EE368 Project Proposal: Android Graph Reader
April 29, 2011

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Project Description
(This project requires a DROID camera phone.)
In this project, we aim to design and implement a system that allows a user to quickly and accurately read values of points of interest in two types of graphs, using photographs of printed graphs taken with an Android phone. We have two target functionalities:

1. Given a photograph of a simple line/curve plot (i.e. depicting a 2D function \( y=f(x) \)) with sufficient markings on linear, semi-log or log axes, our system will calculate the \((x,y)\) coordinates of a point of interest and display this information to the user on the handset.

2. Given a photograph of a simple 2D quantitative grayscale image (i.e. a 3D function \( z=f(x,y) \)) where the \( z \) is displayed as the grayscale value of the pixel at \((x,y)\) with a “color bar”-type legend, our system will calculate the \((x,y,z)\) coordinates or just the \( z \)-value of a point of interest and display this information to the user on the handset.

The target users of our system are students who need to read data off graphs in textbooks and printed notes. Making this system available on the Android platform will improve the accessibility of this technology, especially in comparison to existing computer-based applications (see Related Work).

The software modules in this project include:
1. User interface: input of graph and point of interest, and output of information
2. Image correction: orientation, perspective and lighting/shadows
3. Information extraction: calibration of coordinates using axis markings and “color bar” legend
4. Coordinate estimation: interpolation using extracted information

Image processing techniques to be used in this project include:
- Feature detection [1] [2]
- Orientation and perspective correction [3]
- Lighting compensation (possibly including shadow removal) [4] [5]
- Optical character recognition [6][7]
Related Work
There are a number of existing applications/applets that digitize scatter plots and line graphs. However, most can only process scanned graphs or digital images of these graphs. Most also require manual calibration or selection of curves (1-5 below). The two most advanced applications (6 and 7 below) can perform the first of our two target functionalities to its entirety, though not on an Android platform. However, we have not found any applications with the second of our two functionalities.

<table>
<thead>
<tr>
<th>Application Name</th>
<th>Website</th>
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<tr>
<td>GraphReader</td>
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References


