

Project: Smart Vision	Document: A framework for mobile-based computer vision applications
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1. Project overview

This project consists in the design, implementation and deployment of a general framework for developing mobile-based computer vision applications. Current smartphones and tablets are equipped with a rich set of sensors, such as accelerometer, microphone, GPS and camera that can be used for sensing the environment. This project is aimed to use different kinds of information acquired by a mobile device to obtain useful information about objects around the user. The system should be able to perform searches by keywords, by images or by proximity to retrieve generic objects of interest. Users can define a subset of search criteria to perform the query.

1.1. Involved Topics

The following topics are strictly involved in the project development:

- Software engineering of a client-server application: the client/server technology is computer architecture for separating the application functions into two or more distinct parts. In this way it is possible to divide functions into client (requestor) and server (provider) subsystems, using standard communication protocols, such as TCP/IP.

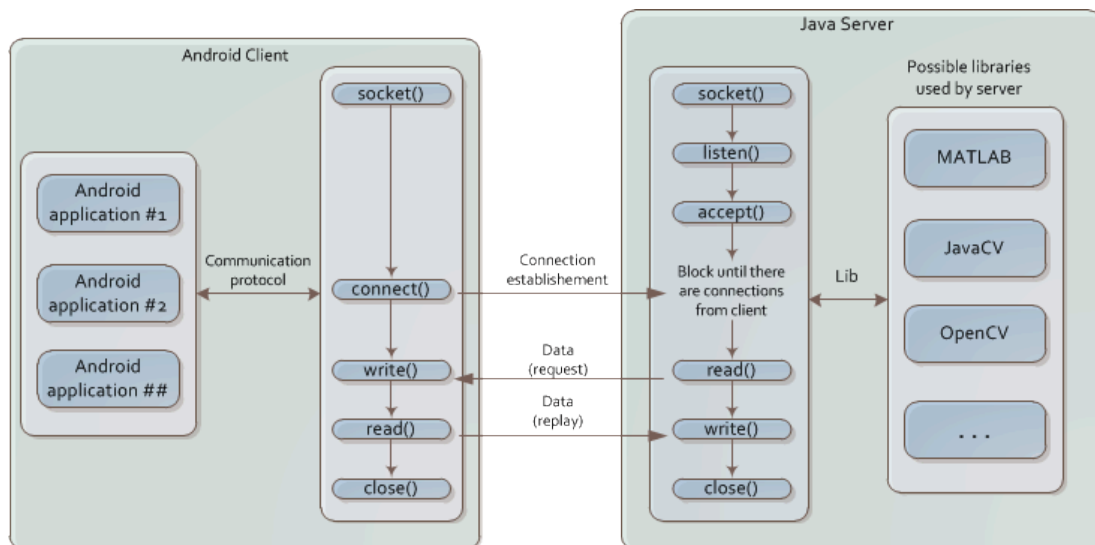


Figura 1: Client-Server approach using socket protocol

The importance to use a Java server is the interoperability between the Java language itself and other toolbox and libraries as MATLAB, JavaCV, OpenCV, etc. Furthermore, using a client-server approach is possible to decrease the computational load of the client increasing the performance of the framework.

- Design of the client side (based on Android OS): while server stores and manipulates data, the client provides to send information and wait for the result calculated. The framework will be develop to perform computer vision applications where the client side input is an image and the output is the same image encoding in byte.
- Design of the provider side, which could involve computer vision approaches and machine learning methods to perform object/image classification. Object recognition from images or video sequences is a challenge task that requires the design of ad hoc algorithms.

- Definition of complex queries based on different search criteria. Data retrieval by image similarity, spatial position or filtering involves the study of ad hoc metric measures, indexing techniques and searching strategies not available in standard database applications.

2. Target Applications

The framework can be exploited for a number of target applications; some examples are given in the following sections.

2.1. Annotating places of interest

This application allows to manage (retrieve and update) information about urban buildings on the basis of mobile phone imagery and position e. g., for tourist information services.

A user acquiring by a mobile camera the image of a place of interest can receive information such as architectural relevance, history of the building, and other specific information. Moreover the user can perform a search of other relevant building of the same type, destination of use or architectural style in a distance range defined by the user. The database of knowledge can be updated by information and pictures provided by other users in a sort of “Wikipedia experience”.



2.2. Fashion shopping

Fashion shopping is a search engine that allows to search clothes and accessories using images in conjunction or as an alternative to words.

The user acquires the image of the item of interests and receives information about the item (and similar objects) such as brand details, availability and prices in the main online stores.



2.3. Waste Recycling

Waste recycling is a system that provides information about correct differentiated waste collection on the basis of visual material analysis and recognition.

A user acquiring by a mobile camera the image of a determined item to trash, can receive information about the material of the item itself using its shape, color and texture.

