Automatic License Plate Recognition

Interim Presentation

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Guide: Sajith N

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Outline

1. What?
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1. What?
2. Why?
3. Scope

Group VI  Automatic License Plate Recognition
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1. What?
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4. System
   - Design
   - Licensing

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5. Issues
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   - Image Quality
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5. Issues
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   - Image Quality
6. Tools
   - Language
   - Libraries
   - Others

Group VI
Automatic License Plate Recognition
Automatic License Plate Recognition (ALPR) is a real time embedded mass surveillance system that captures the image of vehicles and recognizes their license number.
Some applications of the system are:

- Automated traffic surveillance and tracking system.
- Automated high-way/parking toll collection systems.
- Automation of petrol stations.
- Journey time monitoring.

Making the process fast, effective and cost efficient
ALPR systems have been implemented in many countries like Australia, Korea and few others.
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These countries enforced standards on the license plates in terms of dimensions, borders, colour, font size and type. Thus making the system easy to implement.
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Systems have been implemented using proprietary tools and libraries.
Understand the image processing techniques involved.
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Realize the issues and challenges for implementing the system.
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Gain basic project management skills.
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Familiarize several tools for developing an intuitive system.
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Realize the issues and challenges for implementing the system.

Gain basic project management skills.

Familiarize several tools for developing an intuitive system.

Develop basic document writing and presentation skills.
System
The proposed system consists of 6 phases:

1. Capture
2. Preprocess
3. Localize
4. Character Recognition
5. Segment
6. Connected Component Analysis
Data Flow Diagram

- Camera
  - Image
- Preprocess
  - Gray Image
- Localize
  - Binary Image
- Segment
  - Blobs
  - Blob Images
- Classify
  - Selected Blobs
- Character Recognition
  - ASCII
- License Number

Group VI
Automatic License Plate Recognition
Capturing Image

The image of the vehicle is captured using a high resolution photographic camera.
Capturing Image

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To understand the variations in settings like exposure, frame aperture etc, we have chosen 3 cameras.

- **Canon 1000D**
  High resolution DSLR camera. HD images.

- **Canon PowerShot IS 800**
  8 MP digital camera with Image Stabilization.

- **Nokia E72**
  5 MP digital camera embedded on a mobile phone.
Preprocessing

Two operations involved are:

1. **Resize**
   Image from the camera is to be resized for optimization reasons.

2. **Change color space**
   Image is converted to Grayscale from RGB.
Threshold is an image processing operation by which the pixels of the image are truncated to two values depending upon the value of threshold.
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We use this operation to convert the image to binary and localize the license plate from the image of the vehicle.
Thresholding requires pre image analysis for identifying the suitable threshold value.
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Many statistical and physical modelling algorithms have been developed for the same purpose. Normal thresholding techniques are inefficient due to several reasons. Hence, adaptive thresholding is used.
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To be precise, Otsu thresholding is used.
Connected component analysis is performed to identify the characters in the image.
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Basic idea is to traverse through the image and find the connected pixels. Label them and extract.
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cvBlobsLib is a library under OpenCV which extract 8-connected components in binary or grayscale images.
Crop out the labelled connected components called blobs.
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Save them as individual images.
The blobs are send to an Optical Character Recognition engine for returning the ASCII.
Character recognition

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Tesseract is a leading OCR library developed in the HP Labs, later acquired and highly modified by Google.

Google released this into the open source community.
The system will be released under the GNU General Public License V 3.0
Complexity and probability of failure of the system increases as there are multiple issues.
Flaw in license plate standardization

- Dimensions
- Fonts – type, size
- Art works
- Colours
- Position of the plate
Thresholding

- White balance
- Colour spaces
- Camera
- Lighting
Undesirable blobs creep in during connected component analysis which if un-noticed can cause trouble in the character recognition phase.
The entire system is implemented using free software. Ubuntu GNU/Linux operating system is used.
Python

Python is an interactive, interpreted, dynamic language which is free and highly efficient.

Python is language libre. Shaped by the users around the world. Attracting more developers due to its simplicity.

The entire ALPR system is implemented in Python.
Open Computer Vision

OpenCV library is developed at the laboratories of Intel Corporation. They contain sets of highly efficient multimedia processing functions.
Libraries

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Python Imaging Library
PIL is the base image processing library from Python.
**Tesseract OCR**

Tesseract OCR library from Google is used as the OCR engine.
Libraries

Tesseract OCR

Tesseract OCR library from Google is used as the OCR engine.

Qt Designer and PyQt

The GUI is designed using Qt designer and Python code for the same generated using PyQt.
Other Tools

**Project Management**

**Subversion Source code control system.**
Other Tools

**Project Management**

Subversion Source code control system.

**Document Generation**

LaTeX
Dia
Thankyou!

Automatic License Plate Recognition
Interim Report

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