PROPOSED SYSTEM:

# The issue of LP detection in digital photos is addressed in this paper using pictures of a naturalistic setting. By converting the Low-Resolution (LR) photos into High-Resolution (HR) images, single-stage character segmentation and recognition are paired with adversarial Super-Resolution (SR) techniques to enhance the quality of the LP. In terms of the number of layers, an activation function, and the suitable loss regularization utilizing Total Variation (TV) loss, this work suggests useful adjustments to the SRGAN network. An end-to-end deep learning framework based on generative adversarial networks (GAN) that can produce realism in super-resolution images may be summed up as the key contribution of the research. Additionally, it was suggested that a TV regularization be added to the loss function to aid the model in improving image resolution. The system works on real time detection and used for continuous surveillance for safety purposes. Regarding Seat Belt, Helmet and Black films Detection. This project aims at developing a system where we could detect traffic violators, be it 2 wheelers or 4 wheelers and automate the process of detecting their license plate to issue fines. The helmet is checked upon in 2 wheelers to verify if laws are being violated. In case of 4 wheelers, the seat belt is being checked upon to deem a violator and hence the detection of the license plate.

# ADVANTAGES:

* The proposed SRGAN can handle tiny 72 × 72 images of LPs.
* The paper explores how SRGAN performed over different datasets from many aspects, such as visual analysis, PSNR, SSIM, and Optical Character Recognition (OCR).
* The experiments demonstrate that the suggested SRGAN can generate high-resolution images that improve the accuracy of the license plate recognition stage compared to other systems.
* This system helps to improve road safety and transportation efficiency

# HARDWARE REQUIREMENTS:

* System : Pentium IV 2.4 GHz.
* Hard Disk : 40 GB.
* Floppy Drive : 1.44 Mb.
* Monitor : 15 VGA Colour.
* Mouse : Logitech.
* Ram : 512 Mb.

# SOFTWARE REQUIREMENTS:

* **Operating System:** Windows
* **Coding Language**: Python 3.7

# CONCLUSION:

This article introduced techniques to recognize characters in unconstrained LP according to a deep learning technique for a Single Image Super-Resolution (SISR). Experimental findings on AOLP and Car Plate datasets demonstrate the effectiveness of the proposed method, without any scenespecific modification, surpasses current LP recognition algorithms in accuracy and generates a visual improvement in proposed SR outcomes that are better recognition from the original data. Furthermore, including the YOLO detector with the SR network, which is based on GAN, achieves better performance in terms of perceptual quality than using only the detector model (YOLO). We assess the effectiveness of our method by PSNR, SSIM, and using letter recognition with YOLOv5 for reconstructed images from low-resolution images (72 × 72 size).

**NOVELTY**

Automatic License Plate Recognition (ALPR) is a computer vision technology that efficiently identifies a vehicle’s registration plate from images without the necessity for human involvement. Traffic management, law enforcement, toll collection, and vehicle owner identification have become major issues globally. Therefore, the ALPR framework should be developed as one of the potential solutions. Recently, several ALPR systems have been proposed. In recent years, the majority of ALPR applications have been based on real-time detection or recognition of license plates. As a result, there are certain drawbacks since they depend on the vehicle’s availability within a short-range. Otherwise, non-real-time applications rely on improving the quality of images, including license plates, to improve the accuracy of object detection at large distances. Although ALPR systems are based on specific methodologies, it is still a particularly challenging task because some of the variables, such as high vehicle speed, and non-uniform vehicle registration plates, will significantly affect the overall rate of recognition and the expansion of the video camera deployment in every intersection under the Intelligent Transportation System will cause the production of an enormous number of video streams. The environmental conditions and the variety of registration plates are the primary concerns of the license plate recognition problem. Consequently, the environmental side, such as varying illumination, colour, dirt, shadows, or background patterns, significantly influences number plate recognition.

Date: 10-09-2022

To,

The PRC Incharge,

J. Narsimha Rao,

Associate Professor,

CMR Technical Campus

Subject: Requesting Letter of Acceptance for the major project.

Respected sir,

I’m M. Manas Reddy and K. Shashider from IV Year of Computer Science and Engineering Department, I have explained my project idea on “License Plate Image Analysis Empowered by Generative Adversarial Neural Networks (GANs)” My kind request to provide your acceptance for the major project.

Thanking you,

Guide: Yours obediently,

## A. Uday Kiran M. MANAS REDDY (187R1A05L1) K. SHASHIDER (187R1A05P1)