Chapter 1

INTRODUCTION

The term Machine Learning was coined by Arthur Samuel in 1959, Arthur Samuel, a pioneer in the field of artificial intelligence and computer gaming, coined the term “Machine Learning”.

Machine Learning (ML) can be explained as automating and improving the learning process of computers based on their experiences without being actually programmed i.e. without any human assistance. So the concept of Image Processing is explained. It is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image.

There are two types of methods used for image processing namely, analogue and digital image processing. The major traffic monitoring areas that use digital image processing including automatic number plate recognition system(ANPR).

Detection and recognition of Dirty Vehicle plate number appear in vast variety of applications, including travel time estimation, traffic violations detection and surveillance applications.

High camera installation point causes some difficulties against the correct detection of vehicles plates. Vehicles with dirty plates make the situation even more complicated. On the other hand, number plate is the only trustworthy identity of a vehicle in Intelligent Transportation Systems (ITS) and correct vehicle identification depends highly on the accuracy of automatic number plate recognition (ANPR) systems.

An ANPR system consists of three different modules:
a).Monochrome/Color cameras, b) IR projector, and c) the processing board. In addition to compatibility of interfaces, each section must be chosen properly for a specific application. In this paper, a detailed exploration on the important parameters of an ANPR module has been done.

Most of the key parameters are discussed and a comparison between final cost and the desired accuracy is shown. A monochrome camera is usually used with an IR projector for plate detection and recognition. An IR projector increases the contrast between plates characters and plates backgrounds.

License Plate Recognition (LPR) process is divided into three main parts: Plate Detection, Character Segmentation, and Character Recognition. Each of these parts plays an important role in the final accuracy. Here proposed and utilized a revised version of RANSAC is used.

The RANSAC not only identifies the vehicle plates with a high detection rate but also drastically reduces the processing time in comparison with the well-known methods.
There has been many system developed detection of number plate. However, some systems do not have satisfactory accuracy of detection and some systems still has to be improved to achieve highest accuracy.

Chapter 2

PROBLEM STATEMENT

- Traffic monitoring cameras are mounted four to seven meters above the street level. Plate recognition range, where the cameras are able to capture the vehicles plates with sufficient resolution, starts from 20 to more than 50 meters away from the camera location.
- At these heights and distances, vehicles plates are not as clearly visible as in other applications such as toll and parking fee payment systems. High camera installation point causes some difficulties against the correct detection of vehicles plates. Vehicles with dirty plates make the situation even more complicated.
- Number plate is the only trustworthy identity of a vehicle in Transportation Systems and correct vehicle identification depends highly on the accuracy of automatic number plate recognition (ANPR) systems.

Chapter 3

LITERATURE SURVEY

In [1], ANPI is a accumulation observation technique that uses optical character identification on pictures to peruse the licence plates on vehicles. This framework is outlined with a neural network which is prepared to perceive characters that can be found in an Indian criterion High sanctuary Number Plate and is executed utilizing MATLAB. A straightforward and effective framework has been created to restrict the licence plates from the picture of a caught vehicle containing Indian criterion licence plate .A neural network based character identification framework has been actualized to distinguish every one of the characters that can be found in an Indian criterion number plate. The framework is set up to have great execution in contrasting and coordinating the check example and as of now put away examples. Framework is versatile and gives attractive outcomes if there should be an occurrence of slight variety in similar characters because of commotion. The framework limit was observed to be 0.85 which can be auxiliary enhanced preparing. For same character the identification remainder is as high as 0.937 while for various character it is lesser than 0.5 consequently the framework gives fine refinement if there should be an occurrence of various characters.

In [2], the planned framework will kill necessitate of individuals for monitoring and safety benefits. This framework won't necessitate bodily nearness of human being at no stopping range to make a move next to illicitly stopped vehicles. This framework encourages power to make a move next to proprietor of wrongfully stopped vehicles and charge fine web based utilizing GSM modem. This straightforward picture preparing methodology can be utilized for various applications with steady foundation, for example, (i) computerized toll gathering, (ii) admission control, (iii) Border safety and so forth. A portion of the troubles in identification of number plates: (i) wrecked number plate, (ii) closeness among specific characters. (iii) Licence plate not inside the legitimate determinations, (iv) Licence Plate mostly obvious or soil on the plate and so on. The after-effects of this framework are checked at various no stopping areas. They caught foundation pictures and pictures with vehicles at no stopping zone. Checked after-effects of this framework with 20 pictures obtained at no stopping range. The outcome investigation of the framework gives 95% exactness.

In [3], they executed RGB colour extractor on various sorts of tags. More than 225 colour pictures taken by the iPhone 5s camera are utilized as a part of this examination. The test pictures are caught from the front and back of the vehicles under various conditions, for example, unique edges, diverse luminance, and distinctive climate conditions. Despite the fact that the calculations were upgraded for the Illinois number plate, which can be effortlessly stretched out to perceive other state tags of different conditions of the United States. RGB colour observer is a criterion instrument in picture examination that permits us to separate the colour data for the pre-preparing in this procedure. The calculations that we make use of in this paper can full fill character identification precisely. The exploratory outcomes demonstrate that the planned strategy is about compelling and practical. Be that as it may, there is opportunity to get better in calculation because it doesn't work viably in circumstances beneath dim lights and mistakes as of various states of characters we remove. The execution of perusing tags from different states is

additionally very much fulfilled the achievement rate is near 100% which demonstrates this strategy is moderately proficient and exact at extricating the characters with an empowering result. The outcome examination of the framework gives 95.1% exactness.

In [4], Automatic Number Plate Identification (ANPI) framework screens and finds countless enlistment licence plates by perusing the vehicle license plates as information and perceives the license plates' characters as yield naturally. Truth be told, error of recognition can be brought about by different variables, for example, pivot of the plate and non- uniform light amid picture procurement. In de-skewing operation and format coordinating procedure are planned to keep up the precision of the auto license plate at the abnormal state. A caught picture of parked vehicle in Malaysia is picked as tests for the data set in this framework. All the information pictures needs to experience 5 phases of advancement as needs be, which incorporates pre-handling stage, plate restriction organize, skew detection and amendment arrange, character segmentation organize and finally character recognition organize for the framework to create a yield. Each of the stage comprises of particular frameworks that were tried and connected to accomplish the ideal yield. At long last, it is to be turned out to be 100% precise for the plate localization, 99.6% for character division, 91.5% for character identification and the general exactness of the framework is 91.1%.

Chapter 4

OBJECTIVES

The system deal with unclear vehicle plates, variations in weather and lighting conditions, different traffic situations, and high-speed vehicles. Vehicles with dirty plates make the situation even more complicated. Number plate is the only trustworthy identity of a vehicle in Transportation Systems and correct vehicle identification depends highly on the accuracy of automatic number plate recognition (ANPR) systems.

Advantages:

The proposed algorithms for each part of the system are

- highly robust to lighting changes
- size variations
- plate clarity
- plate skewness

Chapter 5

METHODOLOGY

Working:

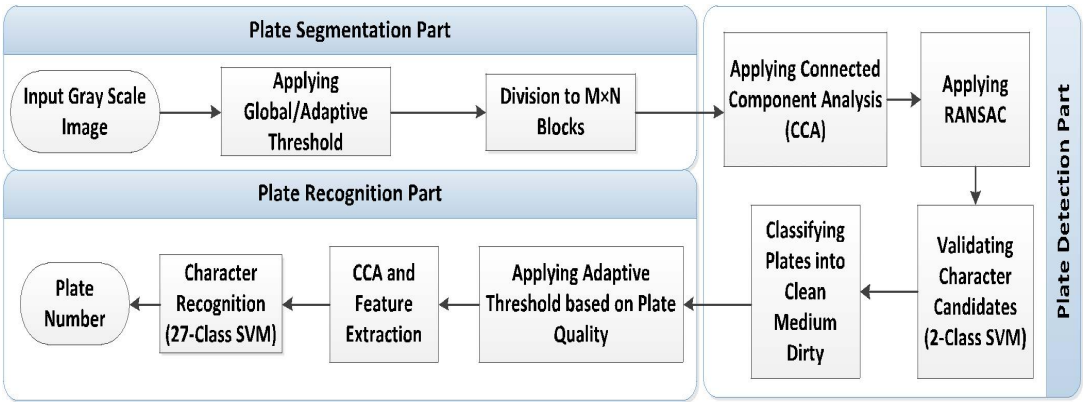

Fig: Process involved in Accurate Detection and Recognition of Dirty Vehicle Plate Numbers for High-Speed Applications

Data Sets:

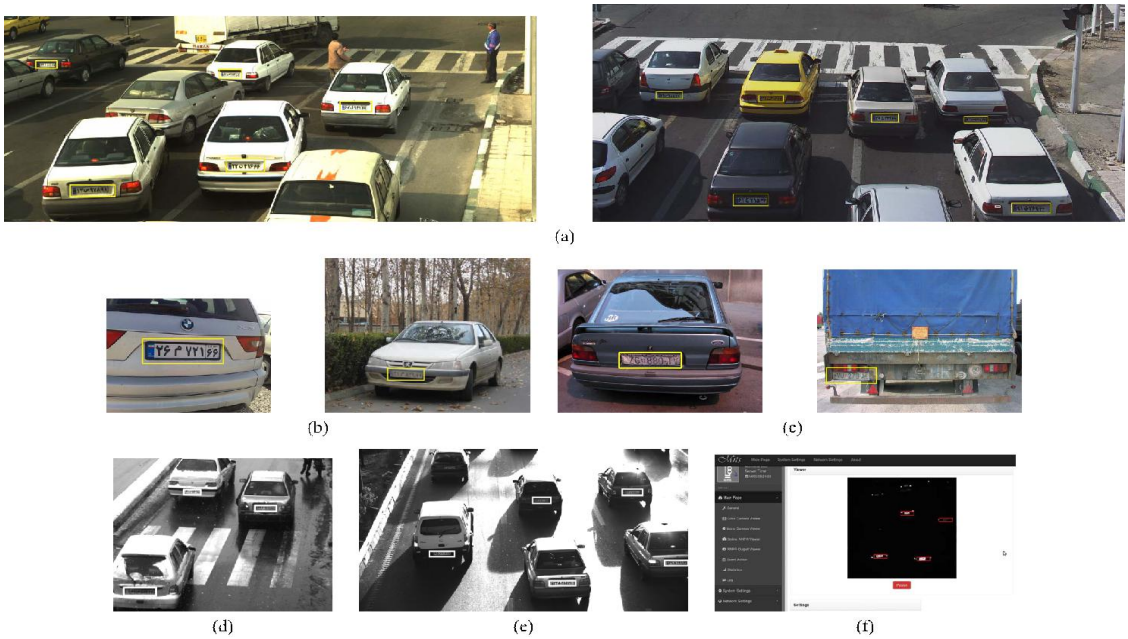

Fig. (a) Our Crossroad data set samples. (b) Data set samples. (c) Data set samples. (d) ANPR results in snowy weather (from our Highway data set). (e) ANPR results in congestion time (from our Highway data set). (f) Our ANPR system web interface.

Algorithms used

1.ANPR

Automatic number-plate recognition (ANPR) is a technology that uses optical character recognition on images to read vehicle registration plates to create vehicle location data. It can use existing closed-circuit television, road-rule enforcement cameras, or cameras specifically designed for the task. ANPR is used by police forces around the world for law enforcement purposes, including to check if a vehicle is registered or licensed. It is also used for electronic toll collection on pay-per-use roads and as a method of cataloguing the movements of traffic, for example by highways agencies.

Automatic number-plate recognition 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 infrared lighting to allow the camera to take the picture at any time of day or night. ANPR technology must take into account plate variations from place to place.

An ANPR system consists of three different modules:
a).Monochrome/Color cameras b) IR projector, and c) the processing board.In addition to compatibility of interfaces, each section must be chosen properly for a specific application. In this paper, a detailed exploration on the important parameters of an ANPR module has been done. Most of the key parameters are discussed and a comparison between final cost and the desired accuracy is shown.

2.RANSAC

The RANSAC algorithm is a learning technique to estimate parameters of a model by random sampling of observed data. Given a dataset whose data elements contain both inliers and outliers, RANSAC uses the voting scheme to find the optimal fitting result. Data elements in the dataset are used to vote for one or multiple models. Random sample consensus (RANSAC) is an iterative method to estimate parameters of a mathematical model from a set of observed data that contains outliers, when outliers are to be accorded no influence on the values of the estimates.

Therefore, it also can be interpreted as an outlier detection method. It is a non-deterministic algorithm in the sense that it produces a reasonable result only with a certain probability, with this probability increasing as more iterations are allowed. The algorithm was first published by Fischler and Bolles at SRI International in 1981. They used RANSAC to solve the Location Determination Problem (LDP), where the goal is to determine the points in the space that project onto an image into a set of landmarks with known locations. The revised RANSAC not only identifies the vehicles plates with a high detection rate but also drastically reduces the processing time in comparison with the well-known methods.

3.Support Vector Machine (SVM)

It is a supervised learning method which classifies data into two classes over a hyper plane. Support vector machine performs a similar task like C4.5 except that it doesn't use Decision trees at all. Support vector machine attempts to maximize the margin (distance between the hyper plane and the two closest data points from each respective class) to decrease any chance of misclassification. Some popular implementations of support vector machine are scikit-learn, MATLAB and of LIBSVM.

4.Artificial Neural Network (ANN)

An artificial neural network (ANN) is a computational model based on the structure and functions of biological neural networks. Information which flows through the network affects the structure of the artificial neural network because a neural network changes or learns in a sense-based on input and output, for that particular stage and consequently for each stage. ANN's are considered nonlinear statistical data modelling tools where the complex relationships between inputs and outputs are modelled or patterns are found. ANN have layers that are interconnected. Artificial neural networks are fairly simple mathematical models to enhance existing data analysis technologies.

5.K- Nearest Neighbour Algorithm (KNN)

The K Nearest Neighbour working principle is based on assignment of weight to the each data point which is called as neighbour. in K Nearest Neighbour distance is calculate for training dataset for each of the K Nearest data points now classification is done on basis of majority of votes there are three types of distances need to be measured in KNN Euclidian, Manhattan, Minkowski distance in which Euclidian will be consider most one the following formula is used to calculate their distance.

6.Naive Bayes (NB)

It is a simple technique for constructing classifiers. It is a probabilistic classifier based on Bayes' theorem. All Naive Bayes classifiers assume that the value of any particular feature is independent of the value of any other feature, given the class variable. Bayes theorem is given as follows: $P(C|X) = P(X|C) * P(C)/P(X)$, where X is the data tuple and C is the class such that P(X) is constant for all classes. Though it assumes an unrealistic condition that attribute values are conditionally independent, it performs surprisingly well on large datasets where this condition is assumed and holds.

Chapter 6

SYSTEM REQUIREMENTS

Hardware Requirements:

Processor	:	Pentium IV-2.7GHz or higher
RAM	:	1GB DDR
Hard Disk	:	100GB
Input Devices	:	Keyboard/Mouse/Compatible Pointing Devices
Miscellaneous	:	USB Interface ,Power Adaptor
Display	:	XGA(1024*768 pixels/higher resolution monitor with 32 bit color settings

Software Requirements:

Operating System	:	Windows 7 or higher
Language	:	Python
Data Base	:	MySQL

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