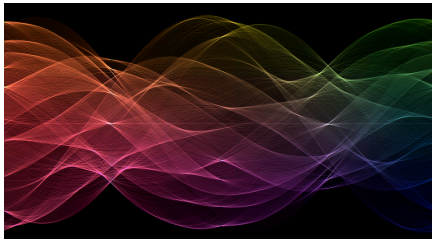


Introduction

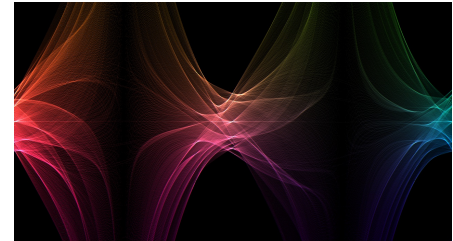
The purpose of the *Digital Artist* project is for students to learn the foundation of digital images and the skills to create digital art using mathematical transformations. Students will have to implement their programs using a high-level programming language (such as C) and experiment their own mathematical functions to create different artistic expressions in digital forms. Through this exercise, students will be able to link mathematics, computer programming, and art creation all together.

Tasks

The *ELRO Digital Art Studio (ELRODAS)* is planning to create a mobile app (called *Digital Artist*) for art creation. The purpose of this mobile app is to allow general public with no formal art training to be able to create unique and beautiful artistic expressions on the go easily in digital forms. The core of this app is a set of algorithms that will convert a simple drawing from the user to a piece of digital art.



Recently, our *Computational Thinking* classes signed a contract with *ELRODAS* to research the algorithms for the *Digital Artist* mobile app. Each project group is required to develop at least one algorithm to create the digital art. A panel from *ELRODAS* will visit us and judge on the algorithms. If any algorithm is picked by *ELRODAS*, it will be integrated into the *Digital Artist* app. At the same time, *ELRODAS* will donate \$1,000 to any charity organization specified by our school. In addition, the summer paid internship opportunity will be guaranteed for those project groups.



Specification

Input Files: Five black-and-white (white line/curve drawn on black background) input images will be provided. They represent the random drawings from users. The file format for these images is *PPM* file. The size of the files is 200×300 (rows \times columns). The value of white color is 255 and the value of black color is 0. The following are some examples:



Output Files: Five output color images corresponding to the input images need to be created. The file format for these images is *PPM* file. The size of the files is 720×1280 (rows \times columns). There will be 256 gray levels for each red (R), green (G), and blue (B) colors.

Resource

Paintbrush:	A paint program for Mac OS X. (http://sourceforge.net/projects/paintbrush/)
Image Converter:	An image to image converter. (http://www.sciweavers.org/free-online-image-converter)
ToyViewer:	An image viewer for Mac, which can view PPM files. (Apple Store)
PPM Format:	A ppm file format specification. (http://netpbm.sourceforge.net/doc/ppm.html)
Hough Transform:	A ppm file format specification. (http://homepages.inf.ed.ac.uk/rbf/HIPR2/hough.htm)
drawing1.ppm:	(https://drive.google.com/file/d/0B4er4OWY8aPMWVczckIXQ0t3aGc/view?usp=sharing&resourcekey=0-bMvDUSGvnU4tfly38geOdQ)
drawing2.ppm:	(https://drive.google.com/file/d/0B4er4OWY8aPMVVLtIVDYIpoOWM/view?usp=sharing&resourcekey=0-uSNguOM5D8wTX0aYtKqGDA)
drawing3.ppm:	(https://drive.google.com/file/d/0B4er4OWY8aPMVHUwZWRvWIR3Nzg/view?usp=sharing&resourcekey=0-jKbaJk-De8YFphPnwJRgOQ)
drawing4.ppm:	(https://drive.google.com/file/d/0B4er4OWY8aPMOXYZTi1kcmYyTHc/view?usp=sharing&resourcekey=0-idi3br4_Hvm_hp9h-GXCZg)
drawing5.ppm:	(https://drive.google.com/file/d/0B4er4OWY8aPMcnhOTIFyVfULUu/view?usp=sharing&resourcekey=0-9QLiZGuvL7F8522b7aOdQ)

Deliverable

1. A technical report in *Microsoft Word* format including (1) problem description, (2) explanation of mathematical functions and algorithms used in the program, (3) implementation (*attach computer programs*) of your project, and (4) the output images of your program.
2. Compressed project folder in ZIP file format. Five output images in JPG file format.
3. Project groups should be ready to demonstrate and explain their functions/algorithms/programs to the class.