Strategies for the Efficient Sharing of Regionally Distributed Traffic Information in Smart Cities

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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 a variety of operations such as gray-scale conversion, morphological transformation, canny edge-detection and extraction of number plate from vehicle picture. After this segmentation is applied to identify the typescript present on number plate using template matching. This algorithm can identify number plate rapidly and precisely from the vehicles picture. Optical Character Recognition technique is also used for the character recognition and will take out the accurate image from the frames of the video which will match exactly for the particular 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 exceptional recognition of vehicle. Real time number plate detection plays an important role in maintaining law enforcement and maintaining traffic rules. It has extensive applications areas such as toll plaza, parking area, highly security areas, boarder's areas etc.

The recognition task is tricky because of the nature of the light. The location error will amplify if the color of the number plate is very

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analogous to the background. Clamor on the number plates various time causes error and results in low precision. Car number plate detection is a part of digital image processing which plays critical role in vehicle transportation system to spot the vehicle.
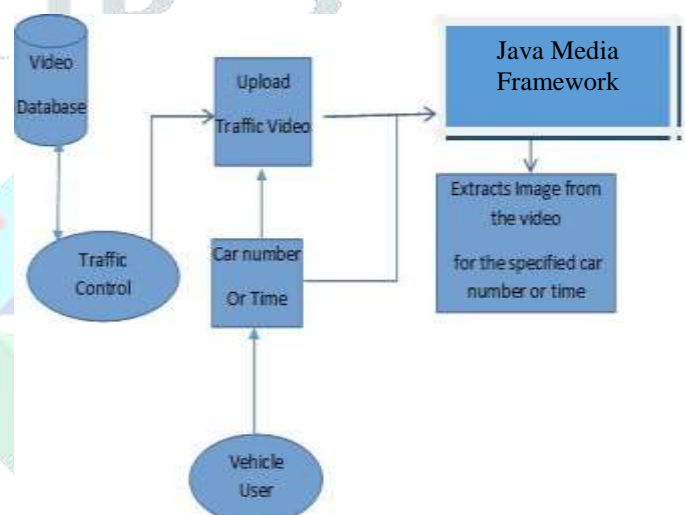

Fig.1 Architectural Diagram

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 idea behind edge detection is considerably dipping the amount of data in the images and will conserve 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. speaks about the robust and simple approach based on edge detection and segmentation with morphological operations. Recommended approach is performed in 3 steps: step detection of license plate, segmentation of character is done from detected number plate. While in the 3rd 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 rectification and the number-plate localization is an image processing technique used to identify a vehicle by its number plate. Technological

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

Fig. 2 JMF data processing model

There are 3 stages of data processing in Java Media

intellect is a highly required after product even in traffic based systems. These clever systems will not only help in traffic monitoring but will also help in computer security, 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 intend a robust and the real time system for tracking vehicle and their proposed algorithm includes two stages: vehicle detection, vehicle tracking. Vehicle detection is the key pace and the notion of tracking vehicle is built mostly upon the vehicle segmentation methods

. In [6], Priya, V. Lakshmi, and K. Perumal speaks about edge discovery and competent morphological operations for detecting the car number-plate by process called segmentation.

III. SYSTEM DESIGN

This paper's main aim starts with the Java Media Framework, where JMF take in image dispensation algorithms which will be explained separately 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 diverse behaviors. It covenants with real time multimedia presentations and effects processing. JMF levers time based media that is media that changes with revere to time.

JMF conceptualizes the media it plant 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

Framework architecture which includes: input, output, and processing as shown in Fig.2.
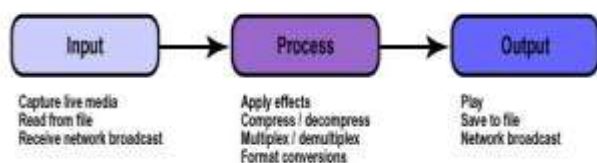
• Input embraces working with the capture devices, reading data from files on the hard drive, and all sorts of network data-input. In the input stage, data is read from a source and it is passed into buffers to processing stage. The input stage will consists of reading data from a local capture device (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.

• Dispensation carries number of codec and effects intended to change the data stream to one appropriate

for output. These codecs may execute functions such as compressing or decompressing the audio to a distinct format, adding a watermark, clear out noise, or applying an effect to the stream (such as echo to the audio). Once the dispensation 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 totally image processing.

- Output includes the use of a video renderer, saving output to disk, and saving output to the network. The output phase may take the stream and surpass it to a file on disk, output it to the local video display, or set out it over the network, then pass it to the processing stage to put in watermark in the curve of each frame and then send out it exactly over the local intranet in the output stage. In this paper we are implementing to obtain the image as the output from the traffic video depend on the precise necessities.

B. Gray-scale conversion

To modernize a color from color space based on RGB color model to the gray-scale design of its luminance, influenced sums should be deliberate in the linear RGB space [9] that will be after the gamma firmness function had been detached 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 set as an input and it will be changed 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 split the

amount of the data to be achieved. It has been largely applied in several processer visualization systems. Canny has initiated the provisions for the submission of edge-detection on several visualization systems are moderately related. Thus, an edge-detection result to report those requirements can be instigated in a varied assortment of conditions to placate those necessities. Canny is used in the calculus of deviations, a process which reserves the function which heightens an exacting function. The finest function in Canny-detector is chosen by the summation of 4 exponential relations, but it can also be predictable by the foremost derivative of the Gaussian. Amongst the edge detection approaches technologically sophisticated so far, canny edge-detection algorithm is one of the tremendous sternly demarcated approach that delivers virtuous and consistent recognition. Owed to its optimality to meet with the three benchmarks for edge-detection and the practicality of growth for implementation, it turn out to be one of the most admired algorithms for edge-detection. Since all edge detection consequences are uncomplicatedly inflated by image

images into a number of pixels, reliant on the essential spatial resolution. This collection 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 obtain the mediocre of the contribution from individual channel is (R+B+C)/3. Gray-scale is a variety of shadows of gray with no superficial color. The gloomiest likely shadow is black, which is the whole absence of transferred or simulated light. The daintiest possible shadow is white, the whole transmission or replication of light at all apparent wavelengths.

C. Canny Edge-Detection

Firmness of edge-detection is dramatically reducing the sum of data in an image and conserve the basic properties for the auxiliary image processing. Edge-detection achieves the detecting sharp disjointedness in an image. This is the well-known frequent approach for spotting expressive discontinuities in intensity values. The edge is a frontier amid two counties with fairly different gray level possessions. In edge-detection, several operatives are definite such as sobel, log, canny, prewitt. The Canny operative was projected to be most major edge detector. It will take as input a gray-scale image, and which will fabricate as an output, image presenting the acne of tracked intensity disjointedness.

Canny edge-detection is a method to abstract useful vital information from different visualization objects and fundamentally decrease the

noise, it is required to strain out the noise to shun false detection triggered by noise. To flat out the image, a Gaussian filter is applied to convolve with an images. This phase will be clearly smoothens the images to diminish the special effects of the recognizable noise on the edge detector. An edge in an image will tip in a assortment of guidelines, so canny algorithm will use four filters to notice vertical, horizontal and diagonal edges in the unclear 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

E. Optical Character Recognition(OCR)

Optical character recognition is typically abbreviated as OCR. It includes the electrical and mechanical transformation of scanned images of typewritten, handwritten text into the machine text. This is the general technique of digitizing printed text so that they can be by electronic means examined, deposited more competently, showed on line, and is used in machine methods such as machine translation, text mining and text to speech. Character recognition will develop the processing of the scanned image by allowing to automatically diagnose and take out specific text content from diverse data-fields. For example, when you scan a form and use document imaging software to process it, OCR allows us to move data directly from document to an automated electronic database. The bounding-box is used to gauge the assets of the image region. This technique is used to verify he numbers with template used by template matching algorithm in Optical Character Recognition [10]. Template Matching is majorly used classification method. The features that classifies will depend on the individual pixel. An image will be compared with the predefined images, which will be referred to as templates. Once the video is rehabilitated into frames Optical Character Recognition will be applied to each and every frame so that image can be extracted properly for the requested image. Optical Character Recognition is major role in this paper implementation as image has to be extracted subsequent to searching, recognizing and matching.
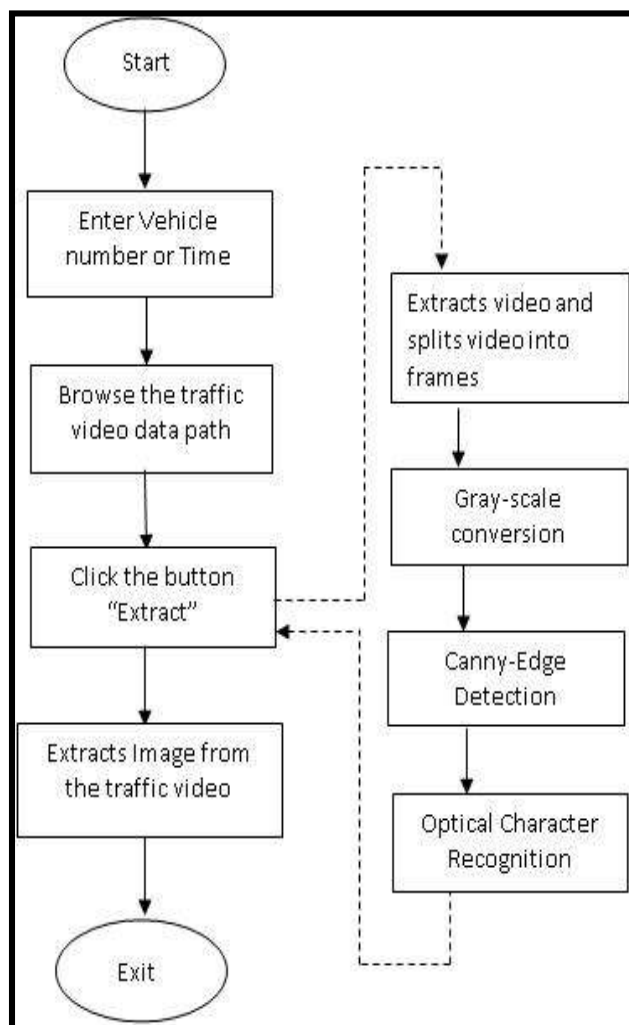
trailing structures of the characters. Segmentation is one of the most important measures in the automatic number plate recognition. If the segmentation flops, a character can be wrongly dispersed into two fragments, or two characters can be improperly shared together. In order to differentiate the vehicle number plate characters subsequently, each character must be alienated 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 gauge a set of properties for the each label region in label matrix. The median-filter is a nonlinear filtering process used to get rid of noise from image under consideration. While it helps in eliminating the instinct noise it conserves the edges. After segmentation filtering is used to eradicate all the lines expect characters. It will be extensively used and it is very operational at removing noise while stabilizing edges. . In OCR the filtering character is harmonized with template using template matching algorithm and finally the character will be extracted with image from the video.

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 alike of the template with the image to be scanned for retaining center of the template at all possible pixel of the main image. Then using a contrast metric, similar to regularized cross association, should find the pixel by giving maximum match. That is the place which had a pattern most alike to the template. This is just the concise description of template matching. We can find proper origin of normalized cross connection in standard texts on Image processing. There are some clear flaws in template matching as the tool for a lot of 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.

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

IV. CONCLUSION

The Java Media Framework (JMF) is an exhilarating and flexible API that allows Java developers to process media in lots of different ways. JMF was preferred 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 simple to take out the image from the traffic video data to shun traffic violations. This paper implementation is mostly focused to use by the traffic controller to shun the traffic rules and perplexity among the vehicle user and the traffic regulator. 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 vast traffic data through the implementation of similar technique and which will implement map-reduce framework on top of planned work which will assist to recover the images from huge or large data in an efficient time. Now a days vast data is surrounding everywhere so execution on big data acts as a major role and it is very vital because traffic data will turn out to be vast day by day so we have need of big data concepts like map-reduce framework, which will make easier means to attain the operations on vast data in quicker way.

VI. REFERENCES

[1] Agarwal, Anu, and Sudhir Goswami. "An Efficient Algorithm for Automatic Car Plate Detection & Recognition." *Computational Intelligence &*

Communication Technology (CICT), 2016 Second International Conference on. IEEE, 2016.

[2] Dev, Ashwathy. "A Novel Approach for Car License Plate Detection Based on Vertical Edges." *Advances in Computing and Communications (ICACC), 2015 Fifth International Conference on*. IEEE, 2015.

[3] Lee, Hwajeong, et al. "Real-time automatic vehicle management system using vehicle tracking and car plate number identification." *Multimedia and Expo, 2003. ICME'03. Proceedings. 2003 International Conference on*. Vol. 2. IEEE, 2003.

[4] Manchikalapudi, Varun. "Skew correction and localisation of number plate using Hough rectangular transform." *International Journal of Computer Science and Technology* 2 (2011).

[5] Xie, Lei, et al. "Real-time vehicles tracking based on Kalman filter in a video-based ITS." *Communications, Circuits and Systems, 2005. Proceedings. 2005 International Conference on*. Vol. 2. IEEE, 2005.

[6] Priya, V. Lakshmi, and K. Perumal. "Detecting the Car Number Plate Using Segmentation." *International Journal of Engineering and Computer Science* 3.10 (2014): 8823-8829.

[7] *Sivic, Josef, and Andrew Zisserman. "Efficient visual search of videos cast as text retrieval." IEEE transactions on pattern analysis and machine intelligence 31.4 (2009): 591-606.*

[8] Li, Xue-Chao, Cui-Hua Li, and Yi Xie. "A retrieval system of vehicles based on recognition of license plates." *Machine Learning and Cybernetics (ICMLC), 2011 International Conference on*. Vol. 4. IEEE, 2011.

[9] Zhong, Yu, Kalle Karu, and Anil K. Jain. "Locating text in complex color images." *Pattern recognition* 28.10 (1995): 1523-1535.

[10] Soni, Vishakha, Sandeep Kumar Mathariya, and Ranu Soni. "User friendly approach for video search technique using text and image as query." *IT in Business, Industry and Government (CSIBIG), 2014 Conference on*. IEEE, 2014.