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Automatic Alphanumeric recognition using Python and OpenCV- A new approach of ANPR

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ABSTRACT

Alphanumeric recognition is a computer aspect that recognizes any digital Image automatically fed from an external source. This system initiates from obtaining digital images, localizing concerned alphanumeric areas, truncating characters and OCR from given alphanumeric characters. This system is intended to be designed and developed for helping in image processing and algorithms to indentify the area from where given alphanumeric digits can be identified. These characters in a segmented way are identified by aid of Open Source Computer Vision Library (OpenCV) and programmed in python language. In given source image KNN (k-Nearest Neighbor) algorithm is used to find all possible alphanumeric characters.

Keywords— **Alphanumeric Character, OpenCV, KNN algorithm, Optical Character Recognition (OCR).**

1. INTRODUCTION

Contributive mutualism for the pursuit of innovative and creative aspects in many fields including computer science have let people develop marvelous things .Cutting across differences ,people likely interested and enthusiastic have developed things working together. This type of open-source contribution has led to the development of python. Computer vision developed at Intel called Open-Source Computer Vision (Open CV), is a library of programming functions mainly aimed at real-time computer vision. Open CV was built to provide a common infrastructure for computer vision application and to accelerate the use of machine perception in the commercial products. In the continuation of paradigm, we have combined programming aspects from python with OpenCV also known as Open CV python to attain our results.

Identification of numeric ID's will be the main concern aimed to be achieved with this project. Number plates used in vehicles which are unique to every other and with the advent of increasing vehicular presence this come in wrap with huge problematic aspects in dealing with the same, technological aspects are needed to manage safety, lane switching alerts, highway speed detection, stolen vehicles detection and interception for securities.Typical Automatic License Plate Recognition (ALPR) systems are implemented using proprietary technologies and hence are costly.

2. PROPOSED SYSTEM

In India usually as standard protocol, two types of number plates are used on vehicles; Black characters in white background color and black characters on yellow background plate. We will try to emphasis on these two types of cases in following steps.

2.1 Capture the Input Image

Using any high-resolution camera or an Infrared (IR) camera. The camera needs to be rolled and pitched with respect to the aim objects such as Number plate. Capturing should be done with care as little skew can cause distortion of image and character recognition difficult. The image captured in RGB format has to be converted to grayscale format.

2.2 Preprocessing:
After capturing the image preprocessing is used to enhance the quality of the same to make it more valid sample for further applicability of process. As we are dealing with computer vision aspect, preprocessing is very common to in so.
A set of algorithms in present system will involve two processes to preprocessing.

- **(a) Resize:** Aspect ratios of taken image are adjusted in this step as images captures might be large and can affect system processing speed.
- **(b) Convert Color Space:** Images captured are either in any raw or multimedia format and needs to be converted into grayscale.

2.3 Localize
Localization is basically a process of binarizing the image as during capture of our sample possibility of inclusion of aspects of environment is high. Our concern is the area with the alphanumeric digits Ex. Number plate and need of localizing it from noise. Localization involves two steps:

(a) Highlighting Character
(b) Suppressing background

Image processing technique Called Thresholding and is done for Localization. The pixel of the images is truncated to two values depending upon the value of threshold. Threshold requires pre-image analysis for identifying the suitable threshold value. Adaptive thresholding technique determines a local optimal threshold value for each image pixel so as to avoide the problem origination from non-uniform illumination.

2.4 Connected Component Analysis
Blobs
With the purpose of eliminating undesired image areas, a connected component algorithm is applied to binarized sample . Connected component analysis is performed to identify the characters in the image. Traversing the sample image happens to find connected pixels. Each connected component (blobs) are labeled and extracted.

2.5. Segmentation
Once the blobs are labeled, segmentation is used to crop them out. Cropped blobs are supposed to be in the sample area captured and truncated in earlier steps. Image Scissoring algorithm is used to vertically scan the obtained sample and scissored at the row on which there is no white pixel and scissored area is copied into a new matrix.

2.6 Character Recognition
Selected blobs are sent to Optical character Recognition (OCR) Engine, which returns the ASCII of the sample.

Tools
2.7.1 Python: Python is a general-purpose interpreted, interactive, object- oriented, and high-level programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL). It offers strong support for integration with other languages and tools, and comes with extensive standard library. Python helps the user to think problem centric rather than language centric as in other cases. This makes python best for computational problems involving cross-over analysis to deduce results.

2.7.2 OpenCV: OpenCV is a cross-platform library using which we can develop real-time computer vision applications. It mainly focuses on image processing; video capture and analysis including features like face detection and object detection. Originally

developed by Intel, it was later supported by Willow Garag. The library is cross-platform and free for use under the open-source Apache 2 License. Starting with 2011, OpenCV features GPU acceleration for real-time operations.

2.7.3 Tesseract: Tesseract is an optical character recognition engine for various operating systems. It is free software, released under the Apache License. Originally developed by Hewlett-Packard as proprietary software in the 1980s, it was released as open source in 2005 and development has been sponsored by Google Google since 2006. In 2006,Tesseract was considered one of the most accurate open- source OCR engines then available.

cvBlobsLib: Is a library to perform binary images connect component labeling. It also provides functions to manipulate. filter and extract results from the extracted blobs. The library provides two basic functionalities.

- Extract 8-connected components in binary or grayscale images.
- Filter the obtained blobs to get the interest objects in the image.

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