Mobile Augmented Reality Number Plate Detection Android System

System User Manual

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Background

This document contains all information required for an effective and efficient use of the Mobile Augmented Reality Number Plate Detection System for both the mobile (Android) and web interfaces. It entails detailed steps one must follow for a detection and retrieval of information pertaining to the detected number plate.

Software Installation Prerequisites

Mobile Application

- The mobile application subsystem runs on mobile smartphones with an Android OS.
- Efficient operation of this application will be fully evident on devices running Android KitKat (4.4/ API 19) operating system.
- For backward compatibility reasons, the application allows effective operation on devices running android Jellybean (4.0.3/ API 15).
- Before installation, the user must install a piece of software containing all dependencies for the application to operate. The software name is "*OpenCV Manager*" and can be found on the Google Play Store for free.

Web Application

- The web application requires no extra piece of software than the user's choice of the supported web browsers, namely; Google Chrome, Mozilla Firefox (Version 16+), Opera (Version 9+), Internet Explorer (Version 7+), Safari (Version 6+) and Ice Weasel. Any operating system that supports these web browsers will be able to get the web application operating.
- For retrieval of information from the remote database, the application will need internet connection. The speed of the retrieval will be determined by the speed of the connection.

Installation

The process of installing the mobile application is silent and automated. The installation concludes that the user has fully granted access of all the device's counterparts for the operation of the application. On the other hand, the web interface needs no explicit installation since all its operations are deployed onto the server.

Data Management (CRUD)

The web application controls all the data for vehicle owners as well as information about the vehicles. This application can be used to create, update, delete, and read data about owners, vehicles, detections as well as the Audit Log for all processes that take place on either the mobile application or the web application.

Mobile Application Operation

After successfully installing the mobile application, the user may start performing number plate detections.

When the application opens it loads a menu with two items ("Detect" and "History"). The user can select either. The process description for each menu item is provided below.

Detect

- This menu item is used to perform number plate detections with the device's camera.
- It loads a camera interface view that looks like one wants to take pictures or videos. However this is used for the Augmented Reality feature of the application.
- When the user pans through the natural environment, the application keeps searching for a "number plate" object. When it recognizes it, an orange frame is drawn around the perceived number plate to prepare for recognition of the contents of the number plate.
- At this stage the user must try to keep the device stable for flexible and more accurate detections.
- When the detection is complete, an appropriate message will appear on the screen notifying the user that the detection has been made and the information can be found on the History page.
- Furthermore, a tone plays based on the vehicle status. I.e. If the vehicle status is negative (stolen, has fines, etc.) then a low sound plays, else if the vehicle status is positive then a higher sound will play.

History

- Selecting this menu item will open a History page with a list of number plates that have been scanned since installation.
- These number plates are ordered by detection time in descending order from the most recent detection.
- Each list item is expandable and by so doing, the application will retrieve, from the database, all information pertaining to the detected number plate (owner's details, vehicle's details, and vehicle status).
- If the number plate is not in the database, an appropriate message is shown on expansion of the number plate item.

Compilation and Maintenance

For development purposes, this part discusses methods that were used by the developers of this system. However, it does not rule out use of any other technologies or techniques for maintenance purposes.

Mobile Application

All source code was written and compiled in a JAVA Virtual Machine with the use of the Eclipse IDE in conjunction with the Android SDK. For compilation, one will need an Android device that meets the Software Installation Prerequisites stated above. A connection between the IDE and the mobile devices requires a USB Cable for the installation to take place after compilation.

Web Application

The web application was designed and developed as a Java EE project that makes use of Servlet pages for interface interaction. Compilation of this application is done in conjunction with the building and deployment of the REST service which produces a .war file that can be plugged onto any server. In our case we used Glassfish 4.

Maintenance

The whole system was created using a Layered Architectural pattern, thus making it easier to maintain the different components and layers of the system without interference of the rest of the layers. After maintenance of a component and/or layer, one would obviously need to update communication adapters were necessary. In addition, each of the subsystems can be plugged/integrated with any other system without any major development changes.