An Emergency Notification Android Application Using Number Plate Recognition

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----------ABSTRACT----------

When we were young, we were taught "precaution is better than cure" but nothing is as great like "one should help a person in need"The object we are proposing is an emergency notification application to broadcast emergency notifications to one or multiple groups of contacts using number plate recognition. It is built to run on mobile devices such as smart phones and tablet computers.Our subject is basically an emergency app which gives an helping hand in case of any accident situations that causes lives.an emergency notification application to broadcast emergency notifications to one or multiple groups of contacts using number plate recognition. It is built to run on mobile devices such as smart phones and tablet computers. Our subject is basically an emergency app which gives an helping hand in case of any accident situations that causes lives.

I. INTRODUCTION

The aim of the project is developing an android application using Automatic Number Plate Recognition (ANPR). Automatic Number Plate Recognition was invented in 1976. However, it gained much interest along with the improvement of digital camera and the increase in computational capacity. It is simply the ability to automatically extract and recognize a vehicle number plate's characters from an image. In essence it consists of a camera or frame grabber that has the capacity to grab an image, find the location of the characters in the image and then Retreieve the characters for character recognition tool for to translate the pixels into numerically understandable characters. ANPR can be used in many areas from speed enforcement and tool collection to management of parking lots, toll collection places at highways, tracking of stolen cars, etc. It can also be used to detect and prevent a wide range of criminal activities and for security control of a highly restricted areas like military, access and border control, central and local governments, law enforcements, police, etc. The presented ANPR system is aimed to be light weighted so that it can run real time and recognizes standard number plates under normal conditions.

OCR helps with the issue of recognizing optically processed characters. Optical recognition is performed off-line after the writing or printing has been completed, as opposed to on-line recognition where the computer recognizes the characters as they are drawn. The morer constrained and regular the input is, the better will be the performance and output of the OCR. The important rule in automatic recognition of patterns, are first to teach and let the machine understand which classes of patterns that may have occured and what they seem to look like. In OCR, the patterns are letters, numbers and some special symbols like commas, question marks, etc., while the different classes correspond to different characters. The understanding of the machine is done by showing the machine examples and lists of characters of all range of variety of different classes. According to these examples, the machine builds a prototype, model or a definition of each class of characters. Then,at recognition, the unknown characters are compared to the previously obtained descriptions, and assigned the class that gives the best match to the visual presentation.OCR systems used in Automatic Number Plate Recognition involves three major processes. They are number plate localization, character segmentation, character recognition. In this project, we are going to develop an android application that is designed for use during an emergency situation. The application uses the device's camera to recognise the license plate in a vehicle and use the license plate number to derive the corresponding data sets from the database. The data set will return details of the victim's registered acquaintance number like their family members and doctor and the GPS coordinates of the accident occurred zone. The application notifies the victim's acquaintances along with the location and also sends a computerized call to the nearest emergency centre or an ambulance.

II. RELATED WORK

2.1 License Plate Recognition Based On Temporal Redundancy

Identification of vehicle number plates is an vital task in several realtime applications. Most approaches usually at first detect a vehicle, localize the number plate and then recognize ,identify its characters. However, the focus of

the work does things on performing these task using only a single frame of each vehicle in the video. Therefore, such kind of approaches might have their recognition rates reduced immensely due to noise present in that particular frame or photo. Instead of selecting a single frame to perform the recognition, this is a novel real-time approach to automatically detect the vehicle and identify its license plate based on temporal redundancy information

2.2 Automatic Recognition Of Ethiopian License Plates

This paper presents an automatic recognition system for Ethiopian license plates. The proposed system has three major components: plate detection, character segmentation and character recognition. This system used Gabor filters for plate detection, connected component analysis for character segmentation, and a correlation based template matching method for character recognition.Adding to the correlation value the recognition process gets help by color analysis techniques and location data of characters. To test the performance of the system, a dataset of 350 car images of RGB color format were collected from moving cars under different angle, distance,motion and illumination conditions. Test results on the dataset showed plate detection rate of 88.9%, character segmentation accuracy of 83.9% among detected plates, and character recognition rate of 84.7% among correctly segmented characters.

2.3 Automatic License Plate Location And Recognition Based On Feature Salience

License plate recognition plays an important role in numerous applications, and a number of techniques have been proposed. In this paper, a nobel method to recognize license plates is implemented. At First, the license plates are located using important features. after, each of the seven characters in a license plate is then segmented. At the end, the character recognizer extracts some salient features of the characters and makes use of a feature-salience classifier to achieve robust results of recognition. The overall rate of success of the deployed method is 93.1%.

2.6 Geometric alignment by deep learning for recognition of challenging

license platesthis method finds a solution to the problem of license plate recognition in-the-wild (in the meaning of capturing data in unconstrained conditions, taken from arbitrary viewpoints and distances). This proposed system is a method for automatic license plate recognition based on a geometric alignment of license plates as a preceding step for holistic license plate recognition. The alignment is done by a convolutional neural network that estimates control points for rectifying the image and the following rectification step is formulated so that the whole alignment and recognition process can be assembled into one computational graph of a contemporary neural network framework, such as tensorflow. The experiments show that the use of the aligner helps the recognition considerably; the error rate dropped from 9.6% to 2.1% on real-life images of license plates.

2.6 Learning-Based Approach For License Plate Recognition

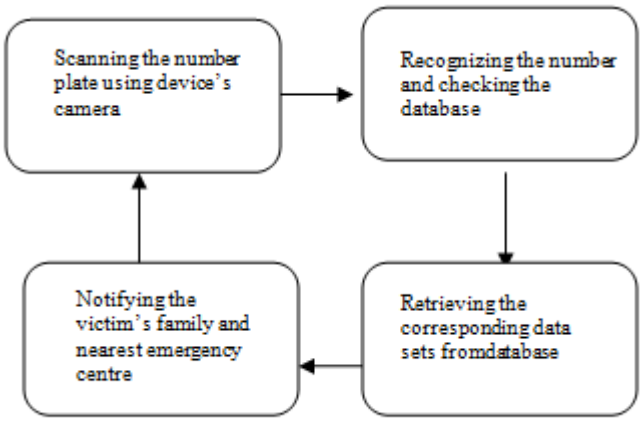
This system consists of three modules. Which are, the car detection module, the license-plate segmentation module and the recognition module respectively. The car detection module recognise the car in a given image sequence obtained from the camera with a simple color-based approach. The segmentation module gets the number plate in the detected car image by neural networks as filters for analyzing the color, texture and properties of the number plate. The recognition module then reads the characters on the detected license plate with a support vector machine (SVM)- based character recognizer.

2.6 Recognition of Vehicle Number Plate Using Matlab

This system is also implemented on the gateway of security control of a highly restricted area for example military zones or area around top government offices like Parliament etc.,The developed system first detects the vehicle and then picture the vehicle image. Vehicle number plate region is distillated with the help of image segmentation in an image. OCR technique is used for the character recognition. The resultant data is then used for comparing with the records on a database so as to come up with the specific information like the vehicle owner, place of registration, address, emergency contact etc. This system is implemented and simulated in Matlab, and its performance is tested on real image.

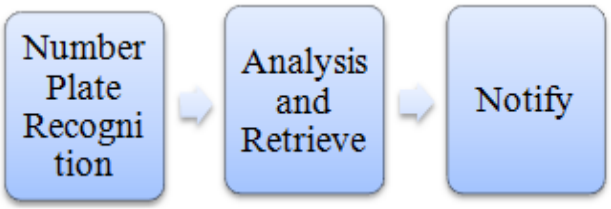
III. PROPOSED WORK

In this project, we present a real time application based on android for automatic number plate recognition. Steps are given as follows



Detects and recognises the characters from scanning the number plate [2]Uses the vehicle number to retrieve the corresponding data sets from the database

Notifies the victim's family members and the nearest emergency centre.



The android application is based on Optical Character Recognition which involves the following three stages – Number plate localization, Character segmentation and Character recognition.

IV. ALGORITHM

The major steps of the proposed android application for automatic license plate recognition are shown below:

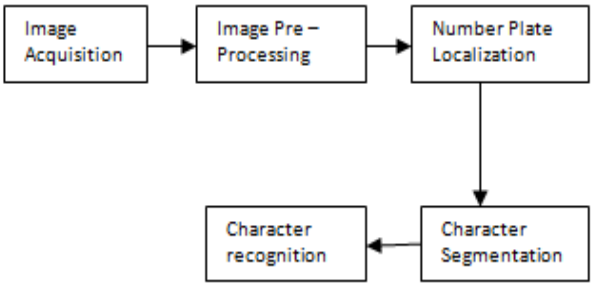


Figure 1 - Android Application Algorithm

4.1 Image Acquistition

Image acquisition is an Principle stage to the ANPR system because it gives the input data for the further subsiding processes. There are numerous ways of acquiring the license plate's images. In the proposed system, digital camera of an android phone of 3.2 megapixel camera is used. The input image is 120 * 600 or 1200 * 600 pixels. For example, a digital camera with or without anembedded infrared lighting have been used to acquire license plate.

4.2 Image Pre-Processing

The ultimate goal of this process is to improve image quality which was captured previously. In this stage, the colour image was converted to gray scale, and non-linear medium filter was used to enhance the image. It can be summarized that the choice of pre-processing algorithms depends on the complexity and the level of noise of the acquired image. Due to low processing power of smart phone, we need to carefully select the pre-processing algorithm so as not to burden the processor but producing a reasonable enhanced image.

4.3 Number Plate Localization

Localization of the license plate is to detect the rectangular area hat surrounds the number plate in a pictured image. In human explanations, a number plate is a plastic or metal plate pasted to a vehicle for identification purposes. However, the machines do not understand well this description.so, we have to find an alternative description of a number plate based on descriptors that will be understandable for machines. In our design, the license plate image was captured by smart phone, in which a relatively proper image could be obtained by using rectangular guide during capturing.

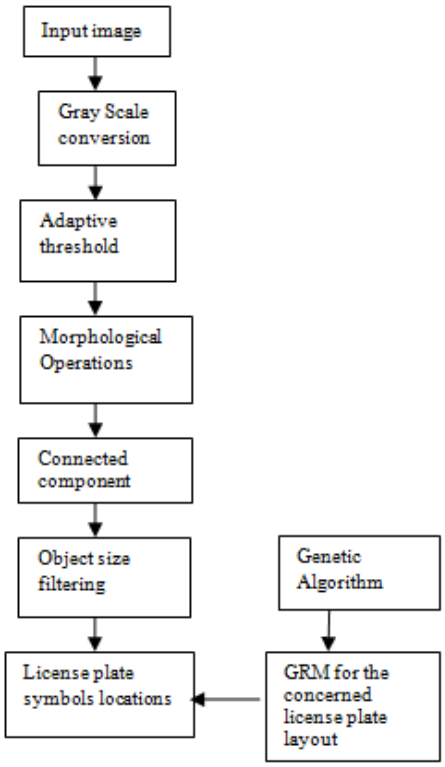
4.4 Character Segmentation

Segmentation is a method that determines the components of an image There are many different methods for character segmentation. The first step is increasing the contrast of the image to extend over the entire range of gray levels available which is between (0-225). The next step is threshold the image. Actually, search for components connectivity in the image and assign a special label for each connected items. Finally, resize each character from the previous step to the standard size (20x10) to be used for next step recognition process.

4.5 Character Recognition

Optical character recognition (OCR) is the process of converting the images of handwritten or typewritten into machine encoded text. In previous researches, there are numerous methods such as simple Euclidean distance, Hidden Markov Model (HMM), Artificial Neural Network (ANN), Support Vector Machine (SVM) and template matching. OCR could be achieved through different algorithms. The corresponding and matching algorithm is selected based on the requirements of the applications and constraints. Our proposed system uses Genetic algorithm due to its robustness and success in the resolution of diverse types of problems. If two or more characters can represent the region, the genetic decisor selects by deciding which of them will be given as recognized. Some virtual indentitis are made that are compared with the

image, as follows: if be white where it had to be white, his fitness is hiked. Even though, if the color does not match with the waited one, his fitness the reduces.



V. CONCLUSION

In this paper, we have presented a robust real-time endto-end ANPR system using optical character recognition state-of-the-art YOLO object detection C. We trained a network for each ANPR stage,except for the character recognition where letters and digitsare recognized separately (with two distinct CNNs).We also introduced a public dataset for ALPR that includes4,500 fully annotated images (with over 30,000 LP characters) our OCR could recognize anything at a look but not to import image and process it.At present, the bottleneck of ANPR systems is the character segmentation and recognition stages. In this sense, we have performed several approaches to increase the recognition rates inboth stages, such as data augmentation to simulate LPs fromother vehicle's categories and also to hike characters with fewinstances in the training set. Although simple, these strategieswere very useful to accomplish outstanding results.Our system was capable to achieve a full recognition rate of93:54% (85:45% without temporal redundancy) in the SSIGdataset, considerably outperforming previous results (81%) with temporal redundancy and 63% without and presenting a performance slightly better than commercialsystems (93%). In addition, the proposed system was theonly to correctly recognize at least 6 characters in all LPs.We also evaluated our proposed ALPR system and twocommercial systems as baselines on the new dataset. Theresults demonstrated that the UFPR-ALPR dataset is verychallenging since both commercial systems reached recognitionrates below 70%. Our system performed with betterment, withrecognition rate of 78:34%. whatsoever, this result is still not thatsatisfying for some real-world ANPR applications.

As future work, we intend to explore new CNN architecturesto further optimize (in terms of speed) vehicle and LPdetection stages. We also intend to correct the alignment ofinclined LPs and characters in order to improve the charactersegmentation and recognition. In addition, we are planning to explorethe vehicle's manufacturer and model in the ANPR pipelineas our new dataset provides such information set. Although oursystem was conceived and evaluated on two country-specificdatasets from Brazil, we believe that the proposed ALPRsystem is robust to locate vehicle, LPs and alphanumericcharacters from any other country. In this direction, aiminga fully robust system we just need to design a characterrecognition module that is independent of the LP layout.In this block-based motion estimation and motion compensation, an Adaptive Rood Pattern Search is proposed. This technique is analyzed with the various existing algorithms to measure the executing time and the Peak Signal-to-noise Ratio. In future, ARPS technique could be integrated with the Rate Distortion Optimized Transform in order to further reduce the computational complexity and achieve more compression rate without compensating the video quality.

REFERENCES

[1] S. Du, M. Ibrahim, M. Shehata, and W. Badawy, *"Automatic licenseplate recognition (ALPR): A state-of-the-art review," IEEE Transactionson Circuits and Systems for Video Technology*, vol. 23, no. 2, pp. 311–325, Feb 2013

[2] C. Gou, K. Wang, Y. Yao, and Z. Li, "*Vehicle license plate recognitionbased on extremal regions and restricted boltzmann machines," IEEETransactions on Intelligent Transportation Systems,* vol. 17, no. 4, pp.1096–1107, April 2016.

[3] O. Bulan, V. Kozitsky, P. Ramesh, and M. Shreve, "*Segmentationandannotation-free license plate recognition with deep localization andfailure identification," IEEE Transactions on Intelligent TransportationSystems*, vol. 18, no. 9, pp. 2351–2363, Sept 2017.

[4] J. Deng, W. Dong, R. Socher, L. J. Li, K. Li, and L. Fei-Fei, *"ImageNet:A large-scale hierarchical image database," in 2009 IEEE Conference onComputer Vision and Pattern Recognition,* June 2009, pp. 248–255.

[5] H. Li and C. Shen, "*Reading car license plates using deep convolutionalneural networks and LSTMs,*" CoRR, vol. abs/1601.05610,2016.[Online].Available: http://arxiv.org/abs/1601.05610

[6] H. Li, P. Wang, and C. Shen, "*Towards end-to-end car license platesdetection and recognition with deep neural networks,*"CoRR, vol.abs/1709.08828, 2017. [Online]. Available: http://arxiv.org/abs/1709.08828

[7] S. Z. Masood, G. Shu, A. Dehghan, and E. G. Ortiz, *"License platedetection and recognition using deeply learned convolutional neuralnetworks," CoRR, vol.*

abs/1703.07330, 2017. [Online]. Available:http://arxiv.org/abs/1703.07330

[8] G. R. Gonc¸alves, S. P. G. da Silva, D. Menotti, and W. R. Schwartz,"Benchmark for license plate character segmentation," *Journal of Electronic Imaging,* vol. 25, no. 5, pp. 053 034–053 034, 2016.

[9] G. Ning, Z. Zhang, C. Huang, X. Ren, H. Wang, C. Cai, and Z. He,"Spatially supervised recurrent convolutional neural networks for visualobject tracking," in 2017 *IEEE International Symposium on Circuits andSystems (ISCAS),* May 2017, pp. 1-4.

[10] B. Wu, F. Iandola, P. H. Jin, and K. Keutzer, "SqueezeDet: Unified,small, low power fully convolutional neural networks for real-timeobject detection for autonomous driving," in 2017 *IEEE Conference on computer Vision and Pattern Recognition Workshops (CVPRW),* July2017, pp. 446–454.

[11] J. Redmon and A. Farhadi, "YOLO9000: Better, faster, stronger," in2017 *IEEE Conference on Computer Vision and Pattern Recognition(CVPR),* July 2017, pp. 6517–6525.

[12] J. Redmon, S. Divvala, R. Girshick, and A. Farhadi, "You only lookonce: *Unified, real-time object detection," in 2016 IEEE Conference onComputer Vision and Pattern Recognition (CVPR),* June 2016, pp. 779–788.

[13] C. N. E. Anagnostopoulos, I. E. Anagnostopoulos, I. D. Psoroulas,V. Loumos, and E. Kayafas, "License plate recognition from still imagesand video sequences: A survey," *IEEE Transactions on IntelligentTransportation Systems,* vol. 9, no. 3, pp. 377–391, Sept 2008.

[14] G. S. Hsu, J. C. Chen, and Y. Z. Chung, "Application-oriented licenseplate recognition*," IEEE Transactions on Vehicular Technology,* vol. 62,no. 2, pp. 552–561, Feb 2013.

[15] H. Ashtari, M. J. Nordin, and M. Fathy, *"An iranian license platerecognition system based on color features," IEEE Transactions onIntelligent Transportation Systems,* vol. 15, no. 4, pp. 1690–1705, Aug2014.

[16] M. S. Sarfraz, A. Shahzad, M. A. Elahi, M. Fraz, I. Zafar, and E. A.Edirisinghe, *"Real-time automatic license plate recognition fr for CCTVforensic applications," Journal of Real-Time Image Processing*, vol. 8,no. 3, pp. 285–295, Sep 2013.

[17] R. Panahi and I. Gholampour, "Accurate detection and recognition ofdirty vehicle plate numbers for high-speed applications*," IEEE Transactionson Intelligent Transportation Systems*, vol. 18, no. 4, pp. 767–779,April 2017.

[18] Y. Yuan, W. Zou, Y. Zhao, X. Wang, X. Hu, and N. Komodakis,"A robust and efficient approach to license plate detection," *IEEETransactions on Image Processing,* vol. 26, no. 3, pp. 1102–1114, March2017.

[19] S. Azam and M. M. Islam, "Automatic license plate detection inhazardous condition," *Journal of Visual Communication and ImageRepresentation,* vol. 36, pp. 172 – 186, 2016.

[20] S. Montazzolli and C. R. Jung, *"Real-time brazilian license platedetection and recognition using deep convolutional neural networks,"in 2017 30th SIBGRAPI Conference on Graphics, Patterns and Images*,Oct 2017, pp. 55–62