ACTIVITY 2 – PRACTICAL IMAGE PROCESSING 2

Introduction

While reading a scientific paper you might come across a graph that you would like to use in your analysis. Or say you plan to use a device in your experimental setup. You might need to know the numerical values of the plotted specification of the device to run some simulations before you build. In both cases, you can contact the author, or the manufacturer, and ask for the plot's table of values. If you're lucky they might share their spreadsheet. But in case the authors are long dead, or the manufacturers refuse to share data then use image processing to extract the data from the graphs.

Instructions

1. Search for an image of hand-drawn plots with clear scale values along the x- and y-axis. You can search online for images or, if you are hard core, you can visit the College of Science library and look for hand-drawn plots in very old journals. Use your smartphone to take a picture of the graph making sure the x and y axis are as horizontal and vertical as possible. Alternatively, you can also look for a plot of a characteristic of a device in a specification sheet.
2. Open the image in Paint, GIMP, or ImageJ. Move the mouse on the tick marks of the graph. For each axis tabulate the image coordinates of the tick marks and their physical values. Note also the pixel location of the graph's origin.
3. Using the table, derive an equation to convert pixel location into its corresponding physical value, one each for the plot's x-axis and y-axis.
4. Move your mouse about some points on the graph. Tabulate these pixel locations and use your equations to convert the point locations into physical values.
5. Recreate the plot using any spreadsheet application like Excel, Google Sheets, or LibreOffice Calc.
6. Compare the scanned graph with the reconstructed graph and rate yourself on how accurately you were able to reconstruct the graph. (Note to Spreadsheet or Excel users, do you know that you can overlay an image on the background of your graph? Bonus points to those who can find out how to correctly do this.)

Fun-fact

Check out this paper on "The Early Origins and Development of the Scatterplot" [Friendly, Michael, and Daniel Denis. *Journal of the History of the Behavioral Sciences* 41, no. 2 (2005): 103-130] for an interesting review of the history of data visualization. The paper is also a source of some interesting historical scatterplots.