

**Problem 1.4.7 Image Artist**

Introduction

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| Digitized images become a larger part of our lives every year. Consider   * magazines and websites, * movies and TV, * security cameras and satellite images, * astronomy telescopes and climate satellites, * MRIs and X-rays, and * fine art to 3D print.   Computers  produce, analyze, and manipulate  more and more  of what we see in the world.  How will computation change your visually creative work? | Image courtesy Rolfes ©2004 |

Materials

* Computer with Enthought Canopy distribution of the *Python*® programming language
* Webcam or other way to obtain a digital picture
* Internet access to obtain images

Procedure

1. Form pairs as directed by your teacher. Meet or greet each other to practice

professional skills. Set team norms.

1. Choose a problem following the constraints introduced by one of the clients

below. Define the problem and review the criteria from the rubric below.

1. Document thoroughly. Starting with this problem definition, record your work in a bound design project notebook.. Use unique names to save successive versions of *Python* files in the code editor prior to each set of major changes. Comment out and annotate abandoned code so that you retain a record of what you tried that did not work.
2. Brainstorm to generate ideas.
3. Develop one of your ideas to create a proposal for the client. Get client feedback before digital production.
4. Develop the product.
5. Review each member's understanding of navigator and driver roles.
6. Strategize, code, and test.
7. Continue to document thoroughly. Use the iPython session history as well as the code editor. Use GitHub or another method for version control to retain successive versions that document your code's progress at various milestones. Keep notes about what you tried that did not work, saving those versions too.

Deliverables

5. Prepare your artwork to present to your client. Your work should include one of the following two sets of artifacts.

1. Documentation of collaborative product with all of the following

components.

* A visual display comparing the images used as input to those produced as output by your algorithm
* Credits for raw images used as input or as part of your algorithm
* Sketch of proposed idea
* Visual display of raw images used in the algorithm
* Sequence of images showing stages of manipulation reflecting intermediate stages of data during the algorithm's execution
* Array of images showing results from a range of values for a parameter of the manipulation
* Prose description of the processes used to produce the finished image

1. Documentation of collaborative and individual products and

artifacts in a single related problem area, as described by College Board's *CS Principles* "Create" Task. In this case use the College Board's Performance Task Rubric for the Create Task.

Conclusion

1. Alice and Barb have different ideas about what a “manipulated image” is. Decide whether you think that each of them is right, wrong, or somewhere between. Write an argument in support of your ideas.

Alice: “All images are manipulated. For one thing a camera is sensitive to certain kinds of light and the developer controls the exposure level. Even our human eyes have a limited number of pixels! There are ‘only’ 120 million rods and 6 million cones in each retina, so our vision is pixelated just like a digital image. And our vision is also highly processed – even the blind spot in each eye gets filled in. Out of all those millions of light detectors, only about 1 million ganglia neurons go from the eye to the brain. There is no such image as seeing the ‘real’ thing.”

Barb: “Of course there is a real image. Certain kinds of manipulations are accurate and others tell lies.”

1. Under what circumstances is an image yours to use? Yours to distribute? Yours to sell? Write about your thoughts on this question in the context of downloaded images and images you take with a camera.
2. Reflect on the team dynamic and on the design process. What were areas for improvement? What steps could you take next time to make those improvements?

**Problem 1.4.7 Image Artist Rubric - Option A**

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| --- | --- | --- | --- | --- |
|  | **4** | **3** | **2** | **1** |
| Solves problem | Artifact fully addresses personal, practical, or societal intent posed by problem statement | Artifact addresses the personal, practical, or societal intent posed by problem statement | Artifact partly addresses the personal, practical, or societal intent posed by problem statement | Artifact does not address the personal, practical, or societal intent posed by problem statement |
| Documentation | Uses appropriate techniques for documenting work:  Inline comments  Multiline comments  Project Design Notebook  Named versions of code | Mostly uses appropriate techniques for documenting work | Often uses appropriate techniques for documenting work | Does not usually use appropriate techniques for documenting work |
| Collaboration | Provides substantial original input to others  Promotes positive, productive, and respectful team dynamic  Encourages and incorporates input from others  Promotes equitable workload | Provides significant input  Usually promotes positive, productive, and respectful team dynamic  Receives input from others  Shares workload equitably | Significant but limited input  Sometimes promotes positive, productive, and respectful team dynamic  Mostly receives input from others  Shares workload somewhat equitably | Limited input  Is not promoting positive, respectful, or productive team dynamic  Discourages or is unresponsive to input from others  Does not promote equitable workload |
| Presentation | Attractive and well-organized poster | Sufficiently attractive and organized poster | Mostly attractive and organized poster | Poster is sloppy or poorly organized |
| Appropriate Algorithm | Code demonstrates use of appropriate algorithms | Code generally uses appropriate algorithms | Code mostly uses appropriate algorithms | Code does not use appropriate algorithms |
| Explanation of Process | Prose clearly and thoroughly explains the computing process used to generate the image | Prose explains the computing process used to generate the image | Prose mostly explains the computing process used to generate the image | Prose insufficiently explains the computing process used to generate the image |
| Explanation of Problem Solution | Prose clearly and thoroughly explains how the solution meets the need.  Prose clearly explains the solution’s strengths and weaknesses and strategizes for improvement. | Prose explains how the solution meets the need.  Prose explains a strength or weakness. | Prose mostly explains how the solution meets the need.  Prose mentions a strength or weakness. | Prose does not address how the solution is connected to the need. |

Other comments:

Problem 1.4.7 – Client # 1: A Cause

Your client is a group that advocates for a political cause. It could be the environment, education, anything. The client needs a consistent branding for images that will be used to promote their cause – images that are memorable and will have a lasting impact on people. The client could be a real or fictitious student organization, community group, or state/ national/global advocacy group. The client’s cause should be a true potential cause even if the client is fictitious.

The client wants an automated process to apply to images. They want the process to use some combination of masking, shading, or combining the images with a consistent logo or superimposed image. The client enjoys abstract art as well and might like geometric shapes incorporated in the image – drawn on, as a border, or as a mask.

The client enjoys participating in the creative process and will appreciate being offered a range of options (as a parameter) for one of the image operations you perform.

Problem 1.4.7 – Client # 2: A Family

Your client is a family that would like a standard frame applied to a large number of pictures that feature one or more of the family members. They want the composite image to be memorable and to incorporate some personalized symbol, image, or silhouette that represents the interests of the family member(s). The client enjoys abstract art as well and might like to see geometric shape incorporated in the image—drawn on, as a border, or as a mask.

The client enjoys participating in the creative process and will appreciate being offered a range of options (as a parameter) for one of the image operations you perform.

Problem 1.4.7 – Client # 3: A Product

Your client is a company that manufactures or distributes a product. The client needs an image that is memorable and has a lasting impact on people to increase sales or brand loyalty to their product. This could be a real or fictitious product.

The client wants to be able to apply their brand image as a frame, overlay, or silhouette to a large number of images to be used in the marketing campaign. The client enjoys abstract art as well and would like to see geometric shape incorporated in the image—drawn on, as a border, or as a mask.

The client enjoys participating in the creative process and will appreciate being offered a range of options (as a parameter) for one of the image operations you perform.

**Problem 1.4.7 – Client # 4: A Developer**

You work for a software company that is producing a photo editing tool similar to Photoshop® software. The selling point of your flagship product is a large number of detailed algorithmic photo manipulations. Your team is to create a script to manipulate images into one composite in a unique way, ideally one not possible through simple Photoshop workflow.

Your team wants the end product of the manipulations to be a photomontage made from at least two distinct original images. They believe that an exciting feature will result if you surprise the user by allowing them to combine two images that do not naturally occur together, especially if one of the images is then changed in some way to emphasize the effect of the combination. You know that your goemetric patterns often are a selling point of your software, so your team is also considering how to incorporate geometric shape into the image – drawn on, as a border, or as a mask.

Since this script will work as part of a cohesive software package and you have no way of knowing in advance what images a user is going to choose to manipulate with your company’s product, you cannot make any assumptions about the images that you will have to work with. However, your team plans to offer a range of options (as a parameter) for one of the image operations you perform to allow the user to customize the operation.