ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Special Issue 4, August 2016

MRAFTAAR : An Innovative Mobile Phone Application for Curbing Vehicular Traffic Rule Violations using Cloud Computing

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ABSTRACT: This paper presents a remedy for curbing Traffic Rule Violations using a "Mobile Phone Application" called MRaftaar. The genesis of the paper comes from Large Number Of Accidents and Congestion On Roads causing problems to the general public. The technique used for MRaftaar is (i) Image Processing – extracting text by capturing image, (ii) Analyzing and (iii) Extracting text using OCR Technique.

Most of the people follow traffic rules, but some people don't. The MRaftaar is going to catch those people who don't follow traffic rules. The vigilant citizen who cares for traffic rules must download the MRaftaar Application in his/her phone. Whenever Vigilant Person 'A' finds other Person 'B' violating traffic rules, he takes a snap of B (registration number should be clearly visible in the picture) by clicking the "capture" icon in the MRaftaar App. Rest of the things take place in background and do not require user interaction. The image of the Violator B is uploaded on the Microsoft Azure Database Management System available on Cloud. The Azure Database will be used by the traffic police Person 'C' and he/she will print a Memo 'M' containing the Vehicle No., Offence Proof, Date and Time of Offence, Location and Offence History along with the amount of Fine 'F' which will be mailed to House 'H' of the Violator B. When Violator B gets Memo M, he/she has to deposit the Fine F online or in the Fine Collection Center. A particular percentage of F will be sent to Person A as reward. In this way, the whole process helps to curb Traffic Rule Violations and empowers General Public to behave like A which will reduce the number of people like B in future. This campaign can initiate a domino effect wherein the actions of one vigilant citizen can positively influence a behavioural change among other citizens.

KEYWORDS: Traffic Rule Violations, MRaftaar, Accidents, Congestion on roads, Image Processing, OCR, Microsoft Azure Database.

I. INTRODUCTION

One of the problems faced by our country's increasingly congested roads is that there is blatant violation of traffic rules. In most cases, people tend to follow traffic rules only when there is a traffic cop in the vicinity. The violation can be over-speeding, racing in a public road, dangerous driving, drunken driving, unattended vehicle or any other act that is a hindrance to a smooth traffic. The following are few of the traffic violations according to the Motor Vehicle Act. :

A. Driving a vehicle under the influence of liquor (Sec. 185 Motor Vehicle Act).
B. Driving without valid Driving License (See. 3rd with Sec. 181, Motor Vehicle Act).
C. Driving at Speeds that exceed limits (Sec. 183, M.V.Act)
D. Driving with only one light in front (Rule 37 (xii) read with Sec. 177, Motor Vehicle Act).
E. Using dazzling lights (Rule 405 read with Sec. 197, M.V. Act).
F. Using the horns in a forbidden area (Rule 403 read with Sec. 177, Motor Vehicle Act).
G. Use of air horn / musical horn (Rule 402 Motor Vehicle Act).

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H. Parking in no parking areas (Rule 37(x)read with Sec. 177, M.V. Act).
I. Vehicle emitting excess smoke (Rule 115 (I) C.M.V. Rule).
J. Failure to give proper signals (Sec. 121 read with Sec. 117, M.V.Act).
K. Rash driving (Sec. 184, M.V. Act
L. Failure to stop vehicle when required by any Police Officer in Uniform (Sec. 132 read with Sec. 177, M.V. Act).
M. Non-compliance of directions given by any Police Officer in the regulation of traffic in public places (Sec. 119, M.V. Act read with 179, M.V. Act).
N. Failure to observe the rule of the road (Rule 37(i) read with Sec. 177 M.V. Act).
O. Violations of all restrictions, (Rule 411 read with Sec. 177 M.V. Act).
P. There may be cases when vehicle is left Unattended

- If any vehicle is left unattended in a public place, it is liable for removal by the police.
- If any motor vehicle is left unattended in any public place for more than 10 hours, it can be towed away under the instruction of the police officer even if it is in a permitted parking place.
- If the vehicle is left unattended or abandoned or partially dismantled and is creating a traffic hazard due to its location in the highway or causing impediment to the traffic, it can be immediately removed by towing under the instruction of the Police officer.

As per the Data on Police Organizations in India by Bureau of Police Research & Development New Delhi, the actual strength of traffic police as on 1.1.2011 all over India is 39,654 for a population of 1.21 billion according to the report of 2011 census on indiaonlinepages.com.

With 3.27 being the Traffic Police Ratio per lakh (one hundred thousand) of population, there was an immediate need for a solution that could allow the Smartphone Public to become freelancers and help Traffic Police curb Traffic Rule Violations.

II. RELATED WORK

Similar initiative has been started in Bengaluru city wherein freelancers who download the Mobile App called Public-Eye need to fill in all the necessary information about the Violation in order to file a complaint. MRaftaar makes the process of Complaining against Traffic Rule Violation simple, quick and automatic. The user just needs to click the image showcasing the violation, rest of the things happen in the background without involving user interaction by using the Intelligence of Computer Vision.

III. MRAFTAAR

MRAFTAAR is an Innovative Mobile Phone Application for Curbing Vehicular Traffic Rule Violations using Cloud Computing. MRaftaar is makes the process of Complaining against Traffic Rule Violation simple, quick and automatic. The vigilant citizen who cares for traffic rules must download the MRaftaar Application in his/her phone. Whenever

Vigilant Person ‘A’ finds other Person ‘B’ violating traffic rules, he takes a snap of B (registration number should be clearly visible in the picture) by clicking the “capture” icon in the MRaftaar App. Rest of the things take place in background and do not require user interaction by using the Intelligence of Computer Vision. The image of the Violator B is uploaded on the Microsoft Azure Database Management System available on Cloud. The Azure Database will be used by the traffic police Person ‘C’ and he/she will print a Memo ‘M’ containing the Vehicle No., Offence Proof, Date and Time of Offence, Location and Offence History along with the amount of Fine ‘F’ which will be mailed to House ‘H’ of the Violator B. When Violator B gets Memo M, he/she has to deposit the Fine F online or in the Fine Collection

Center. A particular percentage of F will be sent to Person A as reward. In this way, the whole process helps to curb Traffic Rule Violations and empowers General Public to behave like A which will reduce the number of people like B in future. This campaign can initiate a domino effect wherein the actions of one vigilant citizen can positively influence a behavioural change among other citizens.

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A. Key Features

- Spot Complaint issuance
- Challan entry, pending challan information,
- Information on total cash collected-area-wise/freelancer-wise
- Retrieving transaction logs, verifying the documents,
- Making a daily report of the spot challan collected are all possible.
- Data encryption/decryption and data interface to challan database is also possible.
- Enables reading of daily/weekly/monthly transaction history
- DL & RC details of the vehicle owner and syncing with RTO/theft database.
- Reward to Freelancer

B. Advantages

- It will be able to eliminate full-time and temporary positions and has a better system of tracking warrants and unpaid tickets.
- Increased operational efficiency
- Enhanced transparency and accountability
- Instant server update and receipt printing
- Proven, secure, and scalable solution with Transactions updated in real time on the central server.
- Productivity enhancement of staff.
- Supports both online and offline transactions

IV. EVALUATIONS

The proposed System, MRaftaar is designed such that it is accurate and efficient in curbing Traffic Rule Violations. Although the situations when the efficiency of the system may be challenged have also been analyzed and evaluated:

A. Situations when the user might have shifted from the address after the vehicle registration.
B. There may be times when the vehicle is being driven by someone other than the registered user.
C. Or when the image frame fails to cover the offence and the offender together.

V. DISCUSSION

Text in images can exhibit many variations with respect to the following properties:

A. Geometry: z Size: Although the text size can vary a lot, assumptions can be made depending on the application domain. z Alignment: The characters in the text appear in clusters and usually lie horizontally, although sometimes they can appear as non-planar texts as a result of moving frames and angle of image capture. This does not apply to scene text, which can have various perspective distortions. Scene text can be aligned in any direction and can have geometric distortions (Fig. 4). z Inter-character distance: characters in a text line have a uniform distance between them.

B. Color: The characters in a text line tend to have the same or similar colors. This property makes it possible to use a connected component-based approach for vehicle number detection. Most of the research reported till date has concentrated on finding 'text strings of a single color (monochrome)'. However, video images and other complex color documents can contain 'text strings with more than two colors (polychrome)' for effective visualization, i.e., different colors within one word.

C. Motion: The same characters usually exist in consecutive frames in a video with or without movement. This property is 2 All these properties may not be important to every application. used in text tracking and

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enhancement. Text usually moves in a uniform way: horizontally or vertically. Scene text can have arbitrary motion due to camera or object movement.

D. Edge: Most text is easily read, due to strong edges at the boundaries of text and background.

E. Compression: Many digital images are recorded, transferred, and processed in a compressed format. Thus, a faster TIE system can be achieved if one can extract text without decompression.

VI. LIMITATIONS

The accuracy of Vehicle Number Detection Recognition depends on the quality of the image. An inaccurate reading may be caused by the following:

A. Blurry images
B. Handwritten or cursive text
C. Artistic font styles
D. Small text size
E. Complex backgrounds, shadows or glare over text or perspective distortion
F. Oversized letters

On photos where text is dominant, false positives may come from partially recognized words. On some photos, especially photos without any text, precision can vary a lot depending on the type of image.

VII. CONCLUSIONS

The MRaftaar Mobile Application was tested as a pilot project with 87 students in the Manav Rachna Campus and gave satisfactory results. Continuous changes are being made in the Cloud hosted Algorithms to improve the accuracy of Image Processing and Text recognition to make the Mobile Application more and more reliable.

VIII. FUTURE PROSPECTS

Negotiations will be made with The Traffic Police Department of India for allowing access to the centralized server that has data of each vehicle, including name of owner, type of vehicle, its colours and registration number which will help us automate the process of issuing Challan as well by creating an interface for the Traffic Police Officials who will then be able to issue Challans directly without having to query their Database using the Vehicle Number generated by the Application to acquire details of the Vehicle.

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