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LICENSE PLATE RECOGNITION SYSTEM FOR ABSTRUSE INSPECTION AND PRAGMATIC TRAFFIC STANDARDIZATION

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Abstract:

Intelligent Transport System (ITS) is an integral component of modern day road transportation networks. Identification of vehicles is one of the most important challenges to be addressed in the design of any intelligent transport system. License Plate Recognition (LPR) systems have been used as the means to resolve the issue of identification of vehicles. A typical LPR process consists of four stages viz; Image Acquisition, License Plate Extraction, Character Segmentation and Character Recognition. This Project addresses the Plate Localization problem. The Plate Localization method using connected component analysis is proposed in this project. From the studies made, it is learned that the proposed technique will work reasonably well in real world scenarios.

Index Terms: Localization, License Plate Recognition (LPR) & Intelligent Transport System (ITS).

1. Introduction:

Image Processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image.

The proposed solutions overcomes many of the afore said restrictions is highly efficient and implemented in java so that it can be imported to any real time environments and can be easily embedded to the hardware. This work elaborates the mathematical and physical aspects of license plate recognition not only in theoretical but also with real time examples and statistics. So the proposed solutions can easily be inherited by any ITS application like toll-gate monitoring, red-light violation, vehicle theft identification and border control security force etc.

2. Existing System:

The variations of the license plate types or environments cause challenges in the detection and recognition of license plates. An image may contain no or many plates. Input images may have different types of illumination, mainly due to environmental lighting and vehicle headlights. The license plate normally has a rectangular shape with a known aspect ratio; it can be extracted by finding all possible rectangles in the image. Presences of Unusual characters, other than the License characters are seen in the Indian License plate which may be misclassified as License Plate Characters.

Disadvantages of Existing System:

1) Due to environmental issues image recognition is poor.
2) It detects not only the number plate but also the characters in the vehicles.
3) Plates obscured by dirt.

3. Related Works:

In [1], Chiou et al. To determine and to locate the optimal numbers of license plate recognition (LPR) to minimize error rates of O-D matrix estimation, percentages of LPR coverage and percentages of recorded trips. The results have consistently showed that the optimal locations of LPR are at both ends and in the middle of the segments of a freeway corridor with heavy link traffics. If an extensive coverage of LPR is attempted, however, additional LPR may be placed at the segments with light link traffics so as to balance out the privacy invasion. The percentage of the license plate is analyzed; the accuracy of LPR is less. This system does not recognize broken number plates and number plates which are dusted.

Real-time license plate localization method for traffic control applications [2], According to this, edge content of gray-scale image is approximated using line segments features by means of a local connective Hough transform. It finds complexity in recognizing colored license plates.

Dhawal et al. [3], presents a new design flow for robust license plate localization and recognition. The algorithm consists of three stages: 1) license plate localization; 2) character segmentation; and 3) character recognition. The algorithm uses Mexican hat operator for edge detection and Euler number of a binary image for identifying the license plate region. Complex algorithm is used which cannot be implemented to common people.

In [4], ANPR can provide valuable data source for transport planning and engineering. Multiple tasks can be solved with ANPR systems located at one or more survey points. It presents five applications of the systems: vehicle classification, travel time measurements, through traffic surveys, route choice observations and estimation of O-D matrices. The license plate is not recognized in this system, only the vehicles are classified.

Loumos et al. [5] proposed License plate recognition (LPR) algorithms in images or videos are generally composed of extraction of a license plate region, segmentation of the plate characters and recognition of each character. This task is quite challenging due to the diversity of plate formats and the non-uniform outdoor illumination conditions during image acquisition. The LPR works only under restricted conditions such as fixed illumination, limited vehicle speed, designated routes, and stationary backgrounds. The LPR works only under restricted conditions such as fixed illumination, limited vehicle speed, designated routes, and stationary backgrounds.

4. The Proposed Scheme:

The proposed system deals with capturing of images by setting cameras at each junction. In case of violation or car theft or in case of terrorist move and various other factors this system would be of great help. Though this system is already available abroad, there is still a need for deploying in our country. This technique has to be specially deployed in our country and the issue for implementation includes dealing with fonts of various styles and fonts of various styles and fonts. Number plates of varying background images varied population and congested traffic zones.

Here in our proposed system we have the four steps. They are image acquisition, localization, segmentation, thinning. The proposed system allows efficiency up to 99%. Here we use connected component analysis and deals with plate localization problem is addressed. The advantages of proposed system as follows:

1) Intelligent traffic rule enforcement.
2) Prevention of car theft.
3) Monitoring of vehicle traffic and flow control.

4) Intelligent traffic emergency.
5) Accident handling.

5. How LPR System Works:

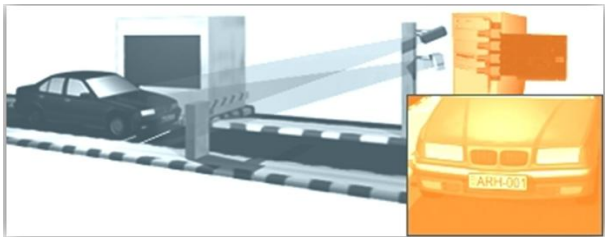


Figure 1: A Car approaching a License Plate Recognition System

Generally, when a vehicle enters into a toll gate, the camera fixed at a particular point captures the front image as shown in the above figure. The application stored on the ROM reads the captured image, locates, segments and recognizes the number plate characters as shown in the below figure

Figure 2: License Plate is recognized from captured image

6. System Model:

It consists of four stages. The first stage is to acquire the car image using a camera. The second stage is to extract the license plate from the image based on some features, such as the boundary, the color, or the existence of the characters.

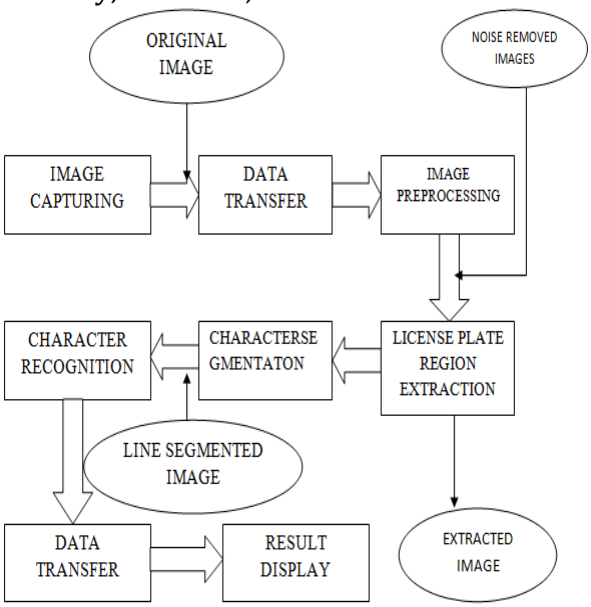


Figure 3: System Model

The third stage is to segment the license plate. The final stage is to recognize the extracted characters by template matching, and finally the result will be display.

Image Acquisition:

This is the first phase in an LPR system. This phase deals with acquiring an image by an acquisition method. The importance of initial image processing, as it forms the basis for the contrast between the characters and the license plate background. The contrast enables correct license plate localization thus if the contrast is too small slight differences between the background and the characters on the license plate won't be

identified. White and black areas which are the results of the thresholding are then labeled, which means that every spot is identified and its size and area are described so that different operations can be done on each spot separately. After labeling the black and white spots the process of elimination takes place. The aim of this stage is to leave in the picture only these spots which are most likely to be license plate characters, assuming that each spot represents a single character and isn't connected with any other object in the image. Values of properly chosen parameters, which are evaluated and compared with certain expected empirically calculated values, are calculated.

License Plate Extraction:

License Plate Extraction is a key step in an LPR system, which influences the accuracy of the system significantly. This phase extracts the region of interest, i.e., the license plate, from the acquired image. The License plate is the only identification that uniquely identifies every vehicle in the universe. It is a basic rule that the vehicle must be kept so clean and the license plate should be visible at all angles of visualization. There are certain rules are stipulated for shape, structure, size and color of the license plate.

The various factors that affect the extraction of License plate from the vehicle image are:

1) In India, the License plate structure is not uniform as stipulated by the laws in Time. The norms are stipulated by the state authorities and so they differ for each state.
2) Despite the norms foresaid for the Size and color of the license plate in paper, this has not been given effect in practice.
3) It has been a tough task to capture the entire vehicle image without external noise; the external noise has adverse impact in the extraction of the license plate image.
4) The license plate image may be skewed and sheared at different angles based on the motion of the vehicle which needs to be tilt corrected.
5) There will be blurring in the license plate image due to the high speed motion of the vehicle which needs to be resolved by calculating the motion blur parameters.
6) A different class of vehicles has their License plates at different positions and possesses different structure.
7) In India, vehicles are foreseen with plate like structure in other parts of the vehicle body, these plates like structures may be misclassified as vehicle's License plate.
8) It becomes a part of tradition to hang over conventional objects near the plate position, which degrades the time and accuracy of the License plate extraction system.
9) In India, in spite of the fact and law to keep the license plate clean and tidy, this has not been effect in practice. This will lead to degrade the behavior of the system.

Localization of potential License plate regions from vehicle image is a challenging task due to the above said parameters. The objective of the LPR system is to localize the license plate from the vehicle image captured through a road side camera and interpret them using a character recognition system to get the license number of the vehicle. Under the influence of weather, illumination and road conditions the vehicle's license plate image has so serious tilt that makes touching and broken characters to appear. This can be avoided by means of rearranging the pixels in the direction of the tilt.

License Plate Segmentation:

License Plate Segmentation, which is sometimes referred to as Character Isolation takes the region of interest and attempts to divide it into individual characters. License Plate Character Feature Extraction involves extraction of features from

character images for effective character recognition. The isolated license plate is then segmented to extract the characters for recognition. An extracted license plate from the previous stage may have some problems, such as tilt and non-uniform brightness. The segmentation algorithms should overcome all of these problems in a preprocessing step.

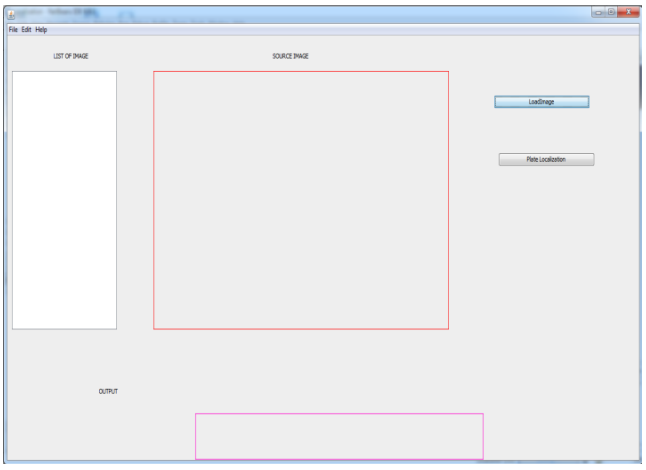
Character Recognition:

The last phase in LPR system is to recognize the isolated characters. After splitting the extracted license plate into individual character images, the character in each image can be identified. The extracted characters are then recognized and the output is the license plate number. Character recognition in ALPR systems may have some difficulties. Due to the camera zoom factor, the extracted characters do not have the same size. Resizing the characters into one size before recognition helps overcome this problem. Also noisy data has to be removed.

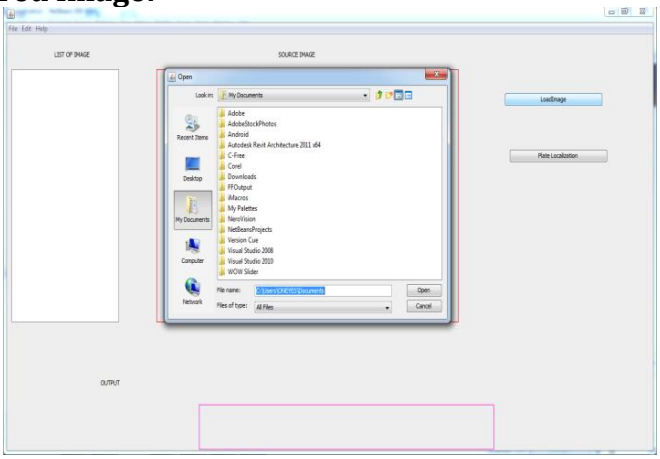
The character segmentation technique using horizontal and vertical projection. The major contribution here is in the method by which thresholding dynamically threshold the license plate image with ten different values and one best image is selected by fixed black and white ratio. And using that image the unwanted parts in license plate has been deleted and using the same threshold image the characters pixel has been taken using horizontal and vertical projection and the characters has been segmented from original license plate image to avoid the problems in recognition process. The experiments on real world data set show that the proposed approach works reasonably well.

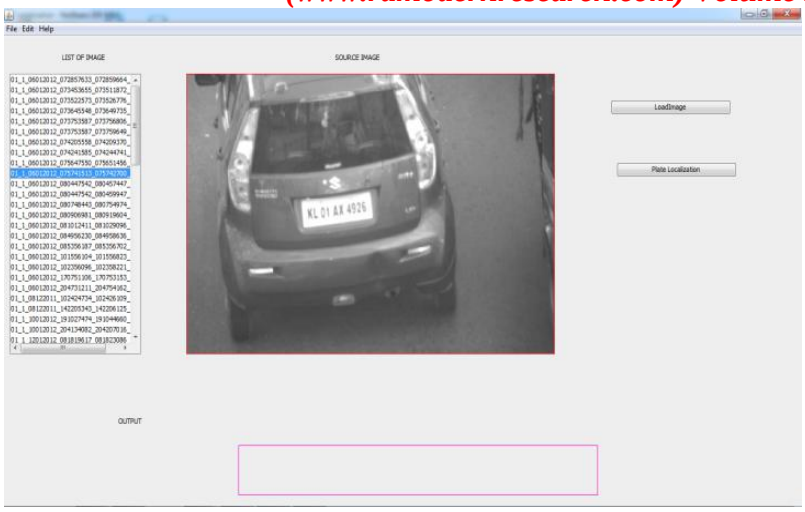
7. Simulation and Results:

7.1 Image Acquisition:

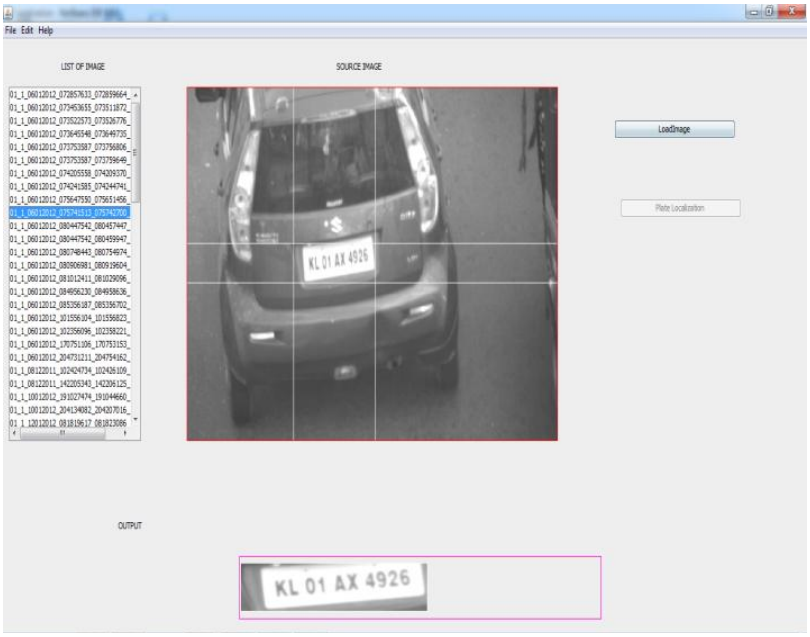


7.2 Load the Captured Image:

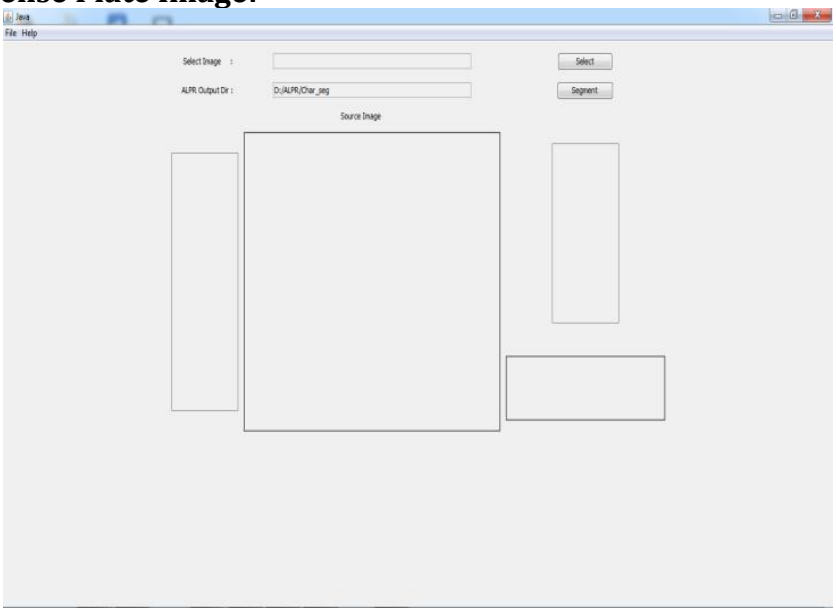


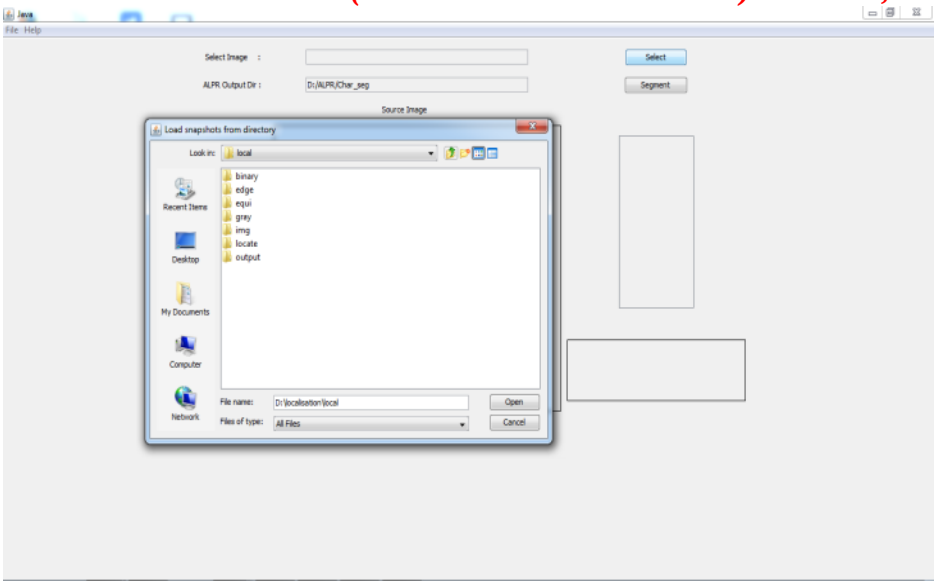


7.3 License Plate Localization:

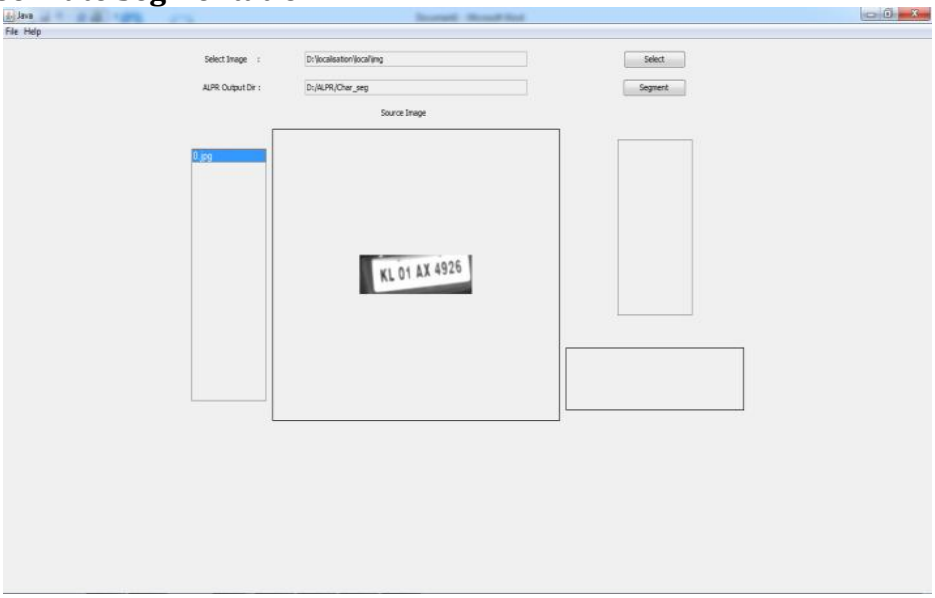


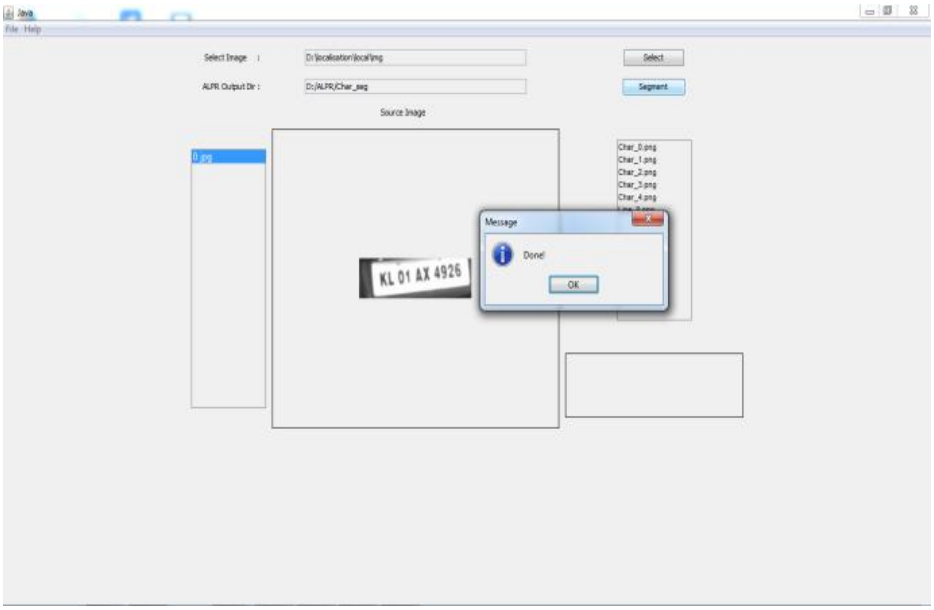
7.4 Select License Plate Image:



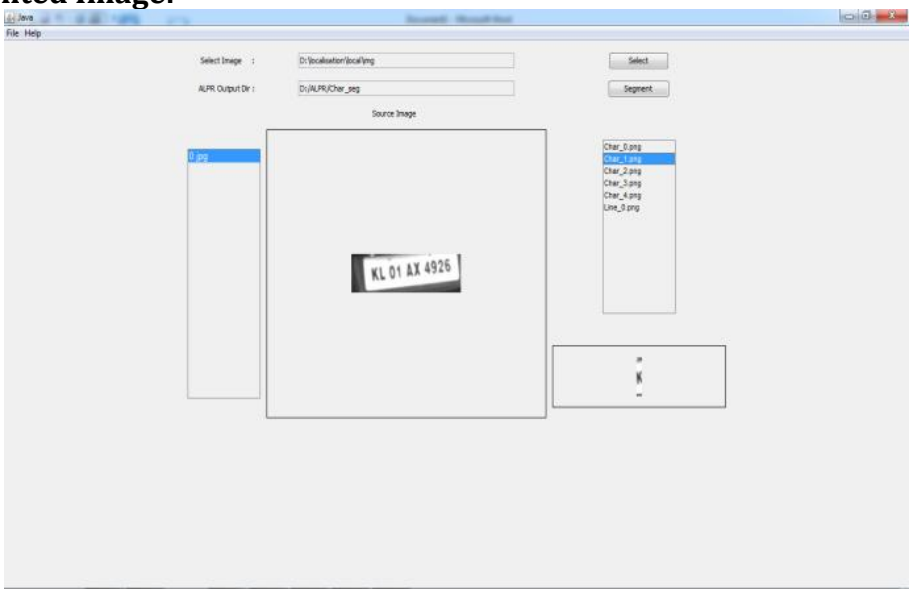


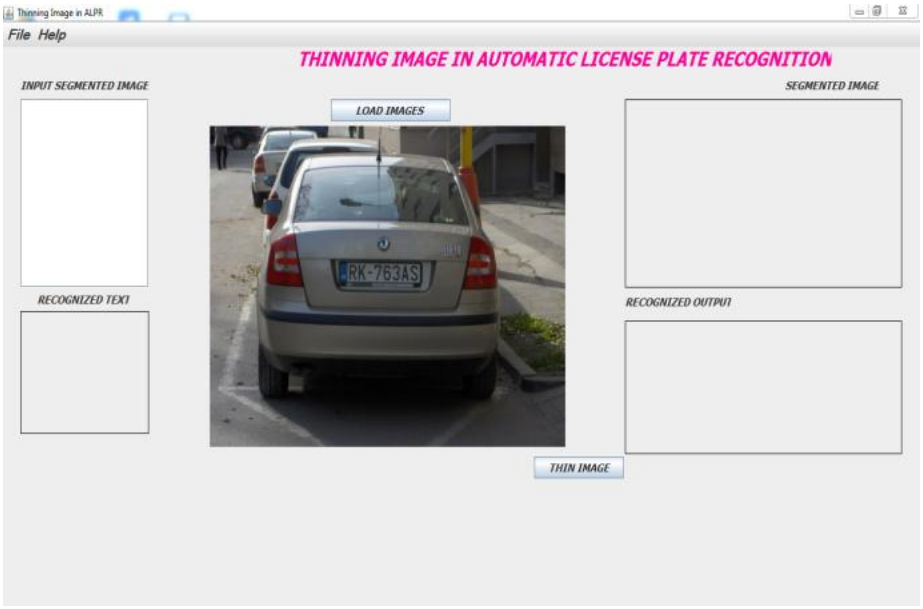
7.5 License Plate Segmentation:

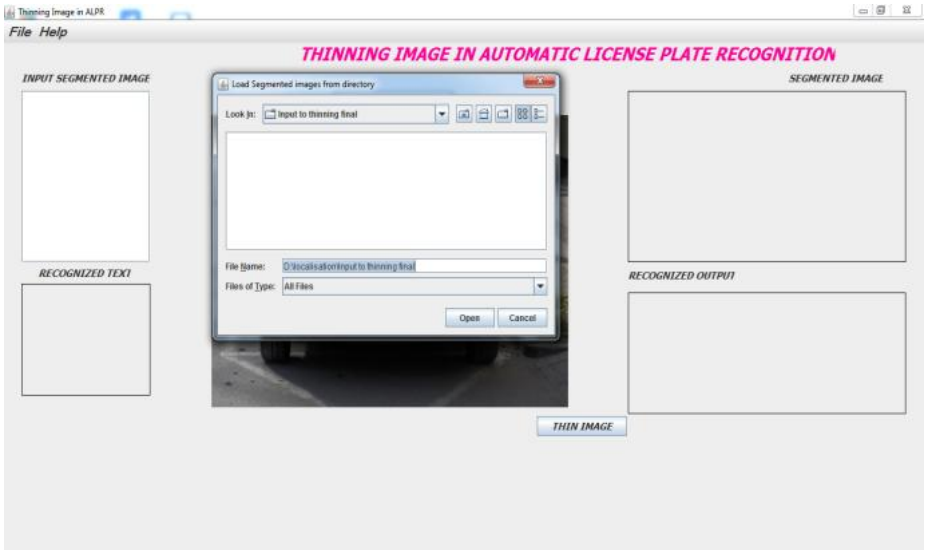




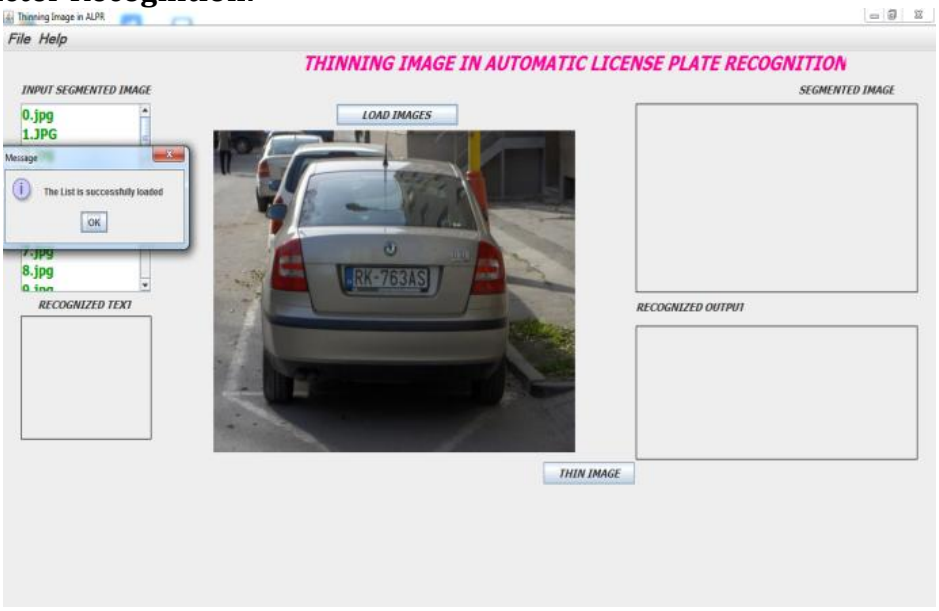
7.6 Segmented Image:

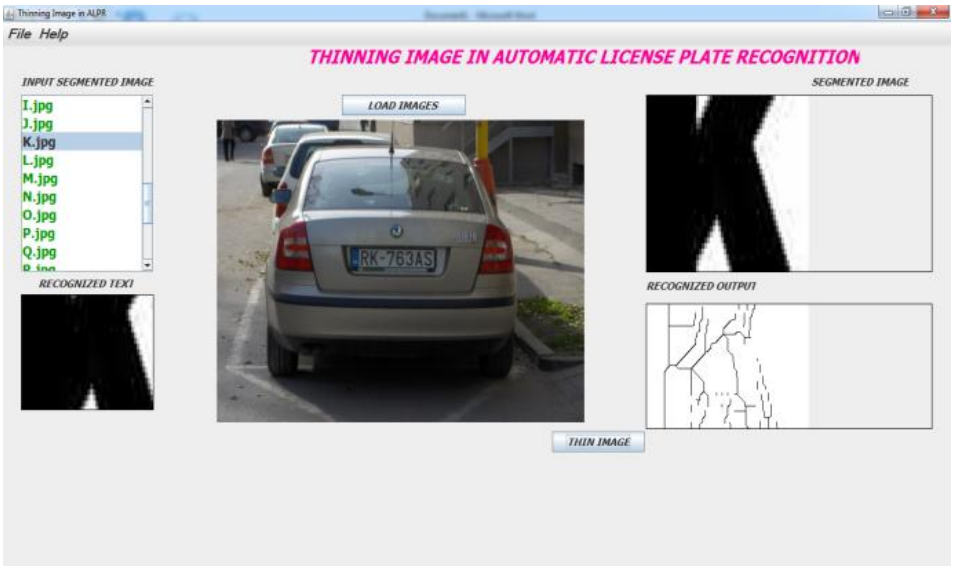






7.7 Character Recognition:





8. Conclusion:

In this paper developed algorithms accurately localize and recognized the number plates. This algorithm can be determined and the accurate outputs are obtained. We are planning to study the characteristic in ANPR system for better performance.

9. References:

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