



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Anna K. Simpson	Project Number S1615
Project Title Local Layering of Images with a Natural User Interface	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Local layering is a new concept giving users the ability to "weave" images as if they are strips of paper or bring regions of interest on several different images to the forefront simultaneously. Conventional stack-based image editing programs (such as Adobe Illustrator) handle a relative depth ordering by compositing a series of images at different layering levels based on a global order. This provides no support for local layering, reduces the possible image complexity, and limits the ability of the user to edit the image. My goal was to create a program to allow users to locally layer images in just one mouse click.</p> <p>Methods/Materials I wrote the program in C++ using the Qt graphics library. My program structures the composite image into groups for efficiency in selection and comparison. To relayer, my program locates the nearest intersection of two selected images and then uses integer vector manipulations to reorder the layers. All relayering is done in such a way that the composite remains physically plausible, as if the images were sheets of paper that can be woven but not cut.</p> <p>Results My program allows local editing of image layers with only one or two mouse clicks - a significant improvement on both commercial image-editing programs and previous work on the subject. Almost all operations are under real time. Users have several options for selecting and relayering groups using the mouse or keyboard. Unlike anything previously published, the program calculates the nearest overlap of two clicked images and relayers them, making it unnecessary for the user to locate exact intersections.</p> <p>Conclusions/Discussion I successfully created a program to locally layer images that will allow users to quickly and easily change image layering among multiple images. An application of my work is in the analysis of scans or microscope slides in medicine or neuroscience, which would give doctors a more complete picture when making a diagnosis. Other applications include compositions of satellite images for military intelligence and manipulations of images in entertainment and engineering.</p>	
Summary Statement I created a program to allow users to quickly and easily edit image depth ordering (layering) in specific locations, a significant improvement over techniques commercially available.	
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