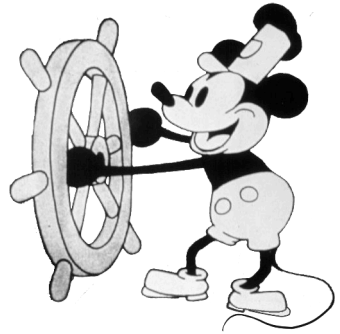


CSCI 461: Computer Graphics

Middlebury College, Fall 2023

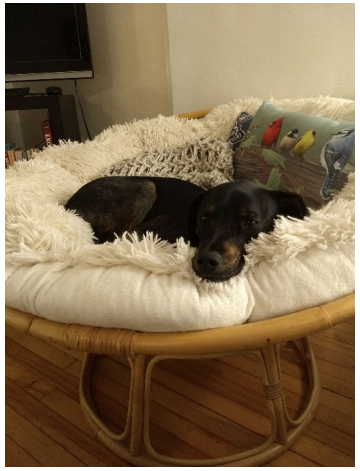
Lecture 01: Pixels

A note about masks.

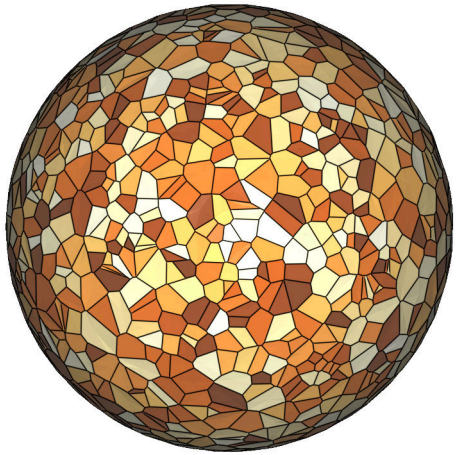
- Please wear a mask during my office hours.
- I'll wear a mask in class during the first few weeks of the semester.
- You are encouraged to wear a mask but free to decide whether or not to wear a mask in class.

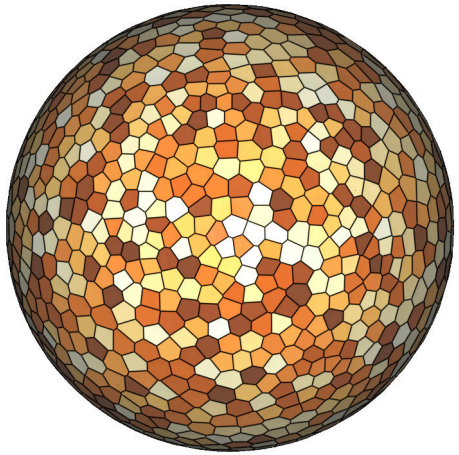
A little about me...

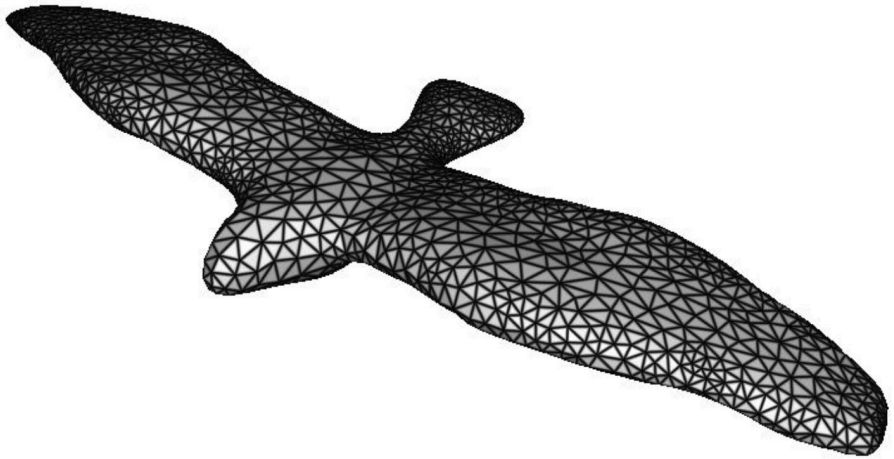
- Please call me Philip.
- I'm from Montreal, went to graduate school in Boston.
- Recently worked for a startup in San Francisco (living in NH).
- My favorite hike around here is the Falls of Lana/Silver Lake trail.
- I have type 1 diabetes and may need sugar if I'm hypoglycemic.
- This is my dog Leila :)



Things I am currently working on...







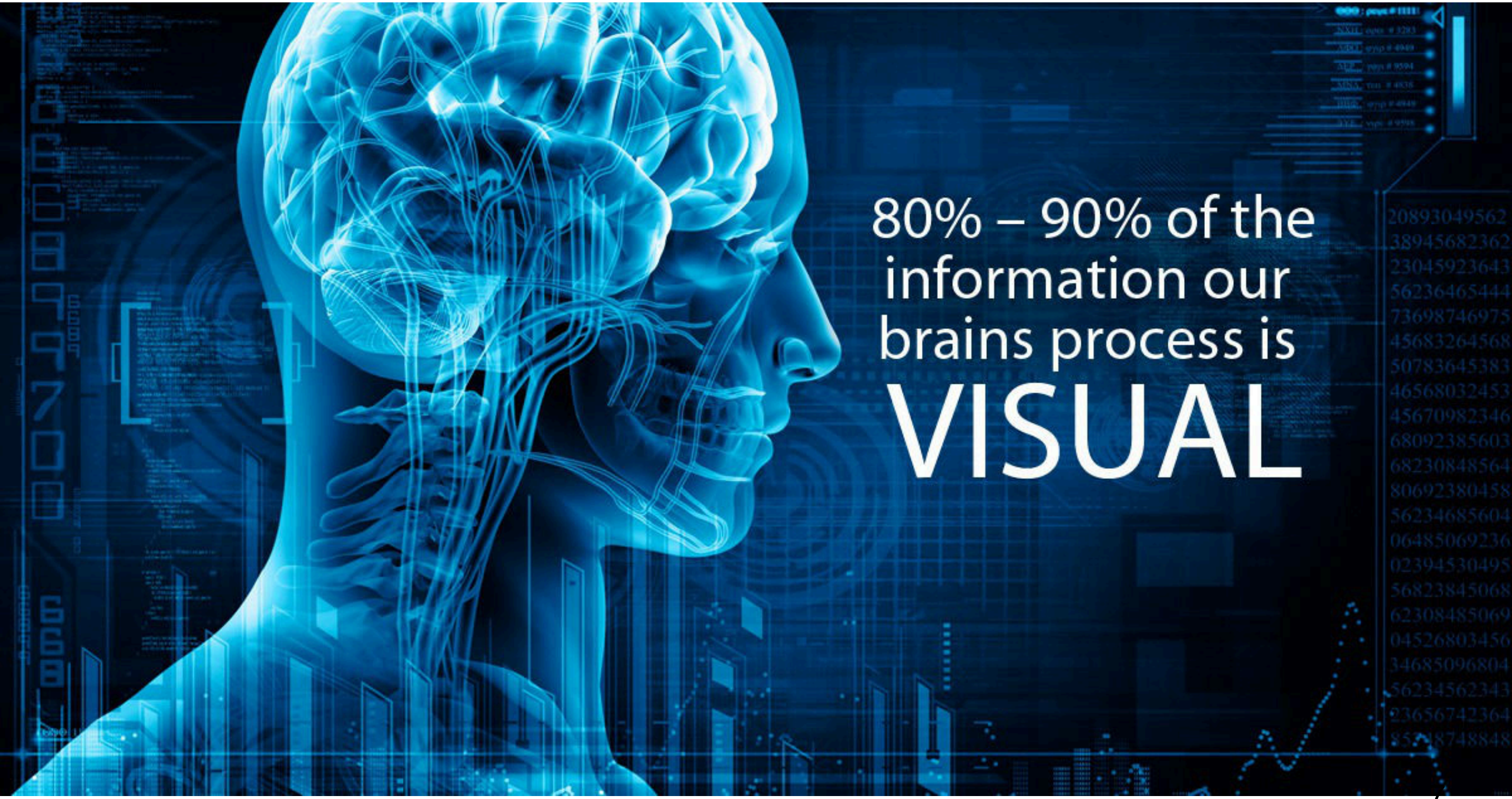
A little about you!

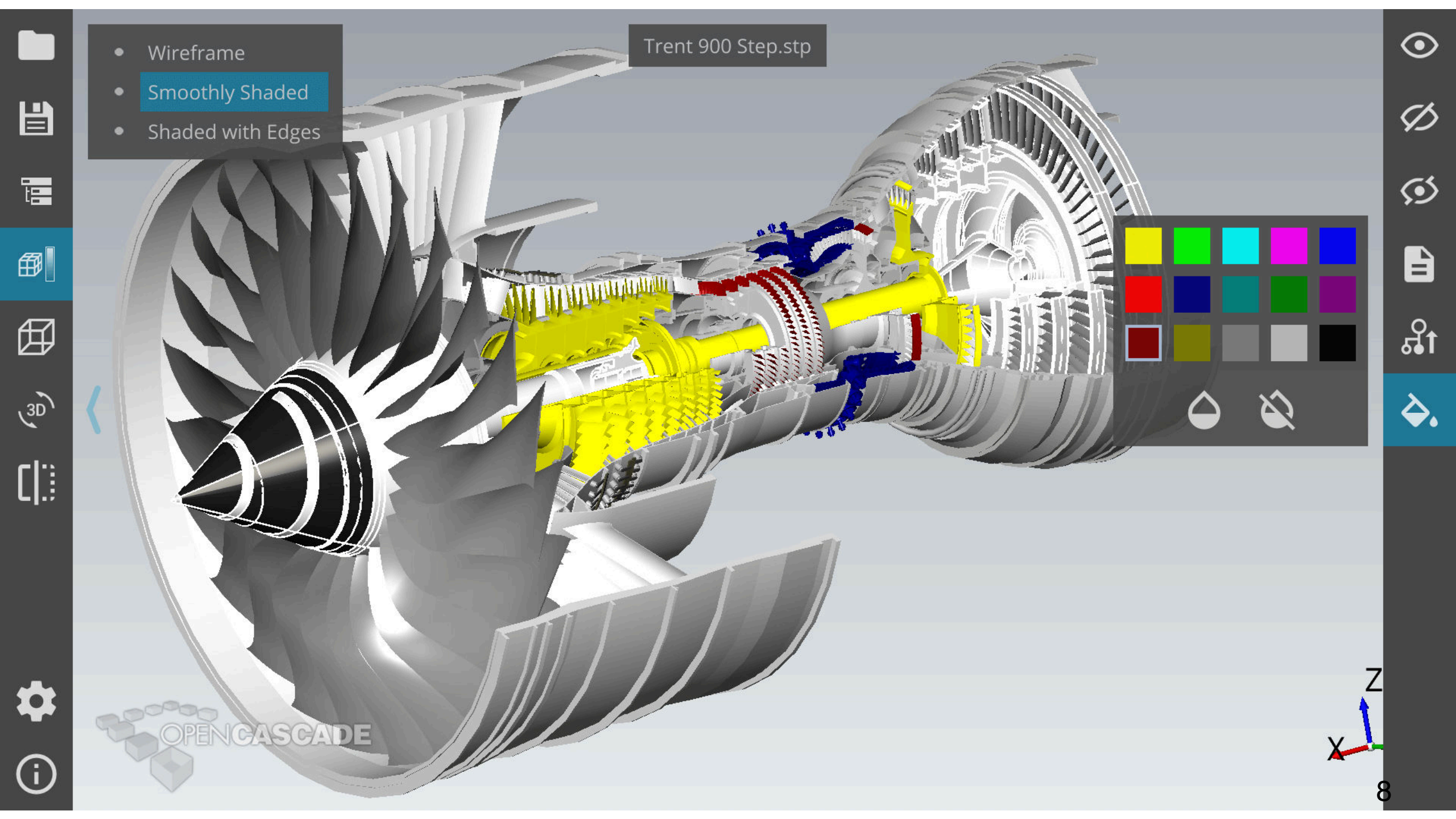
In groups of 3-4:

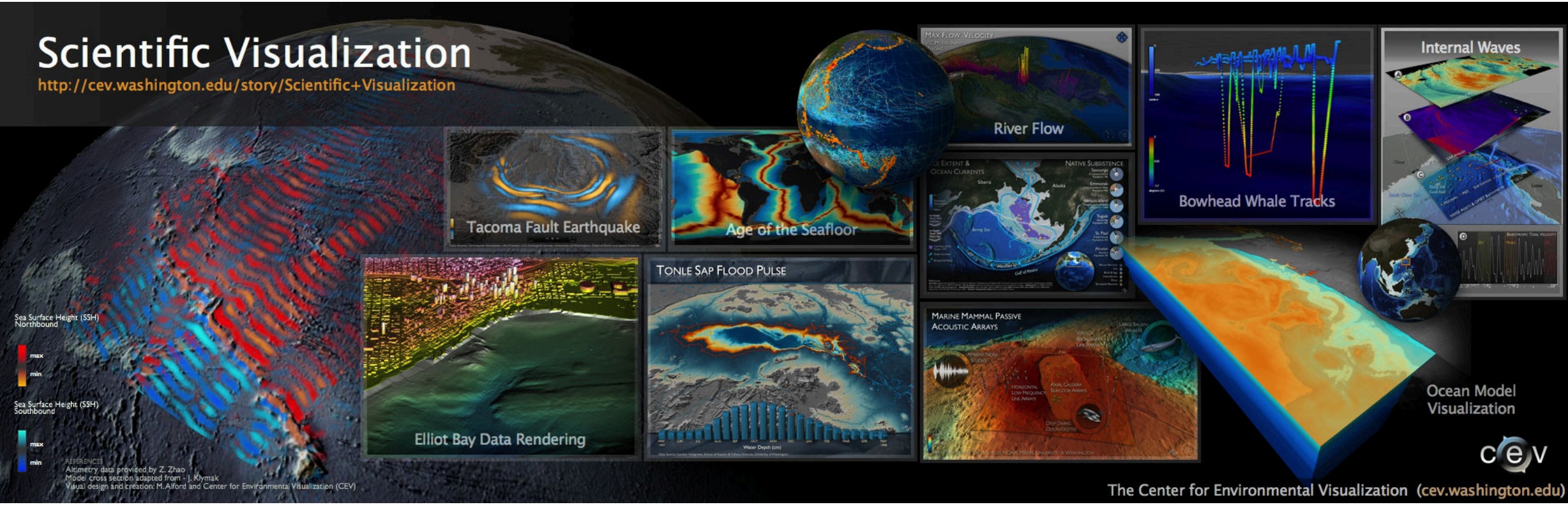
- Introduce yourselves!
- What is computer graphics about?

What is Computer Graphics about?

Computer graphics is about developing computer programs to create visual information.


80% – 90% of the
information our
brains process is
VISUAL


Wireframe
Smoothly Shaded
Shaded with Edges
Trent 900 Step.stp
OPENCASCADE
Z
X


Scientific Visualization
http://cev.washington.edu/story/Scientific+Visualization
Tacoma Fault Earthquake
Age of the Seafloor
River Flow
Bowhead Whale Tracks
Internal Waves
Tonle Sap Flood Pulse
Elliot Bay Data Rendering
Marine Mammal Passive Acoustic Arrays
Ocean Model Visualization
Sea Surface Height (SSH) Northbound
max
min
Sea Surface Height (SSH) Southbound
max
min
References
Altimetry data provided by Z. Zhao
Model cross section adapted from - J. Klymak
Visual design and creation: M. Alford and Center for Environmental Visualization (CEV)
The Center for Environmental Visualization (cev.washington.edu)

What this course is NOT.

Your job is to develop the graphics technology that artists might need.

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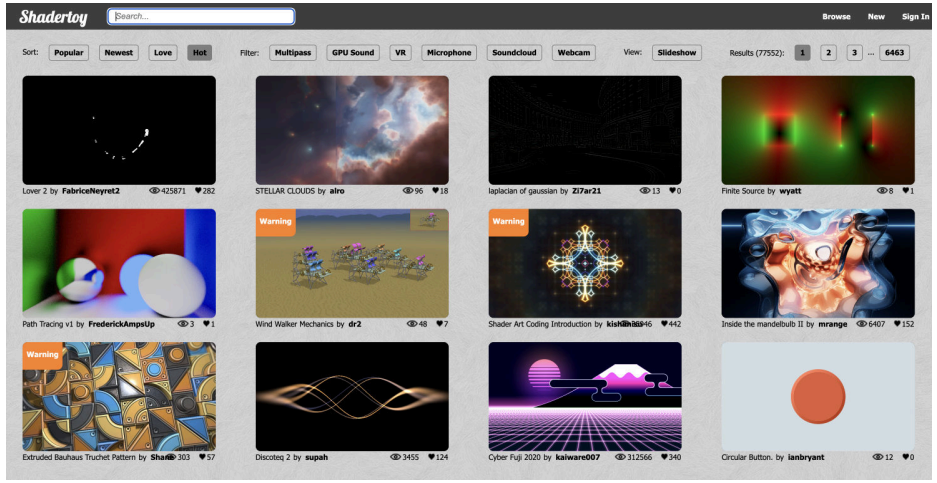
By the end of the course you will:

- develop your own ray tracer to render complex scenes and materials,
- display and manipulate three-dimensional models using rasterization techniques (with `WebGL`),
- animate three-dimensional objects and physical systems.

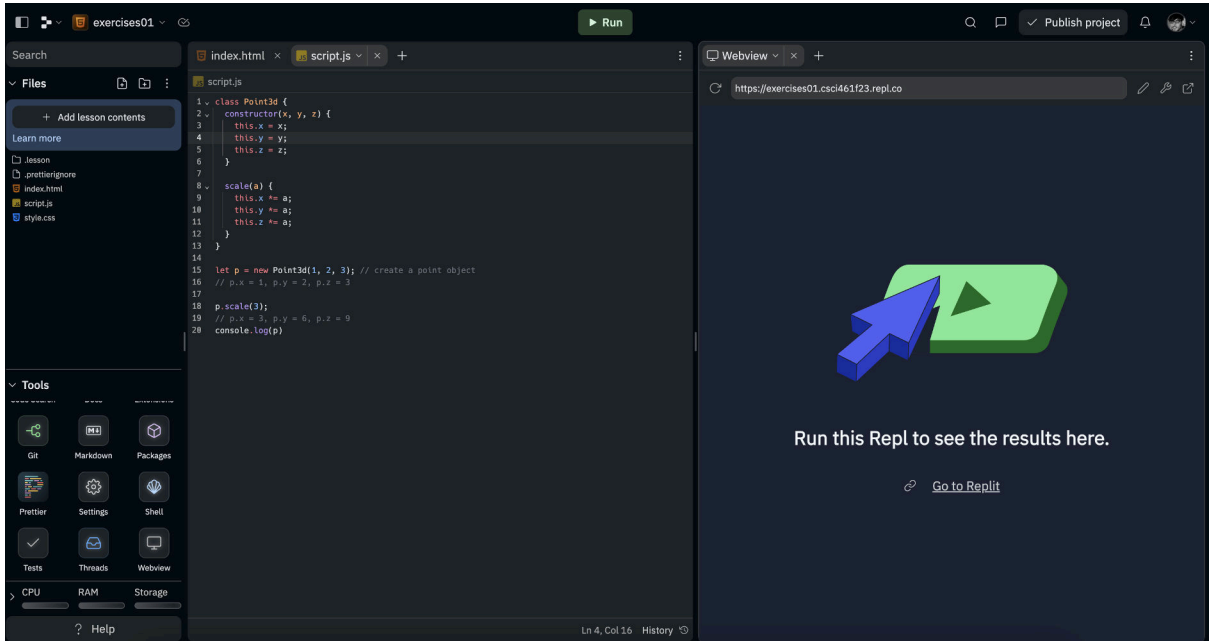
We will use a form of *specification grading*.

- 13 assignments in total: 11 labs + 2 reports.
- Reports (individual) are evaluated CR/NCR:
  - Report 1: reflection on discussion in week 5.
  - Report 2: ShaderToy dissection.
- Labs (groups of 2-3) evaluated using EMRN model:
  - (N)ot assessable: no modification to template or hard to follow.
  - (R)evisions required: error or bug.
  - (M)eets requirements: basic functionality works.
  - (E)xceeds expectations: extensions implemented, experimentation, discussion.



We will use Ed Discussion and `replit`.

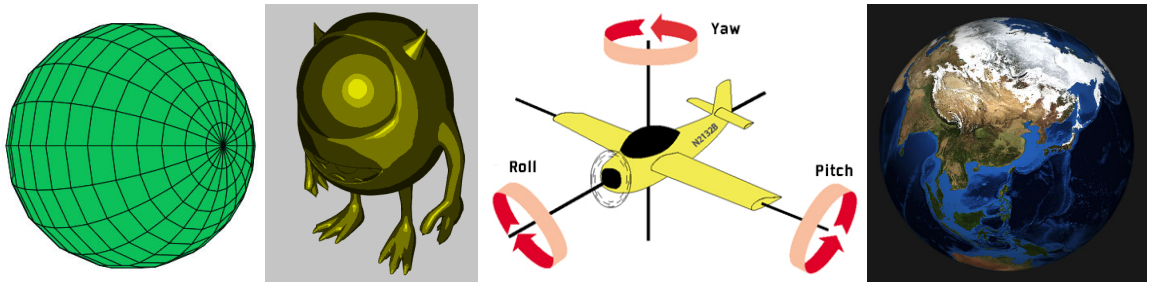
- Join Ed Discussion here: https://edstem.org/us/join/jNDvTh
- Join replit team here: https://replit.com/teams/join/dwguipszohekapvtbpamcckqlbypopyx-csci461f23



What to expect in this course...

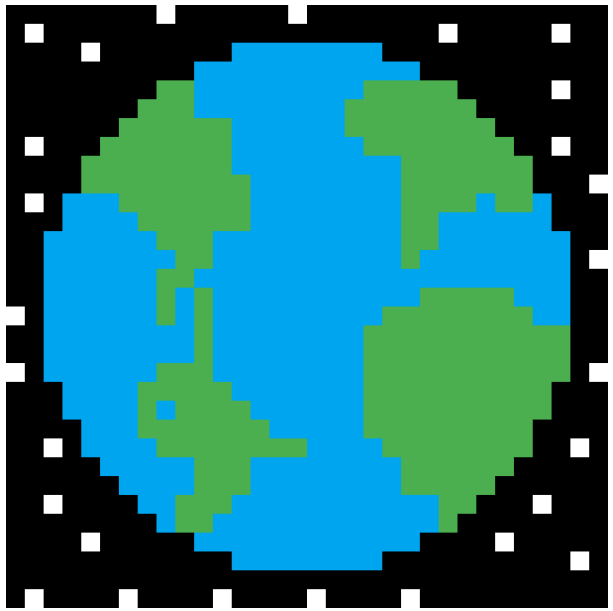
- lectures and exercises on Tuesdays,
- labs in groups on Thursdays, then 1 week to submit lab,
- feedback on current lab status (EMRN), then edit and resubmit,
- A LOT of debugging!
- have fun :)

Labs preview



Let's talk about pixels!

Our goal: assigning pixel colors.



Things to consider:

1. What is the **size** of the image?
2. How to represent **color**?
3. What is the **coordinate system** of the image?

We will often represent the color of a pixel using RGB values in between 0 - 1 (sometimes from 0 - 255).

Please join at slido.com at event #3677434!

In an 8-bit image, there are 8 bits assigned to each pixel. How many possible colors are there for a single pixel? 24

- 8
- 16
- 64
- 256
- 16, 777, 216

Voting as Anonymous

Send

Please join at slido.com at event #3677434!

If a 1200 × 800 image is saved in 8-bit format, how much memory does the image use? Assume the image is not compressed.

23

- ○ 960 kB
- ○ 960 MB
- ○ 7.68 MB
- ○ 7.68 GB

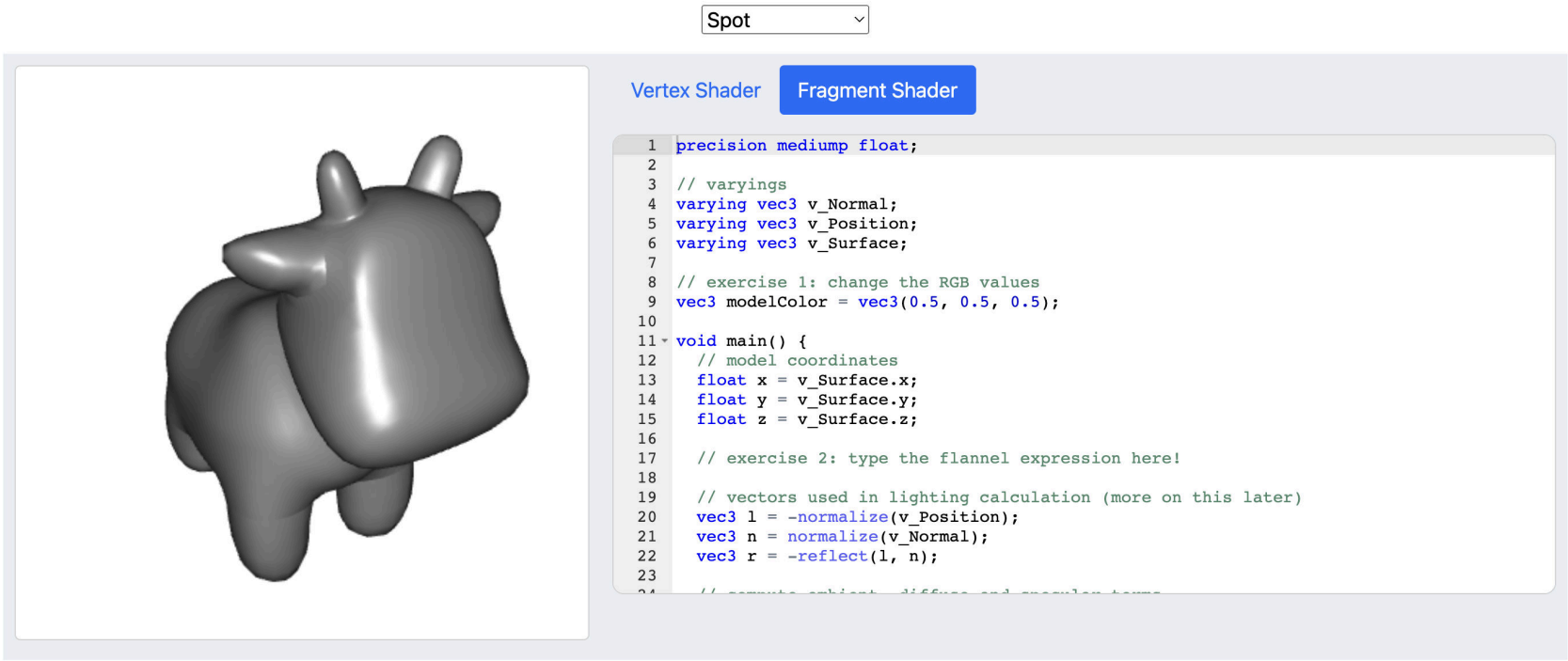
Voting as Anonymous

Send

Let's practice with Spot the Cow.

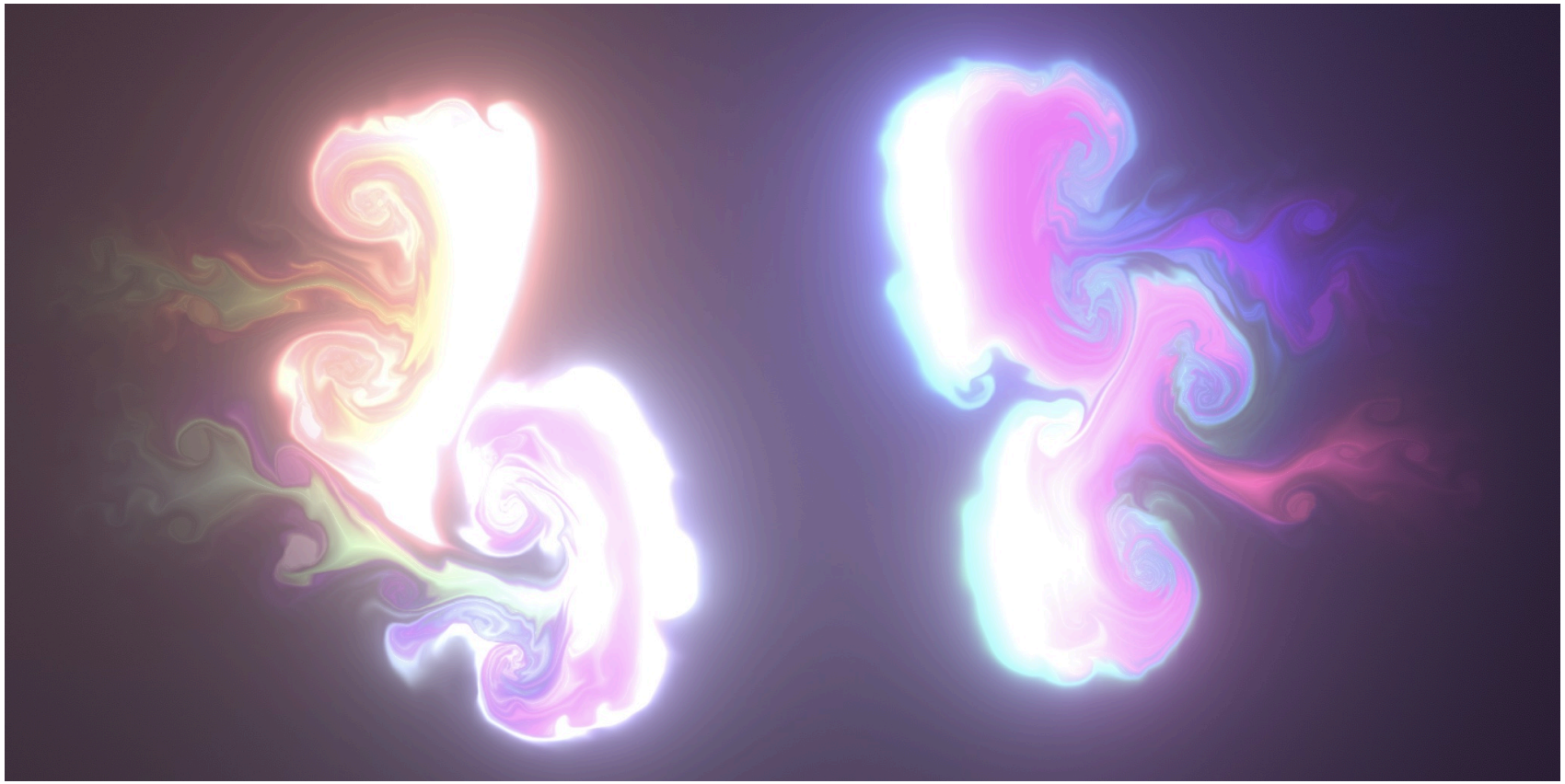
Click to open the shader editor.

(we'll look at **WebGL** and **GLSL** later in the course)



Our goal: assigning pixel colors.

Click to open the WebGL fluids demo.



quickly!

`JavaScript` in one slide.

```
1  class Pixel {
2    constructor(r, g, b) {
3      this.r = r;
4      this.g = g;
5      this.b = b;
6    }
7
8    scale(a) {
9      this.r *= a;
10     this.g *= a;
11     this.b *= a;
12   }
13 }
14
15 Pixel.prototype.set = function(r, g, b) {
```

See you on Thursday!

- Please complete Background Form,
- Familiarize yourself with syllabus, calendar, notes from today,
- Review `JavaScript` (see links in notes).