

## Processing Geo-Dispersed Traffic Data Using Java Media Framework

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*Abstract— Vehicle number and time extraction system is one kind of an Intelligent Transport System (ITS). The proposed work is used to extract image from the traffic video to avoid traffic violations and confusions. This paper will discuss a technique for the vehicle number plate recognition or time recognition in the traffic video using mathematical morphological operations. The main objective is to use diverse morphological operations to match the time or car number of vehicle with the given requirement accurately. Noises in the image are removed using filtering techniques. This is based on various operation such as gray-scale conversion, morphological transformation, canny edge-detection and extraction of number plate from vehicle image. After this segmentation is applied to recognize the characters present on number plate using template matching. This algorithm can recognize number plate quickly and accurately from the vehicles image. Optical Character Recognition technique is also used for the character recognition and will extract the exact image from the frames of the video which will match exactly for the specified requirement.*

**Keywords—JMF; JAI; gray-scale conversion; canny Edge-Detection; OCR;**

### I. INTRODUCTION

Car number plate recognition systems have received a lot of attention from the research community. This system is a part of digital image processing which broadly used in vehicle transportation system to identify the vehicle. A number plate is the unique identification of vehicle. Real time number plate recognition plays an important role in maintaining law enforcement and maintaining traffic rules. It has wide applications areas such as toll plaza, parking area, highly security areas, boarder's areas etc.

The identification task is challenging because of the nature of the light. The location error will increase if the color of the number plate is very

similar to the background. Noise on the number plates some time causes error and results in low accuracy. Car number plate Recognition is a part of digital image processing which plays vital role in vehicle transportation system to identify the vehicle.

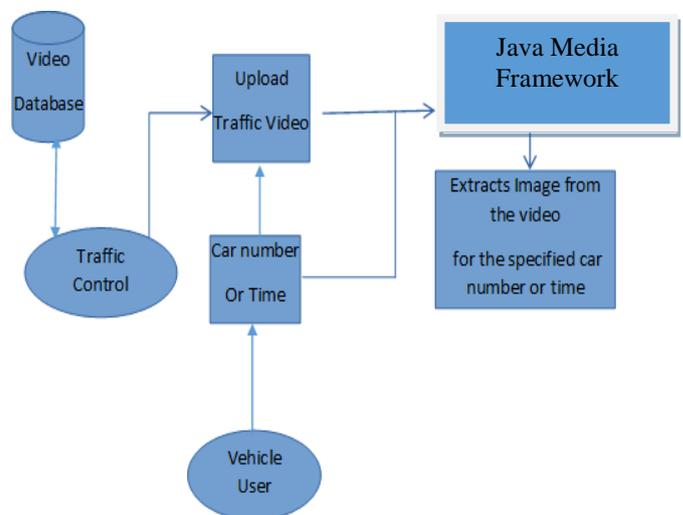


Fig.1 Architectural Diagram

A number plate is the unique identification of vehicle. Real time number plate recognition plays an important role in maintaining law enforcement and maintaining traffic rules. Many number plates have different styles and varying state by state. The number plates have one row or two rows of numbers and have six to more than ten letters. Car number plate recognition process contains three steps. One is Vehicle number plate extraction, the next is character segmentation and finally Optical Character Recognition. Number plate extraction is that stage where vehicle number plate is detected.

The purpose of edge detection is significantly reducing the amount of data in the images and will preserve the structural properties for the further image processing. The detected number plate will pre-process to remove the noise and then the result will be passed from the segmentation parts to segment the individually characters from the extracted number plate. In OCR, the characters are recognized using Template matching.

The JMF (Java Media Framework) is Graphical User Interface driven API and which will also works as Java library that enables video, audio and other time based media will also be added to Java applications and to the applets.

## II. LITERATURE SURVEY

In [1], Agarwal, et al. discussed about the robust and simple approach based on edge detection and segmentation with morphological operations. Suggested approach is performed in 3 steps: step detection of license plate, segmentation of character is done from detected number plate. While in the 3<sup>rd</sup> step, recognition of segmented character is performed. He tested several images taken under different weather condition to check the validity, robustness and efficiency of his algorithm. The result of their experiments is very satisfactory and opens the track of their algorithm which has to be used in many real time applications.

In [2], Dev, Ashwathy aimed to propose fast technique for identifying the vehicle license plate. Here first the input image is binarized by the adaptive thresholding and then image will be enhanced by unwanted line elimination algorithm (ULEA). Then on applying VEDA vertical edges of the image will be detected. Then number of possible candidate's license plate region is extracted out of which the original license plate will be detected.

In [3], Lee, et al. aimed to propose a real time vehicles management system using a vehicle tracking and a car plate number identification technique. The system uses two cameras: one for tracking vehicles and another for capturing license plate. The segmented characters are recognized using the SVM (support vector machine). By combining these two techniques, they construct a real time automatic vehicles management system that can be used to control vehicles parking and searching for the specific vehicles.

In [4], Manchikalapudi, Varun discusses about the Skew correction and the number-plate localization is an image processing technique used to identify a vehicle by its number plate. Technological intelligence is a highly sought after commodity even in traffic based systems. These intelligent systems will not only help in traffic monitoring but will also help in computer safety, commercial application and law enforcement. The violations of traffic-rules will also be detected based on the number-plate localization technique.

In [5], Lei, et al. aim to propose a robust and the real time method for tracking vehicle and their proposed algorithm includes two stages: vehicle detection, vehicle tracking. Vehicle detection is the key step and the concept of tracking vehicle is built mainly upon the vehicle segmentation methods

In [6], Priya, V. Lakshmi, and K. Perumal discusses edge detection and efficient morphological operations for detecting the car number-plate using method called segmentation.

## III. SYSTEM DESIGN

This paper's primary design starts with the Java Media Framework, where JMF include image processing algorithms which will be explained individually in below sections.

### A. Java Media Framework(JMF)

JMF is GUI compelled API and Java library that allows video, audio and other time based media to be additional to Java application and applet. The Java Media Framework API consents developers to route media in different behaviors. It covenants with real time multimedia presentations and effects processing. JMF levers time based media that is media that changes with respect to time.

JMF conceptualizes the media it works with into Data-Source objects for media being read to Java media framework and Data-Sink objects for data being exported out from java media framework. Developers are not given significant access to the particulars of any given format. Media is represented as sources (which are obtained from URLs) that can be read in and played, processed, and exported (though not all codecs support processing and transcoding). A Manager class offers static methods that are the primary point-of-contact with JMF for applications. JMF uses Java

advanced imaging (JAI) API to split videos into frames.

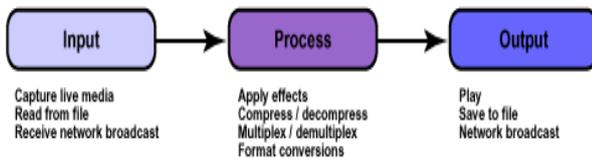


Fig. 2 JMF data processing model

There are 3 stages of data processing in Java Media Framework architecture which includes: input, output, and processing as shown in Fig.2.

- Input embraces working with the capture devices, reading data from files on the hard drive, and all sorts of network data-input. In the input stage, data is read from a source and it is passed into buffers to processing stage. The input stage will consist of reading data from a local capture device (such as a Web-cam or TV capture card), a file on a disk, or stream from the network. In this paper we are taking traffic video as the input.
- Processing contains number of codec and effects designed to modify the data stream to one suitable for output. These codecs may perform functions such as compressing or decompressing the audio to a different format, adding a watermark, cleaning up noise, or applying an effect to the stream (such as echo to the audio). Once the processing stage applies its transformations to the stream, it passes the information to the output stage. In this paper, we are using gray scale, edge detection, object and template matching algorithms as a processing the video, processing part is completely image processing.
- Output includes the use of a video renderer, saving output to disk, and saving output to the network. The output stage may take the stream and pass it to a file on disk, output it to the local video display, or transmit it over the network, then pass it to the processing stage to add a watermark in the corner of each frame and then broadcast it exactly over the local intranet in the output stage. In this paper we are implementing to extract the image as the output from the traffic video based on the specific requirements.

### B. Gray-scale conversion

To renovate a color from color space based on RGB color model to the gray-scale illustration of its luminance, biased sums should be premeditated in the linear RGB space [9] that will be after the gamma firmness function had been removed first via gamma extension. In the RGB format, each pixel had 3 color apparatuses Red, Green, and Blue. In preprocessing step, color image has to be given as an input and it will be converted into the gray-scale image.

The primary step in gray-scale conversion is to digitize a white and black image will be collection of an array of the gray shades which has to divide the images into a number of pixels, contingent on the essential spatial resolution. This range will be represented in intangible way as a range from 1 (white) and 0 (black), with any of the fractional values. While translating an RGB images to gray-scale, we have to take RGB values for each pixel and make as an output single value replicating the illumination of that pixel. One such methodology is to take the mediocre of the contribution from individual channel is  $(R+B+C)/3$ . Gray-scale is a range of shadows of gray without superficial color. The gloomiest possible shadow is black, which is the complete absence of transferred or replicated light. The daintiest possible shadow is white, the complete transmission or replication of light at all observable wavelengths.

### C. Canny Edge-Detection

Perseverance of edge-detection is expressively dropping the amount of data in an image and preserves the fundamental properties for the further image processing. Edge-detection achieves the detecting sharp disjointedness in an image. This is the well-known common approach for spotting expressive discontinuities in intensity values. The edge is a frontier between two counties with moderately distinct gray level possessions. In edge-detection, several operatives are defined such as sobel, log, canny, prewitt. The Canny operative was intended to be most prime edge detector. It will take as input a gray-scale image, and which will produce as an output, image presenting the spots of tracked intensity disjointedness.

Canny edge-detection is a technique to abstract useful essential information from dissimilar visualisation objects and radically decrease the

amount of the data to be achieved. It has been broadly applied in several processor visualisation systems. Canny has initiated the necessities for the submission of edge-detection on various visualisation systems are comparatively related. Thus, an edge-detection result to report those requirements can be instigated in a varied assortment of conditions to mollify those requirements. Canny is used in the calculus of deviations, a procedure which treasures the function which heightens a particular function. The optimum function in Canny-detector is designated by the summation of 4 exponential relations, but it can also be estimated by the foremost derivative of the Gaussian. Amongst the edge detection approaches technologically advanced so far, canny edge-detection algorithm is one of the utmost stringently demarcated approach that delivers virtuous and unswerving recognition. Owed to its optimality to encounter with the three benchmarks for edge-detection and the uncomplicatedness of development for implementation, it turn out to be one of the most popular algorithms for edge-detection. Since all edge detection consequences are straightforwardly exaggerated by image noise, it is necessary to filter out the noise to avoid false detection triggered by noise. To smooth out the image, a Gaussian filter is applied to convolve with an images. This phase will be considerably smoothens the images to diminish the special effects of the recognisable noise on the edge detector. An edge in an image will point in a diversity of guidelines, so canny algorithm will use four filters to detect vertical, horizontal and diagonal edges in the distorted image. The edge-detection operator (Roberts, Sobel, and Prewitt for example) yields a value for the first derivative in the horizontal direction and the vertical direction.

Non-Max overpowering is applied to thin the edge. After applying gradient calculation, the edge extracted from the gradient value and is still quite blurred. With respect to criterion 3, there would only be one exact reply to the edge. Thus non-max overpowering can help to overwhelm all the incline values to 0 except the local maximal, which designates position with the harshest modification of intensity value. The Hough-transform is the feature extraction technique used in an image analysis, digital image processing and computer vision. Canny is edge detector productivity which

will serves as an input to the Hough method. Java Advanced Imaging is a Java platform extension API that affords a set of object oriented interfaces that sustenance a software design prototypical which countenances developers to create our own image manipulation.

#### *D. Morphology*

Morphology is a wide-ranging set of an image processing processes that route images based on contours. Morphological procedures apply a configuring component to an input image, generating an output image of the similar size. The most elementary morphological operations are dilation and erosion [11]. Dilation accomplished by addition of pixels to the borders of objects for all the pixels in an input pixel region. In the binary image, if any of the pixel is fixed to the value 1, the output pixel is fixed to 1. Dilation is used for the purpose of cumulative fatness of the number plate edges. So we can find the numbers easily.

The goal of this phase is that the given dilation image, is to subdivision all the characters, without trailing structures of the characters. Segmentation is one of the most important procedures in the automatic number plate recognition. If the segmentation flops, a character can be incorrectly distributed into two fragments, or two characters can be inappropriately combined together. In order to distinguish the vehicle number plate characters subsequently, each character must be separated respectively. The individual characters have to be segmented from each other. In Character Segmentation, the characters and digits of the plate will be segmented and each will be saved as different images. Mat lab toolbox function provides a function called region props function. It will measure a set of properties for the each label region in label matrix. The median-filter is a nonlinear filtering method used to eliminate noise from image under deliberation. While it helps in eliminating the instinct noise it conserves the edges. After segmentation filtering is used to remove all the lines expect characters. It will be widely used and it is very operational at removing noise while stabilizing edges. . In OCR the filtering character is matched with template using template matching algorithm and finally the character will be extracted with image from the video.

### E. Optical Character Recognition(OCR)

Optical character recognition is usually abbreviated as OCR. It includes the electrical and mechanical transformation of scanned images of typewritten, handwritten text into the machine text. This is the common technique of digitizing printed text so that they can be by electronic means examined, deposited more efficiently, showed on line, and is used in machine methods such as machine translation, text mining and text to speech. Character recognition will enhance the processing of the scanned image by permitting to automatically diagnose and extract specific text content from different data-fields. For example, when you scan a form and use document imaging software to process it, OCR permits us to transfer data directly from document to an automated electronic database. The bounding-box is used to measure the assets of the image region. This method is used to check he numbers with template used by template matching algorithm in Optical Character Recognition [10]. Template Matching is one of the most used classification method. The features that classifies will be based on the individual pixel. An image will be compared with the predefined images, which will be referred to as templates. Once the video is converted into frames Optical Character Recognition will be applied to each and every frame so that image can be extracted appropriately for the requested image Optical Character Recognition is main role in this paper implementation as image has to be extracted after searching, recognising and matching.

Template matching is a 'brute-force' algorithm for object recognition. Its working is simple: create a small template (sub images) of the object to be found. To do a pixels by pixels matching of the template with the image to be scanned for retaining center of the template at every possible pixel of the main image. Then using a comparison metric, like regularized cross association, should find the pixel by giving maximum match. That is the place which had a pattern most similar to the template. This is just the brief description of template matching. We can find proper derivation of normalized cross association in standard texts on Image processing. There are some observable flaws in template matching as the tool for many object recognition. Using template matching and Optical Character Recognition we are recognizing number-plate letter

and digits or time whichever is required will be searched and extracted that particular image from the video.

### F. Flow chart

Figure 3 shows workflow of the implementation where traffic controller has to enter vehicle number or time in the graphical user interface when the vehicle user comes with the challenge, and then correct traffic video data should be browsed.

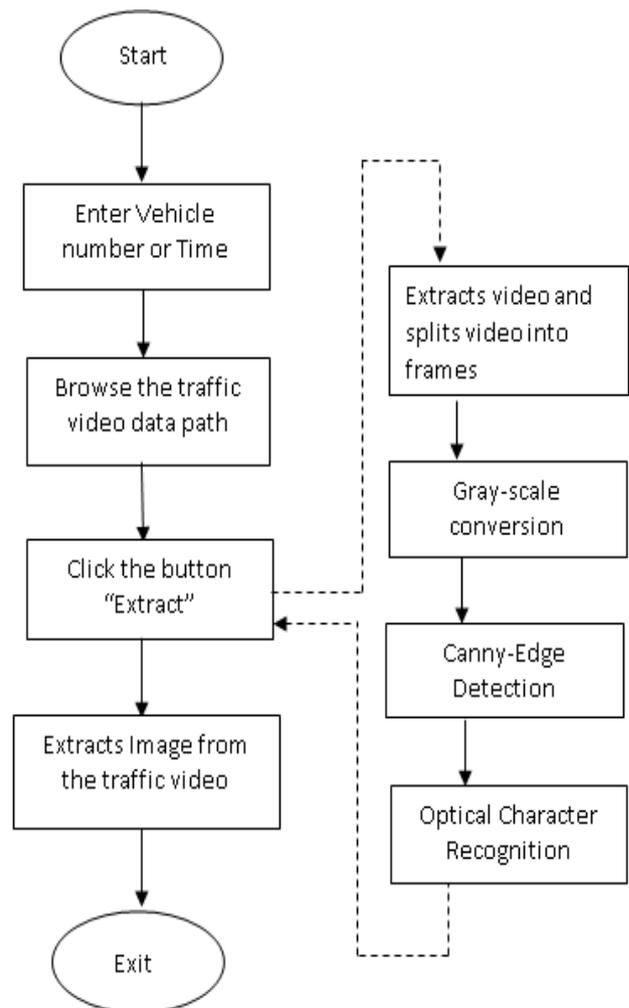


Fig. 3 Flow Chart

As soon as browsing is done, JMF will take video as input and when extract button is clicked on GUI processing part will be continued video will splits into frames and will store it on to disk then image processing operation will happen to finally extract image from the video.

#### IV. CONCLUSION

The Java Media Framework (JMF) is an exciting and versatile API that allows Java developers to process media in many different ways. JMF was chosen for use with MHP and Java TV mainly because it was a standardized API's for media control that is already existed, and DVB does not like reinventing the wheel unless it has to do. Using JMF, it is easy to extract the image from the traffic video data to avoid traffic violations. This paper implementation is mainly focused to use by the traffic controller to avoid the traffic rules and confusion among the vehicle user and the traffic controller. Proposed work will extract the image in the video by searching the impact given to the system, which is vehicle number or time for which image is required. Proposed mainly uses image processing concepts grayscale, edge detection, OCR.

#### V. FUTURE WORK

Future work for this paper implementation can be done for using big data by applying map-reduce for the huge traffic data through the implementation of same technique and which will implement map-reduce framework on top of proposed work which will help to retrieve the images from huge or big data in an efficient time. Now a days huge data is surrounding everywhere so implementation on big data plays a major role and it is very important because traffic data will become huge day by day so we need to use big data concepts like map-reduce framework, which will make easier way to perform the operations on huge data in faster way.

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