CS148 Assignment 1

Visual Vocabulary & VDB

Goals: *Gain familiarity with the basic terminology used to describe images; practice generating simple images from primitives.*
Due: *Thursday 3 July at 11:59pm*

1 Image Analysis

For the first part of this assignment, you will be visiting an art museum of your choice.[1] At the beginning of your visit, take some time to visit several different galleries, noting what catches your eye and keeping in mind the image features discussed in class. Then, using the prompts below, select a few pieces to study in depth. Try to choose works from various cultures, styles, time periods, and media.

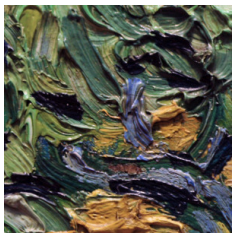
For each of the following, please limit your responses to a few concise and thoughtful sentences; bullet points are also acceptable. With each, please include the artist, title, year, and a photograph of the piece[2], keeping the image to ≈ 500 x 500 pixels.

Make sure to budget at least 2 hours for your trip. There's a lot to see in the museum, and taking time to sit with each piece for 10-15 minutes while taking notes will make your write-up much easier to complete. You may find that sketching helps you describe your thoughts below; if so, please scan and include any sketches with your assignment. You will not be graded on your drawing ability!

For your visit, you will need:

Camera (as permitted - a smartphone camera is fine.)
Note-taking materials
A copy of this assignment

1.1 Rendering media



During your museum visit, you will encounter pieces from a variety of different visual media: paintings, watercolor, photographs, ceramic, sculpture, and so on. In contrast, computer-generated images are almost always rendered into pixels for display on a screen (or printed with ink.) Select a piece whose media might be difficult to reproduce on a computer screen, and describe why.

1.2 Use of color

As we discussed in class, the perception of color is very complex. Artists often use this to their advantage, employing color as a means of heightening realism, stylizing their work, or invoking a certain mood. Select a piece of art in which you find the use of color to be particularly effective or unexpected, and describe why.

[1] The course staff highly recommends the Cantor Museum, conveniently located on the Stanford campus. Admission is free of charge and open Wednesday through Sunday 11am–5pm, Thursday 11am–8pm. See `https://museum.stanford.edu` for details.

[2] The Cantor allows non-flash photography in many galleries, but please check with a guard before taking photographs. If photography is not permitted, you can find photos in the online catalog at `http://cantorcollections.stanford.edu/`.

1.3 Textures and materials

How does one communicate tactile properties of an object using only visual information? Find an example of a material that has been particularly well reproduced by the artist. Examples: textiles, wood, glass, soft skin, water.

1.4 Conveying shape or movement

How is three dimensional shape communicated in a two dimensional medium? How is motion captured in a static image? Find a piece you think effectively communicates either motion or shape, and describe the relevant features.

1.5 Emotional impact

Lastly, visual imagery can be used to express a wide range of emotions. Choose a piece that provoked a strong response and describe the feeling it conveyed. This could be something positive (warmth, energy, ...) or negative (despair, anger, ...). You may wish to select a work you didn't particularly enjoy; if so, try to articulate the visual elements you found unappealing.

2 Show and Tell

Now that you've practiced with human-generated images, find a computer-generated image of your own to analyze in the same fashion. For example, this might be a computer-generated frame from an animated film or game or an interesting data visualization from a newspaper or book. You might also use an image you believe to have been digitally altered or enhanced (e.g., an art photograph or advertisement), or even a figure from a scientific paper in the computer graphics literature.

Submit the image along with a short (one paragraph) description. To the best of your ability, include the following information:

- Image particulars: where is the image from? In what year was it generated? By whom?
- Method of generation
- Content (color palette, textures, materials, ...)
- Composition (layout, aspect ratio, ...)
- Geometry (objects, surfaces, 2D/3D, ...)
- Any questions you have about the image.

Interesting images selected for analysis later in the course will be awarded extra credit!

Sharknado:
the culmination of decades of computer graphics research.

3 Image Generation

The final part of this week's assignment is to draw your own image. To keep things simple, we will be using `vdb`, a visual debugging tool that will come in handy in future assignments. It provides an easy way to draw basic primitives like points, lines, and triangles from any program, without the hassle of setting up an OpenGL viewer and linking it into your existing workflow.

3.1 Download `vdb`

Start by reading this short tutorial page:

`https://github.com/zdevito/vdb`

and downloading and installing `vdb` to your local machine. If possible, we recommend using the prebuilt versions linked under the section title "Using vdb", rather than compiling from source. Once you have `vdb` installed[3], make sure you can compile and run the examples provided.

In the next part, you will write a simple program that uses `vdb` calls to draw an image. To see this image, you will first run the `vdb` viewer in a separate process — this will open a blank window — and then run your program. The `vdb` calls in your program will send draw commands to the `vdb` window, where you will see the result.

3.2 Draw something. Anything!

Your completed program should, at a minimum:

1. Draw using at least two primitives (e.g., lines and triangles)

[3] If you have trouble installing `vdb`, check Piazza for tips or use the Myth cluster. Some OSX Mavericks users have experienced difficulty.

2. Draw using multiple colors[4]

If you are looking for inspiration, you might consider using one of the images you selected in Part 1 as a template, recreating the layout and colors using simple primitives. For instance, see the Wayne Thiebaud gumball machine example at the top of the assignment. Other options include:

- Spirographs or similar functions
- Fractals (e.g., the Julia set or Koch snowflake).
- Simple space filling curves
- Simple L-systems (you might create trees using lines for branches and triangles for leaves)
- Conway's game of life

Extra credit will be happily awarded for particularly impressive or humorous submissions!

4 What to turn in

To submit your assignment, please bundle the following into a `.zip` file with the name `hw1.zip`.

1. A PDF file containing:
   - Responses for each of the 5 prompts in Part 1. Don't forget to include the title, artist, year, and a small image of the work.
   - Your CG image and description from Part 2.
2. The code you used to generate your image in Part 3 using `vdb`. To make your TA's life easier, please provide a Makefile or leave a comment at the top of your code containing the terminal command(s) you used to compile and run the program.
3. A screenshot of your image.
4. A text file README containing anything else we should know: names of classmates you worked with, help received, references, etc.

You can turn in your bundle from the student zone of the course webpage:

`https://www.stanford.edu/class/cs148/students/`

Just follow the "Submit" link next to the assignment.

[4] Warning: students choosing to use garish colors like $\{1, 0, 0\}$ red or $\{0, 1, 1\}$ cyan may be ridiculed! There are lots of helpful websites out there filled with palettes and color ideas, such as `http://www.colourlovers.com/`.