

# Toll Plaza Management System Using Text Detection and Text Recognition Techniques

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**Abstract**-In our day to day life, we pay certain amount of tax through toll plaza to the government. The toll gates are mostly found on national highways and bridges etc., and we pay standing over a queue in the form of cash, although, the mobility of vehicles gets interrupted by this method which takes longer travel time, more consumption of fuel and also pollution level get increased in that region, instead of that the method commonly used by industries and in advanced countries is the Electronic Toll Collection System. Electronic toll collection system is the technology that enables the automatic electronic toll collection from the prepaid account registered on the name of vehicle owner, determining whether the vehicle is registered or not and informs the toll authorities avoiding toll violations. Over last decades, electronic toll collection system has been implemented in real time. Toll Tax Management System is a web based application that can provide all the information related to toll plazas and the passenger checks in either online and pays the amount, then he/she will be provided by a receipt. With this receipt he/she can leave the toll booth without waiting for any verification call. The aim of our project is to design a system, which automatically identifies an approaching vehicles and record vehicles number and time. If the vehicle belongs to the authorized person, it automatically opens the toll gate and a predetermined amount is automatically deducted from its account. This translates to reduced Traffic congestion at toll plazas and helps in lower fuel consumption. This is very important advantage of this system. In this project, we can design system to extract the license numbers from vehicle automatically using image processing techniques. And match with database automatically and generate the bill without any delay. .

## INTRODUCTION

### 1.1 IMAGE PROCESSING

In imaging science, image processing is processing of images using mathematical operations by using any form of signal processing for which the input is an

image, a series of images, or a video, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Images are also processed as three-dimensional signals with the third-dimension being time or the z-axis. Image processing usually refers to digital image processing, but optical and analog image processing also are possible. This article is about general techniques that apply to all of them. The acquisition of images (producing the input image in the first place) is referred to as imaging. Closely related to image processing are computer graphics and computer vision. In computer graphics, images are manually made from physical models of objects, environments, and lighting, instead of being acquired (via imaging devices such as cameras) from natural scenes, as in most animated movies. Computer vision, on the other hand, is often considered high-level image processing out of which a machine/computer/software intends to decipher the physical contents of an image or a sequence of images (e.g., videos or 3D full-body magnetic resonance scans). In modern sciences and technologies, images also gain much broader scopes due to the ever growing importance of scientific visualization (of often large-scale complex scientific/experimental data). Examples include microarray data in genetic research, or real-time multi-asset portfolio trading in finance. Image analysis is the extraction of meaningful information from images; mainly from digital images by means of digital image processing techniques. Image analysis tasks can be as simple as reading bar coded tags or as sophisticated as identifying a person from their face. Computers are indispensable for the analysis of large amounts of data, for tasks that require complex computation, or for the extraction of quantitative information. On the other hand, the human visual cortex is an excellent image analysis apparatus, especially for extracting higher-level information, and for many applications — including medicine,

security, and remote sensing — human analysts still cannot be replaced by computers. For this reason, many important image analysis tools such as edge detectors and neural networks are inspired by human visual perception models. Image editing encompasses the processes of altering images, whether they are digital photographs, traditional photochemical photographs, or illustrations. Traditional analog image editing is known as photo retouching, using tools such as an airbrush to modify photographs, or editing illustrations with any traditional art medium. Graphic software programs, which can be broadly grouped into vector graphics editors, raster graphics editors, and 3D modelers, are the primary tools with which a user may manipulate, enhance, and transform images. Many image editing programs are also used to render or create computer art from scratch. Raster images are stored in a computer in the form of a grid of picture elements, or pixels. These pixels contain the image's color and brightness information. Image editors can change the pixels to enhance the image in many ways. The pixels can be changed as a group, or individually, by the sophisticated algorithms within the image editors. This article mostly refers to bitmap graphics editors, which are often used to alter photographs and other raster graphics. picture. Clipping paths may be used to add silhouetted images to vector graphics or page layout files that retain vector data. Alpha compositing, allows for soft translucent edges when selecting images. There are a number of ways to silhouette an image with soft edges, including selecting the image or its background by sampling similar colors, selecting the edges by raster tracing, or converting a clipping path to a raster selection. Once the image is selected, it may be copied and pasted into another section of the same file, or into a separate file. The selection may also be saved in what is known as an alpha channel. A popular way to create a composite image is to use transparent layers. The background image is used as the bottom layer, and the image with parts to be added are placed in a layer above that. Using an image layer mask, all but the parts to be merged are hidden from the layer, giving the impression that these parts have been added to the background layer. Performing a merge in this manner preserves all of the pixel data on both layers to more easily enable future changes in the new merged image.

## **1.2 STEPS OF IMAGE PROCESSING:**

### **Image Enhancement**

Image enhancement is among the simplest and most appealing areas of digital image processing. Basically, the idea behind enhancement techniques is

to bring out detail that is obscured, or simply to highlight certain features of interest in an image. Such as, changing brightness & contrast etc.

### **Image Restoration**

Image restoration is an area that also deals with improving the appearance of an image. However, unlike enhancement, which is subjective, image restoration is objective, in the sense that restoration techniques tend to be based on mathematical or probabilistic models of image degradation.

### **Color Image Processing**

Color image processing is an area that has been gaining its importance because of the significant increase in the use of digital images over the Internet. This may include color modeling and processing in a digital domain etc.

### **Compression**

Compression deals with techniques for reducing the storage required to save an image or the bandwidth to transmit it. Particularly in the uses of internet it is very much necessary to compress data.

### **Morphological Processing**

Morphological processing deals with tools for extracting image components that are useful in the representation and description of shape.

## **1.3 SEGMENTATION**

In computer vision, image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super-pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics. The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (see edge detection). Each of the pixels in a region is similar with respect to some characteristic or computed property, such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristic(s). When applied to a stack of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like marching cubes. Segmentation is the

most important part in image processing. Fence off an entire image into several parts which is something more meaningful and easier for further process. These several parts that are rejoined will cover the entire image. Segmentation may also depend on various features that are contained in the image. It may be either color or texture. Before denoising an image, it is segmented to recover the original image. The main motto of segmentation is to reduce the information for easy analysis. Segmentation is also useful in Image Analysis and Image Compression.

Segmentation can be classified as follows:

- Region Based
- Edge Based
- Threshold

**a. Region Based:**

In this technique pixels that are related to an object are grouped for segmentation. The thresholding technique is bound with region based segmentation.

**b) Edge Based**

Segmentation can also be done by using edge detection techniques. In this technique the boundary is identified to segment. Edges are detected to identify the discontinuities in the image.

**c. Threshold:**

Thresholding is the easiest way of segmentation. It is done through that threshold values which are obtained from the histogram of those edges of the original image.

**ADVANTAGES:**

- Automatic collection of toll tax
- Free flow of traffic
- Time saving
- Record maintenance
- Problems with pursuing toll evaders can be avoided

**EXISTING SYSTEM**

- Nowadays, increasing traffic volume causes congestions commonly around the toll gate of highway. Therefore, the new technique is urgently required to reform the problem of congestions. Automated toll collection system is one of the methods to solve the above conditions. The automated system is composed of several subsystems. The RFID technology, computer database, power supply, microcontroller, motor and inferred

device are included. Automated system can bring the several sectors for toll gates as saving time and reducing the human workers. Develop the prototype model, which reproduces the operation states of various toll gate systems: passing time and waiting time. There are two ways of collecting toll tax being in practice at present. First is the traditional manual method where one person collects the money and issues a receipt. The other one is Smart Card system where the person needs to show the smart card to the system installed at the toll tax depot to open the barrier. The existing system consists of a microcontroller, RFID reader, RFID Tag and bill printer. The reader retrieves the information about the ID number and identifies the vehicle. Then for the tax to be collected the bill is printed at the time of exit. The motor here is used to open and close the gate automatically. The existing system includes automated system using RFID technology can be classified into two modules. They are vehicle module and base module. The vehicle module consists of passive RFID tag. The RFID reader, host computer system and gate control system are composed as the base module

**DISADVANTAGES**

- In the existing system, though there is an RFID reader the tax collection is manual and not automated.
- There are no security features such as identifying a stolen vehicle etc.
- It leads to queuing up of following vehicles

**2.3 PROPOSED SYSTEM**

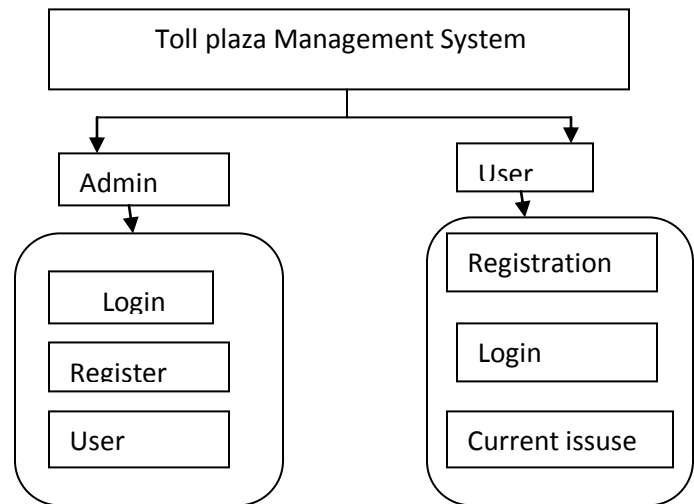
Each vehicle will be provided by license plate number which containing a unique ID. This license plate is captured by an image. When the vehicle will reach at the toll booth web camera capture the license plate with number. This image is passed to the system. Now, with the help of PC interface unit the data collected is passed to PC through serial port. In the proposed system we can convert license plate number into text format. ANPR can be used to store the images captured by the cameras as well as the text from the license plate, with some configurable to store a photograph of the driver. Systems commonly use interface to allow the camera to take the picture at any time of the day. A powerful flash is included in at least one version of

the intersection- monitoring cameras, serving both to illuminate the picture and to make the offender aware of his or her mistake. License plate recognition technology tends to be region-specific, owing to plate variation from place to place. Software developed will show all the details about the vehicle on the screen. Details like date time and id will be stored in the access database. The system will check whether the user is valid or not, if valid the system generates the bill in online transaction. The vehicle details regarding the deducted amount and the main account balance are intimated to the user's mobile through GSM technology. License Plate Recognition is an image-processing technology that is used to identify vehicles by their license plates. A license plate reviewer mechanism works by extracting the characters from an image. This image processing technology is used for various applications such as toll plaza, parking lots, border control, and traffic law enforcement. As a result to the problem of observing the enormous number of vehicles for law enforcement and security, this work concentrates to design a license plate recognition system to make the work more practical. Our system is designed to detect and identify license plates without constant human intervention. This will provide benefit of saving the cost and time to the organization.

### 2.3.1 ADVANTAGES

- Automatic collection of toll tax
- Free flow of traffic
- Time saving
- Record maintenance
- Problems with pursuing toll evaders can be avoided

### ARCHITECTURE DIAGRAM



### CONCLUSION

Toll Tax Management System is a web based application that can provide all the information related to toll plazas and the passenger checks in either online and pays the amount, then he/she will be provided by a receipt. It can be widely implemented on toll tax places .this system make saves time of driver and also of person on service for taking toll tax .This system automate the whole system for toll tax. The proposed system uses less cost to implement and require fewer changes to the current system. It provides the tracking system for theft vehicle which is secured and highly reliable. E-toll system can help to achieve proper traffic management, appropriate toll collection and improves security. Thus a system used as an Automated Toll collection booth, based on image processing saves the time at toll booth, minimizes the fuel consumption during the ideal condition of the vehicle. Also it serves in providing the tracking system for theft vehicle which is secured and highly reliable can be obtained. It can be used to remove all drawbacks with the current system such as time and human effort and it also doesn't require any tag only required best quality camera and fixed font number plate on each vehicle.

### FUTURE WORK:

In this project we can implement more features advance technique in future enhancement. It can be widely implemented on toll tax places. This system

make saves time of driver and also of person on service for taking toll tax.

**REFERENCES:**

- [1] R. B. Girshick, J. Donahue, T. Darrell, and J. Malik, “Rich feature hierarchies for accurate object detection and semantic segmentation,” in Proc. Int. Conf. Comput. Vision Pattern Recog., 2014, pp. 580–587.
- [2] A. Krizhevsky, I. Sutskever, and G. E. Hinton, “Imagenet classification with deep convolutional neural networks,” in Proc. Advances in Neural Info. Processing Sys., 2012, pp. 1106–1114.
- [3] A. Bissacco, M. Cummins, Y. Netzer, and H. Neven, “Photoocr: Reading text in uncontrolled conditions,” in Proc. Int. Conf. Comput. Vision, 2013, pp. 785–792.
- [4] M. Jaderberg, K. Simonyan, A. Vedaldi, and A. Zisserman, “Reading text in the wild with convolutional neural networks,” Int. J. Comput. Vision (Accepted), 2015.
- [5] A. Graves, M. Liwicki, S. Fernandez, R. Bertolami, H. Bunke, and J. Schmidhuber, “A novel connectionist system for unconstrained handwriting recognition,” IEEE Trans. Pattern Anal. Mach. Intell., vol. 31, no. 5, pp. 855–868, 2009.
- [6] Everingham, Mark and Eslami, SM Ali and Van Gool, Luc and Williams, Christopher KI and Winn, John and Zisserman, Andrew, The pascal visual object classes challenge: A retrospective. in IJCV 2014
- [7] Mishra, Anand and Alahari, Karteek and Jawahar, CV, Image Retrieval using Textual Cues, in ICCV 2013
- [8] Gavves, E. and Fernando, B. and Snoek, C. GM and WM Smeulders, A. and Tuytelaars, T., Local alignments for fine-grained categorization, in IJCV 2015
- [9] Zhang, Ning and Donahue, Jeff and Girshick, Ross and Darrell, Trevor, Part-based R-CNNs for fine-grained category detection, in ECCV 2014
- [10] Galleguillos, Carolina and Belongie, Serge, Context based object categorization: A critical survey, in CVIU 2010