Computer Graphics Programming CGRA 354/T1

Lecturers: Dr Alexander Doronin

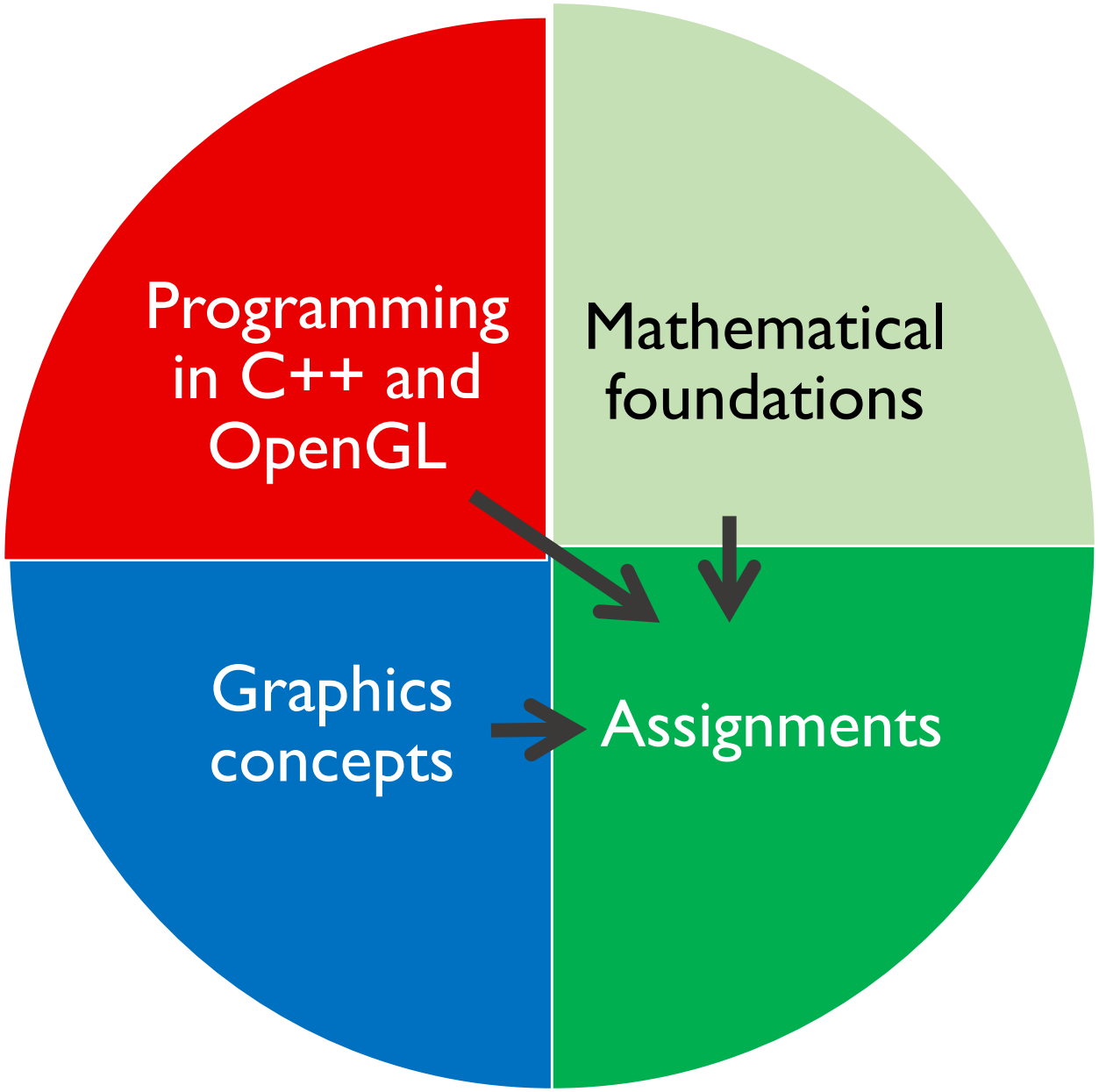
https://ecs.wgtn.ac.nz/Courses/CGRA354_2024T1/LectureSchedule

With slides from: Prof Neil Dodgson, VUW and Prof Holly Rushmeier, Yale

Outline

Or, to paraphrase Ken Perlin...

Computer graphics: What you need to show other people your dreams.



Lectures, Help Desk, Office hours

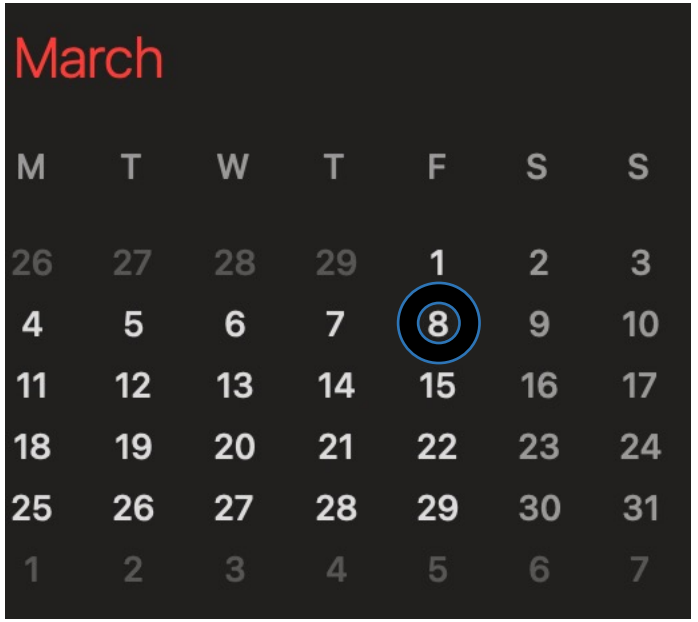
- Week 1:
  - Lectures: Tuesday and Thursday
  - **Friday: no lecture**
- Week 2:
  - Lectures: Thursday and Friday
  - **Tuesday: no lecture**
- How to get help…
  - Go to the Help Desk/Office hours
  - Ask your classmates

From Week 3:

- Helpdesk
  - Tuesday 9:00 - 9:50am
  - CO330 (unless we say otherwise)
- Lectures
  - Thursday & Friday 9:00 - 9:50am
  - LT1, Te Toki a Rata, Kelburn
- Office hours
  - TBA

Administration

- Course representative
  — nominations to me* by Friday
- "no penalty" withdrawal by 8 March 2024
- Four assignments
  - Submission dates are provisional
  - Mark penalties apply for unauthorised late submission
  - Up to three automatic "late days" with no penalty
  - Further late days need substantive evidence (e.g., a doctor's certificate)
- Two tests, 20% + 20%



* Dr. Alex Doronin <alex.doronin@vuw.ac.nz>

The Assignments

Programming Assignment 1 Due: week 3	**CLO:**1 **Mark: 10%**
Programming Assignment 2 Due: week 6	**CLO:**1,2 **Mark: 15%**
Programming Assignment 3 Due: week 9	**CLO:**2,3 **Mark: 15%**
Programming Assignment 4 Due: week 12	**CLO:**3,4 **Mark: 20%**
Mid-Trimester Test Due: week 6	**CLO:**1,2 **Mark: 20%**
End-Trimester Test Due: week 12	**CLO:**3,4 **Mark: 20%**

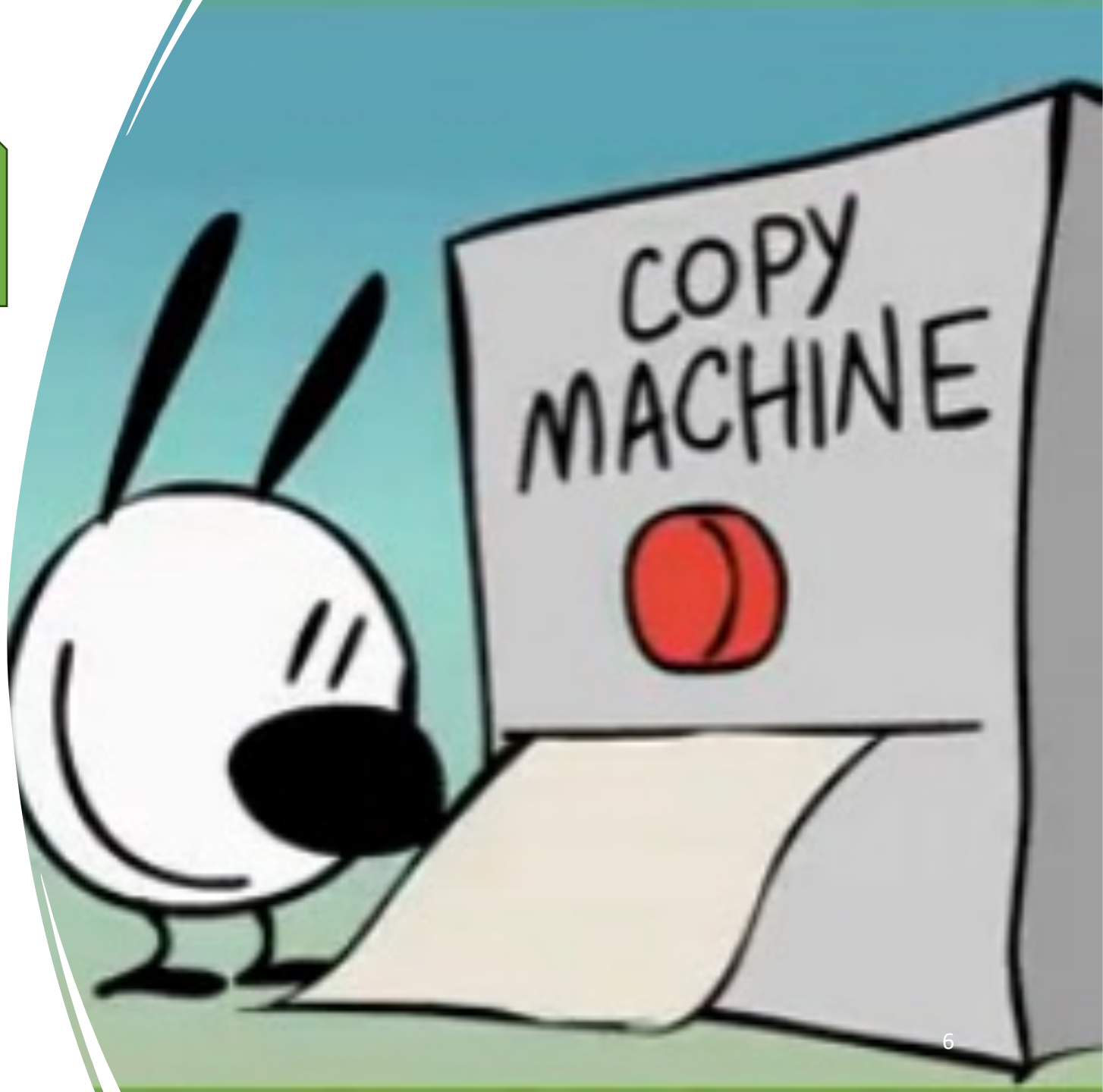
Plagiarism

Al Green

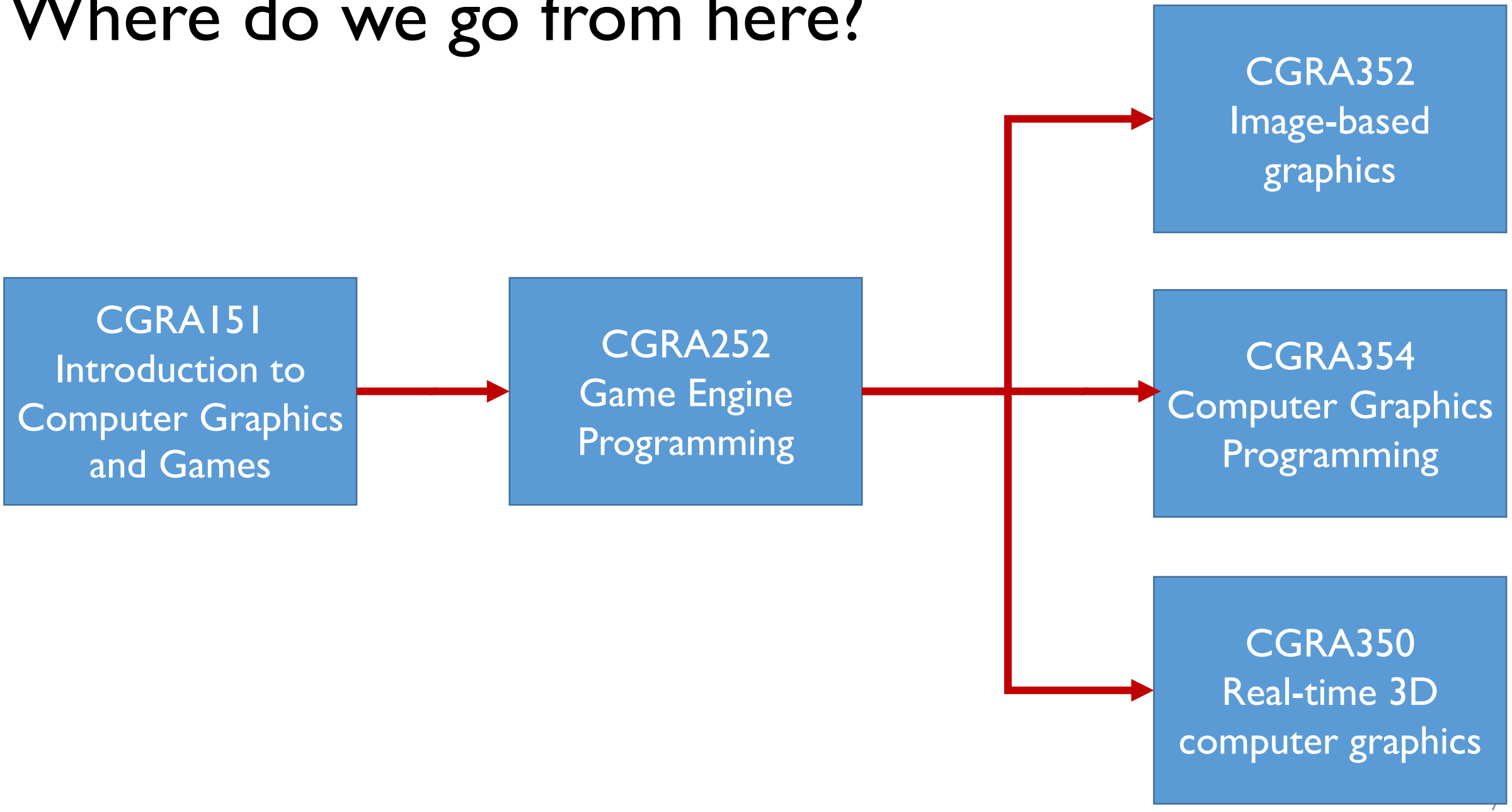
- Plagiarism is **claiming other people's work as your own**
- Do not copy your assignment from another student or any other source
- Penalties are applied to anyone who is caught

- You can:
  - Discuss the assignment with other students
  - Seek help with programming details

- You cannot:
  - Copy someone else's code



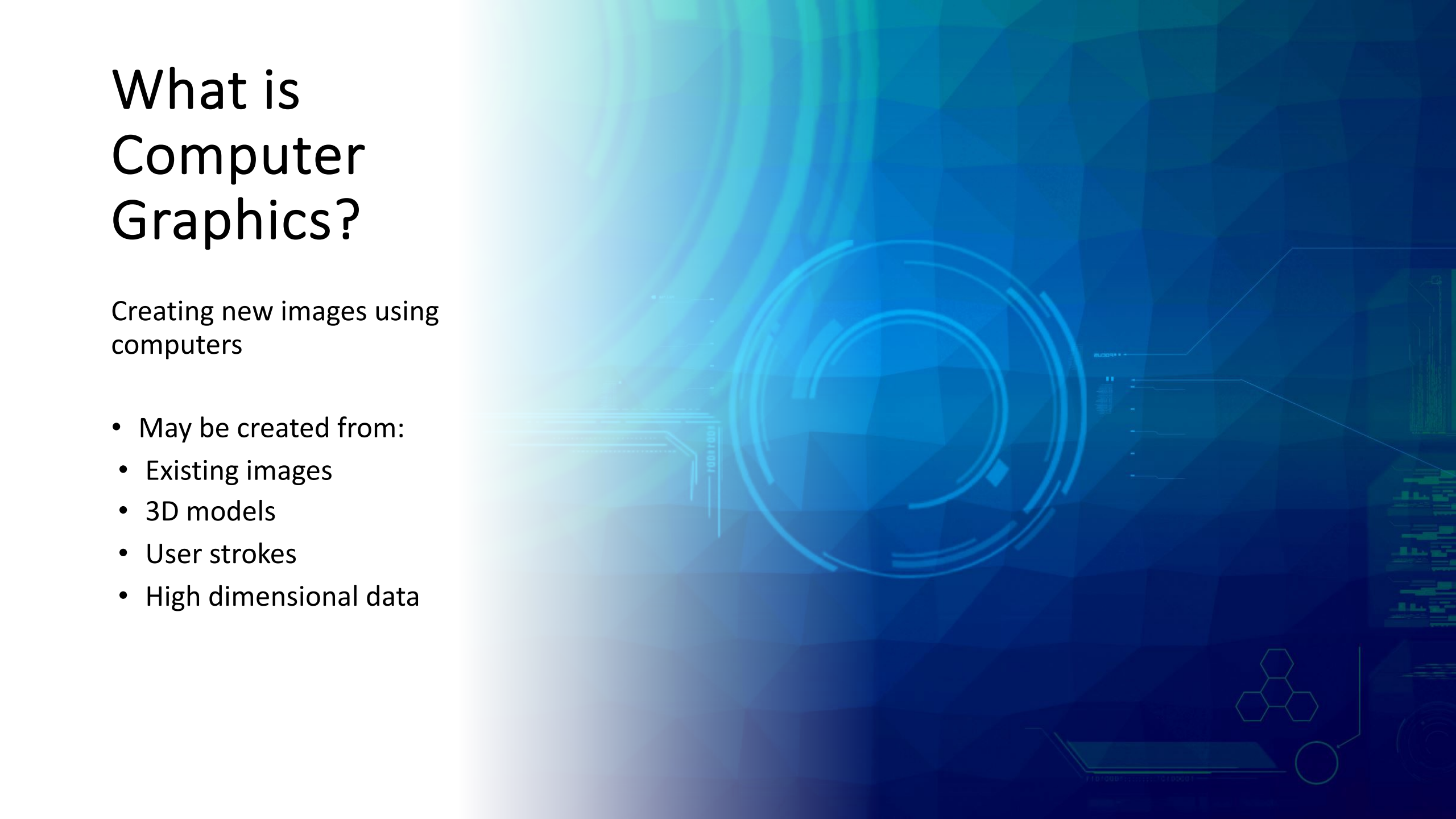
Where do we go from here?



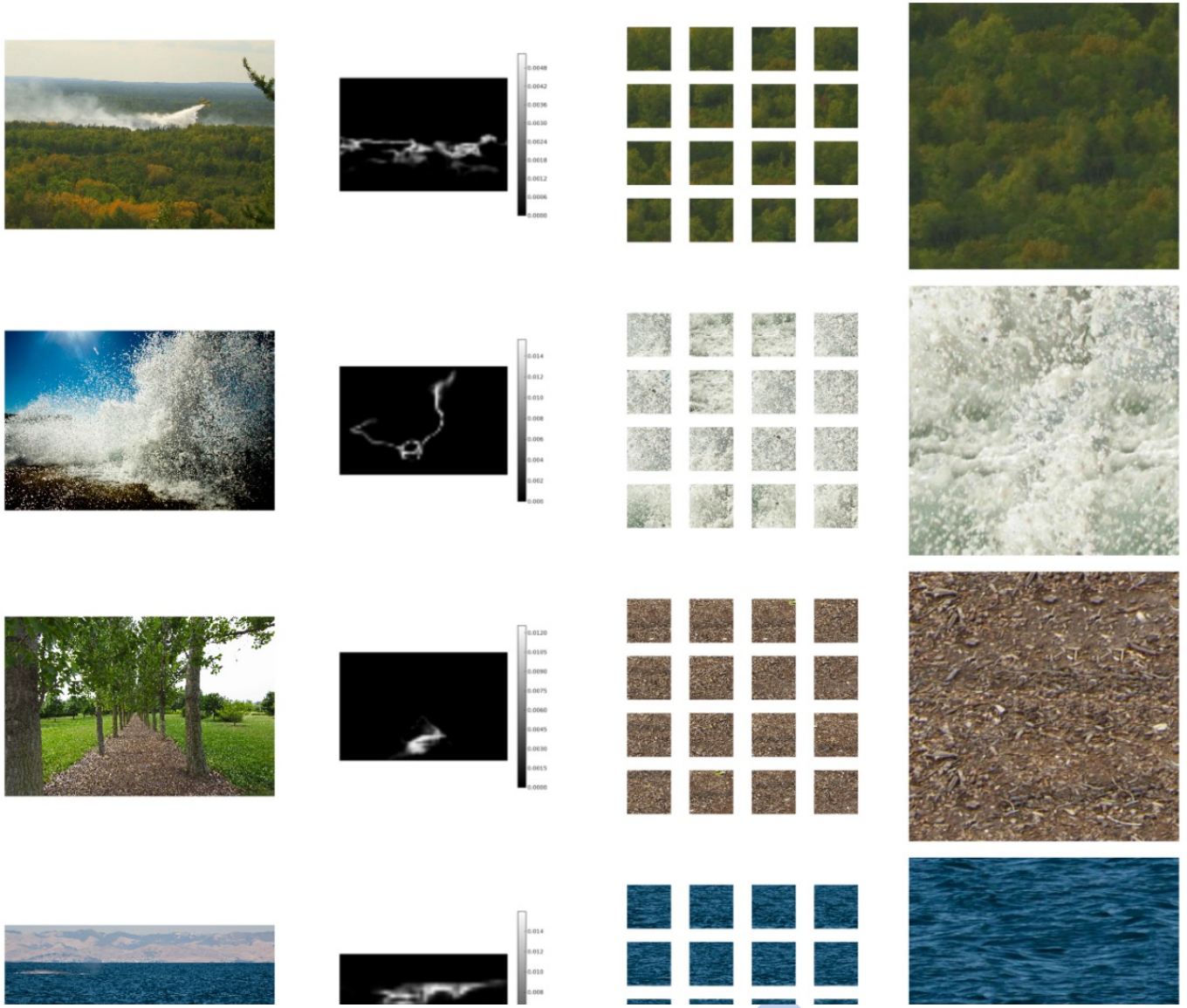
What is Computer Graphics?

Creating new images using computers

- May be created from:
- Existing images
- 3D models
- User strokes
- High dimensional data



From existing images

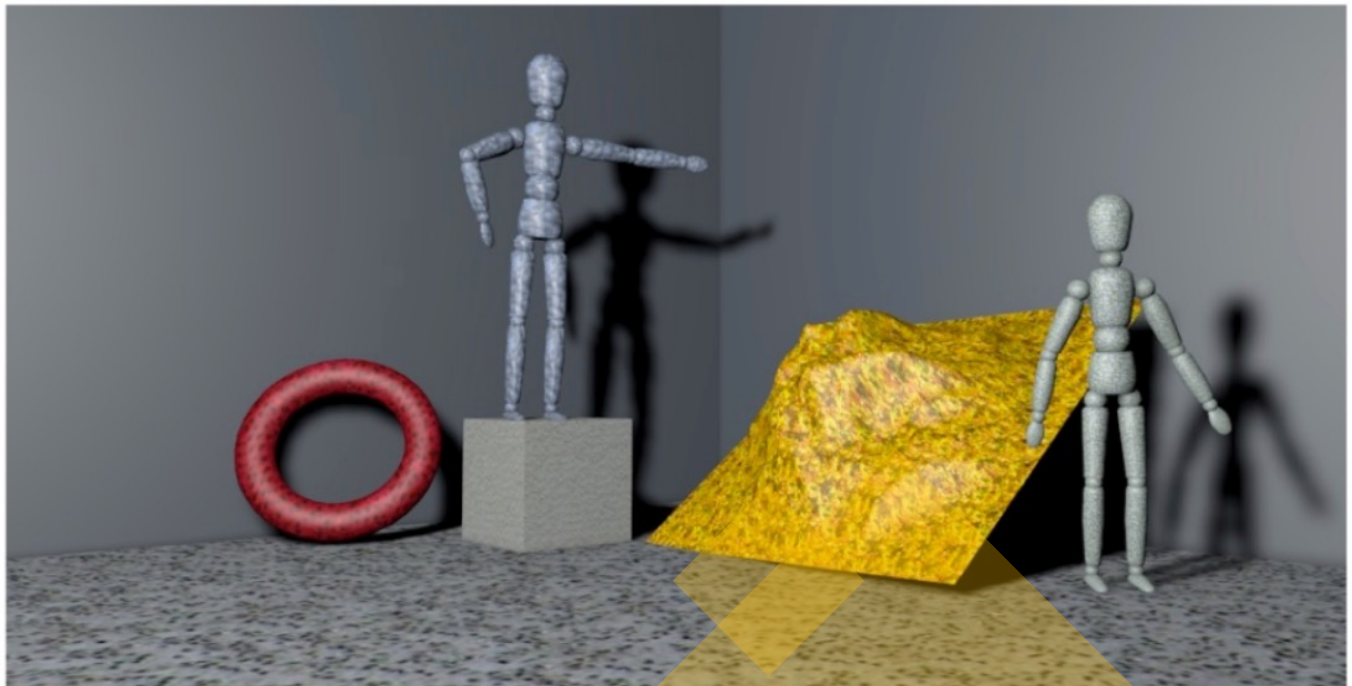


From existing images + 3D models

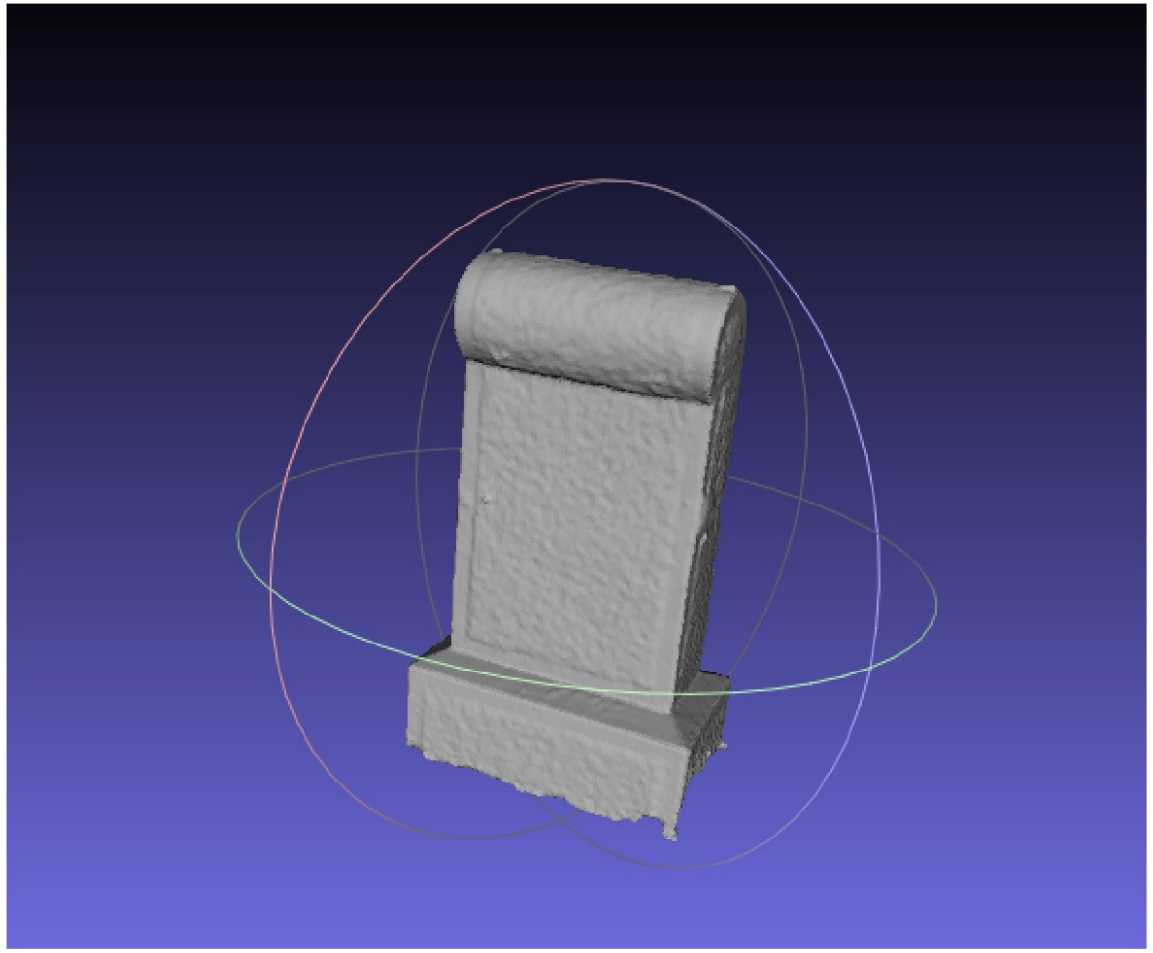




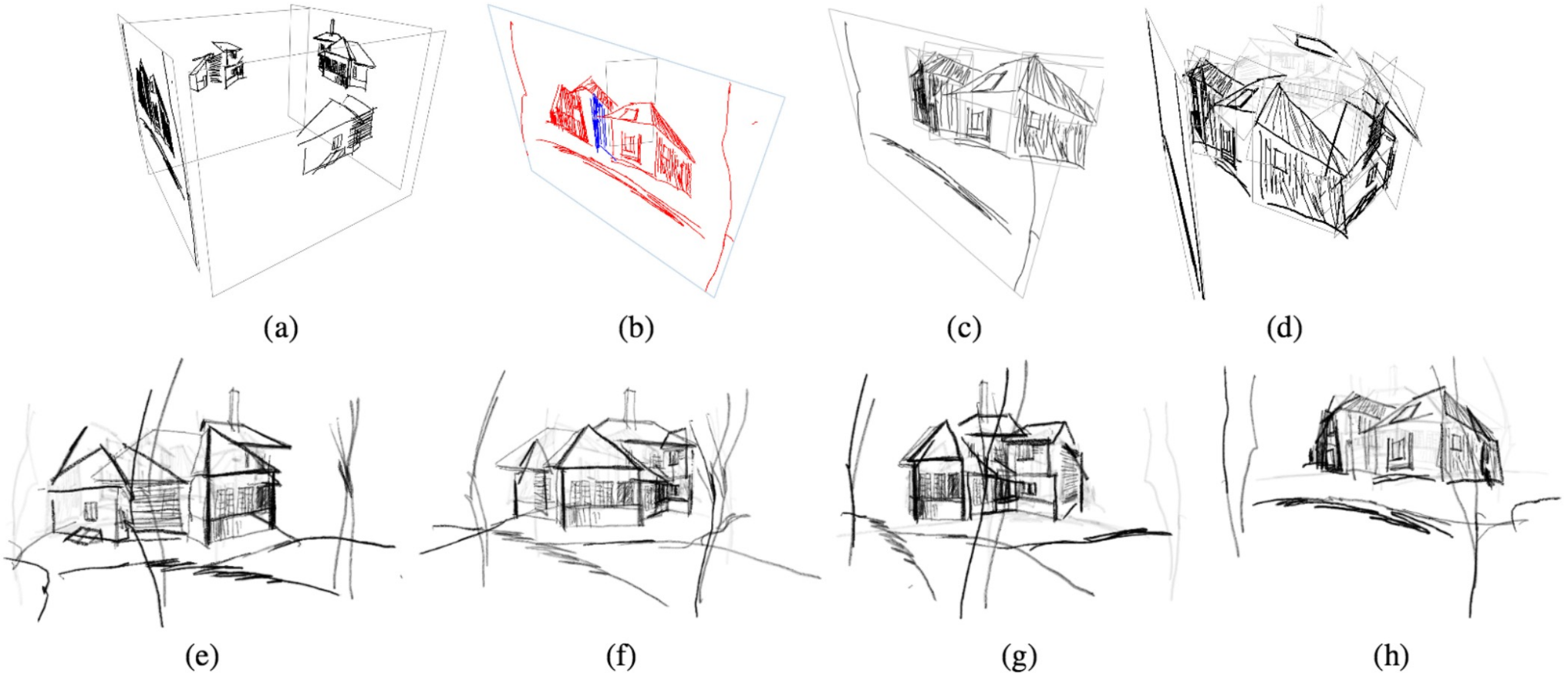




New 3D models from existing images

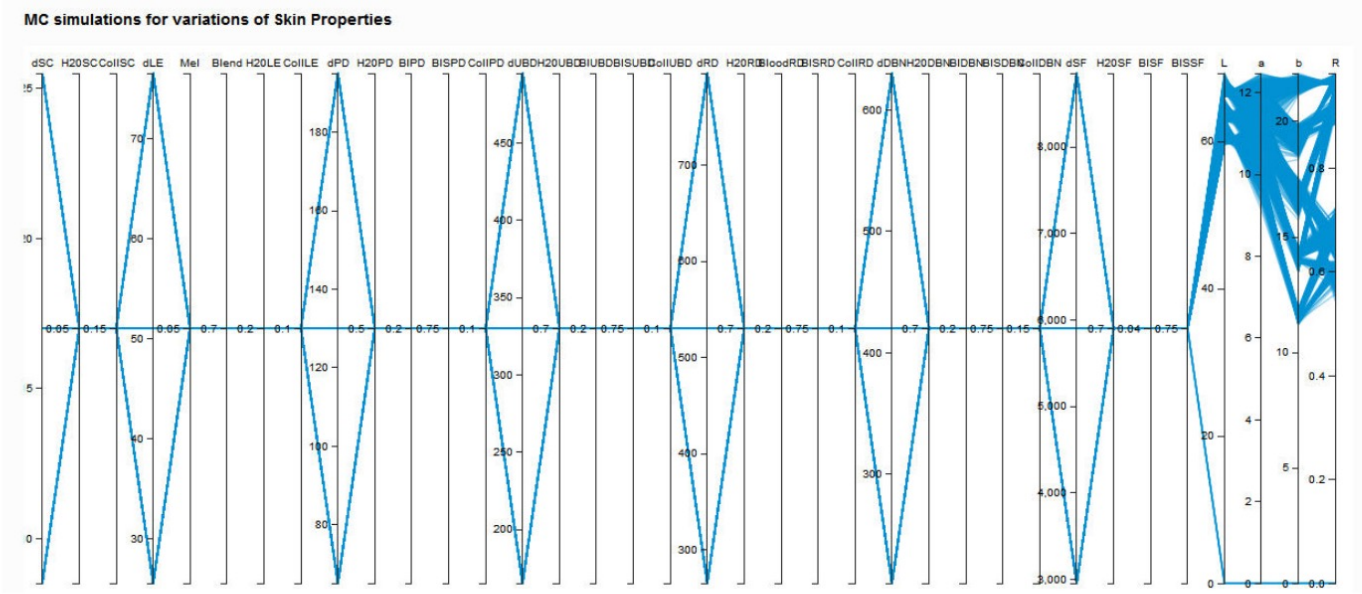


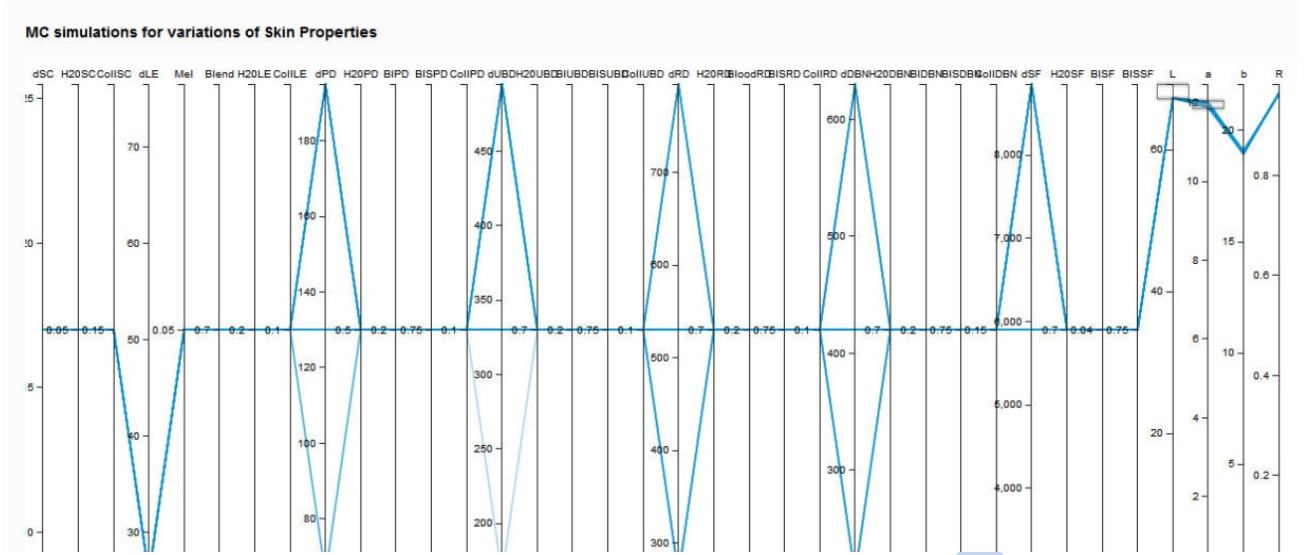
From user strokes



From user strokes

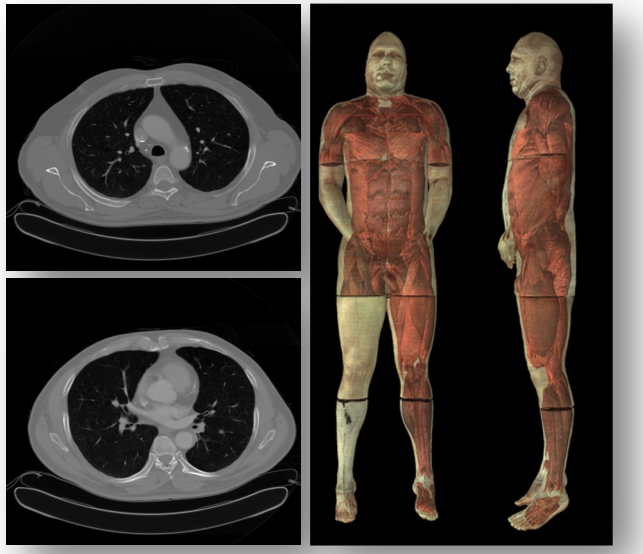
From high dimensional data





Applications

- Movies
- Games
- Computer-aided design
- Scientific visualization
- Medical imaging
- Training
- Education
- E-commerce
- Graphical User Interfaces

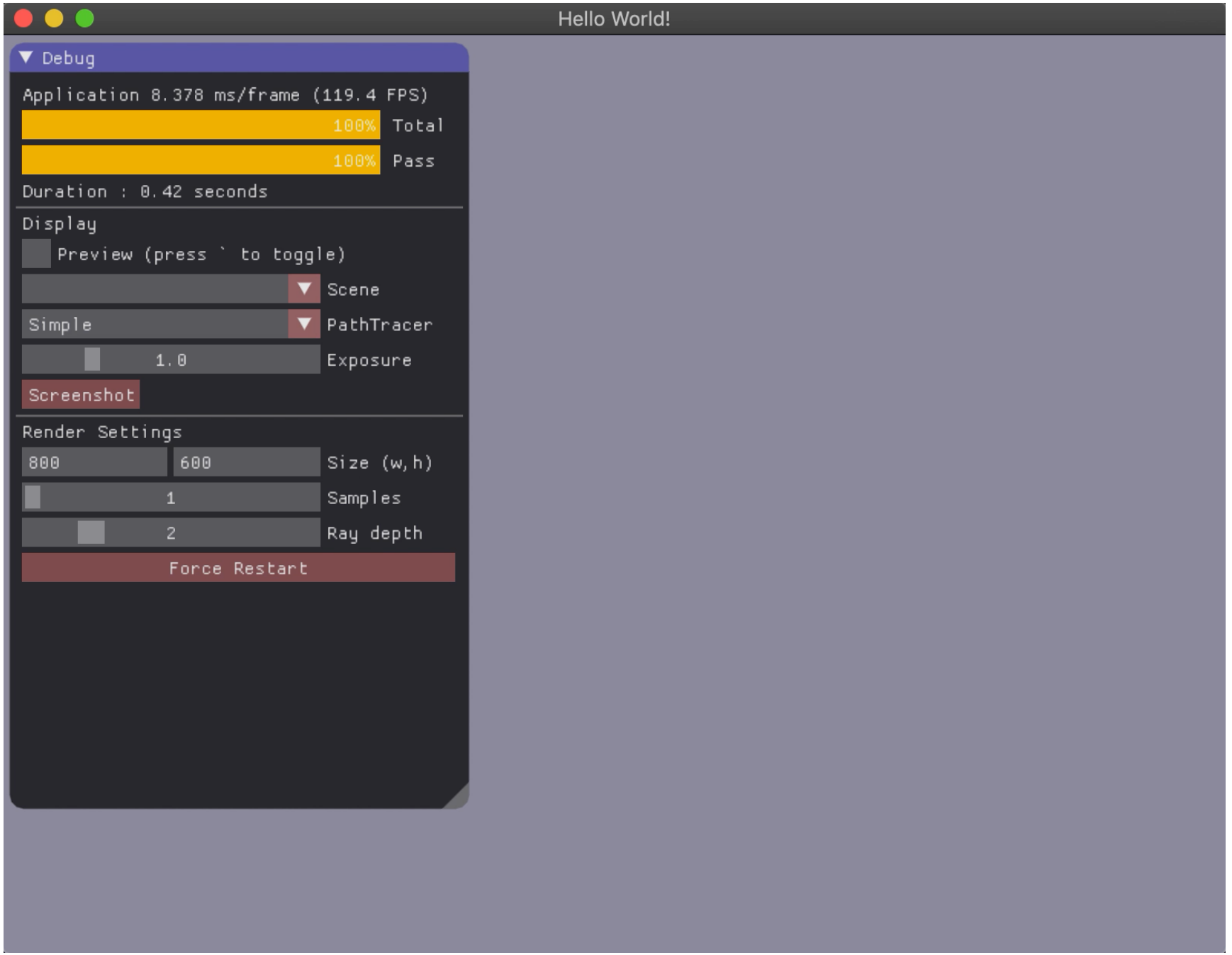


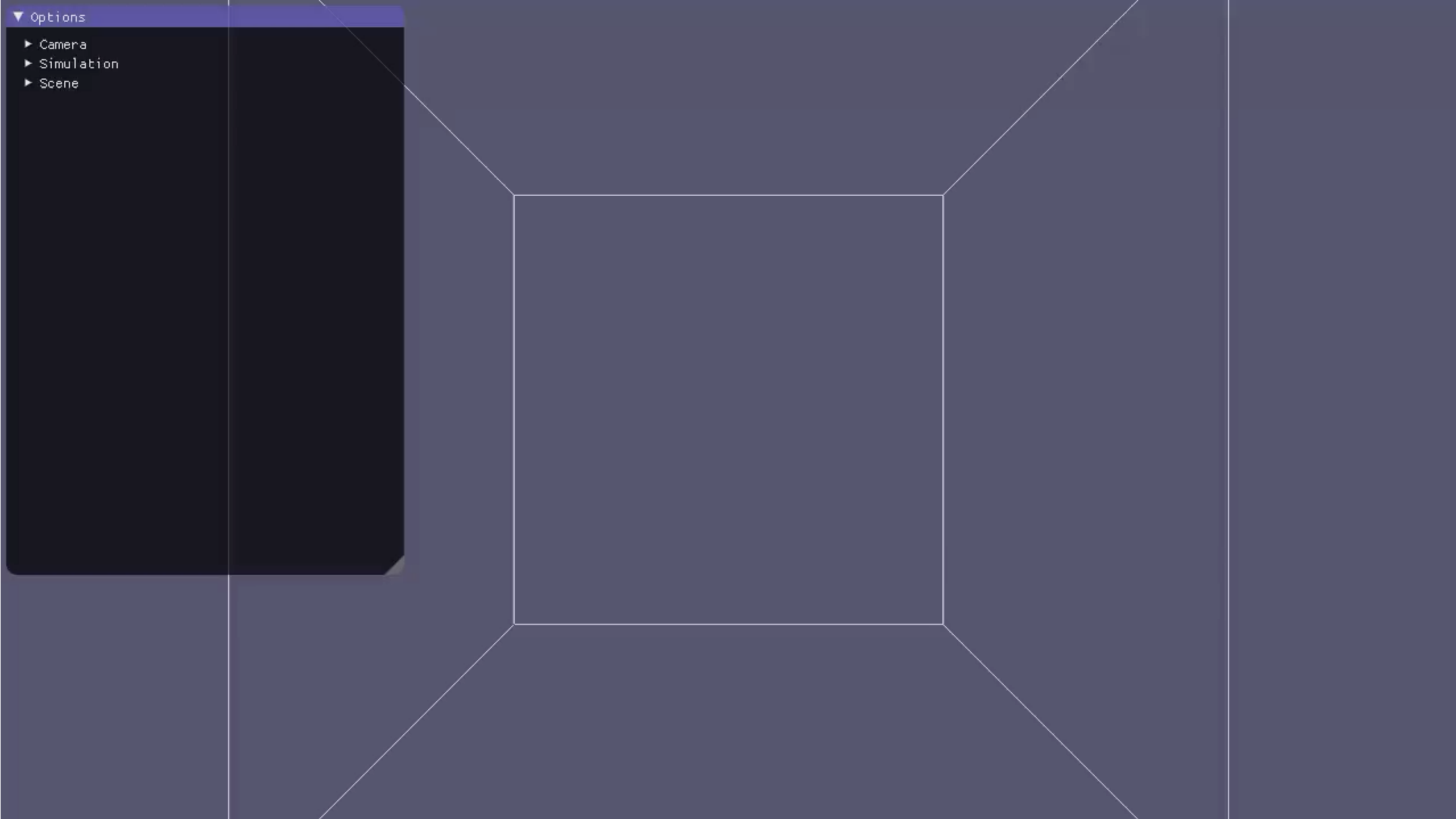
What to Expect From This Course

- Fundamentals of computer graphics algorithms/programming
- Understand how graphics APIs and the graphics hardware work
- Ability to implement many of the applications just shown

What NOT to Expect From This Course

- Software packages
  - Maya/Blender/3DMax
  - Photoshop and other painting tools
- Artistic skills
- Game design


Hello World!
Debug
Application 8.378 ms/frame (119.4 FPS)
100% Total
100% Pass
Duration : 0.42 seconds
Display
Preview (press ` to toggle)
Scene
Simple
PathTracer
1.0
Exposure
Screenshot
Render Settings
800
600
Size (w,h)
1
Samples
2
Ray depth
Force Restart


Options
Camera
Simulation
Scene

Shapes

0.000000 0.000000 0.000000 Rotation

0.000000 0.000000 0.000000 Translation

1.000000 Scale

Wireframe

.obj File

Load File

1 1 1 Divisions

Trilinear Interpolation Interpolation type

What language/framework used for assignments?

- we will use C++ and OpenGL

- Why C++ and not Java?
  - Versatile - powerful
  - Performance
  - Available geometry processing libraries
  - Similar to GDSL, GLSL or CUDA languages
  - It is the industry standard for computer graphics
- How do languages differ in general?