情報可視化論

第1回ガイダンス

システム情報学研究科

計算科学専攻

坂本尚久, 陰山聡

2017年4月11日

Information Visualization

W01: Guidance

Graduation School of System Informatics

Department of Computational Science

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Purpose

- The importance of data visualization technique as a key component for the knowledge discovery from complicated and sophisticated Big Data is rising concurrent with recent advances in technology.
- The course discusses the elemental techniques of data visualization widely used in scientific, medical and industry fields in addition to computer graphics techniques.
- The purpose of the course is to understand the elemental algorithms of computer graphics and data visualization, and its implementations with GPU acceleration techniques.

目的

- 近年の爆発的な情報技術の進歩に伴い大規模・複雑化するデータから、そこに隠された特徴や変化を見逃さず、新たな知見を得るための情報可視化技術は、欠かすことのできない基盤技術として重要性が増している。
- 本講義では、コンピュータグラッフィックスの要素技術に関する説明に加え、多くの分野で活用されている可視化の基本アルゴリズムについて解説する。
- 本講義では、コンピュータグラフィックスおよび可視化基本アルゴリズムとGPU（シェーダ）を使ったプログラミングの習得を目標とする。

Keyword

- Computer Graphics
- GPU
- Shader
- Data Visualization
- Isosurface Extraction
- Volume Rendering

Schedule

- General information
  - Q1
  - Tue (13:20 - 14:50)　　Classroom lecture
  - Wed (13:20 - 14:50)　　Programming exercise

Schedule

- W01 4/11 Guidance
- W02 4/12 Setup
- W03 4/18 Introduction to Data Visualization
- W04 4/19 CG Programming
- W05 4/25 Rendering Pipeline
- W06 4/26 Coordinate Systems and Transformations
- W07 5/09 Shading
- W08 5/10 Shader Programming
- W09 5/16 Visualization Pipeline
- W10 5/17 Data Model and Transfer Function
- W11 5/23 Scalar Data Visualization 1 (Isosurface Extraction)
- W12 5/24 Implementation of Isosurface Extraction
- W13 5/30 Scalar Data Visualization 2 (Volume Rendering)
- W14 5/31 Implementation of Volume Rendering
- W15 6/06 Student Presentations

Schedule

INTRODUCTION

- W01 4/11 Guidance
- W02 4/12 Setup
- W03 4/18 Introduction to Data Visualization
- W04 4/19 CG Programming

CG

- W05 4/25 Rendering Pipeline
- W06 4/26 Coordinate Systems and Transformations
- W07 5/09 Shading
- W08 5/10 Shader Programming

VIS

- W09 5/16 Visualization Pipeline
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- W14 5/31 Implementation of Volume Rendering

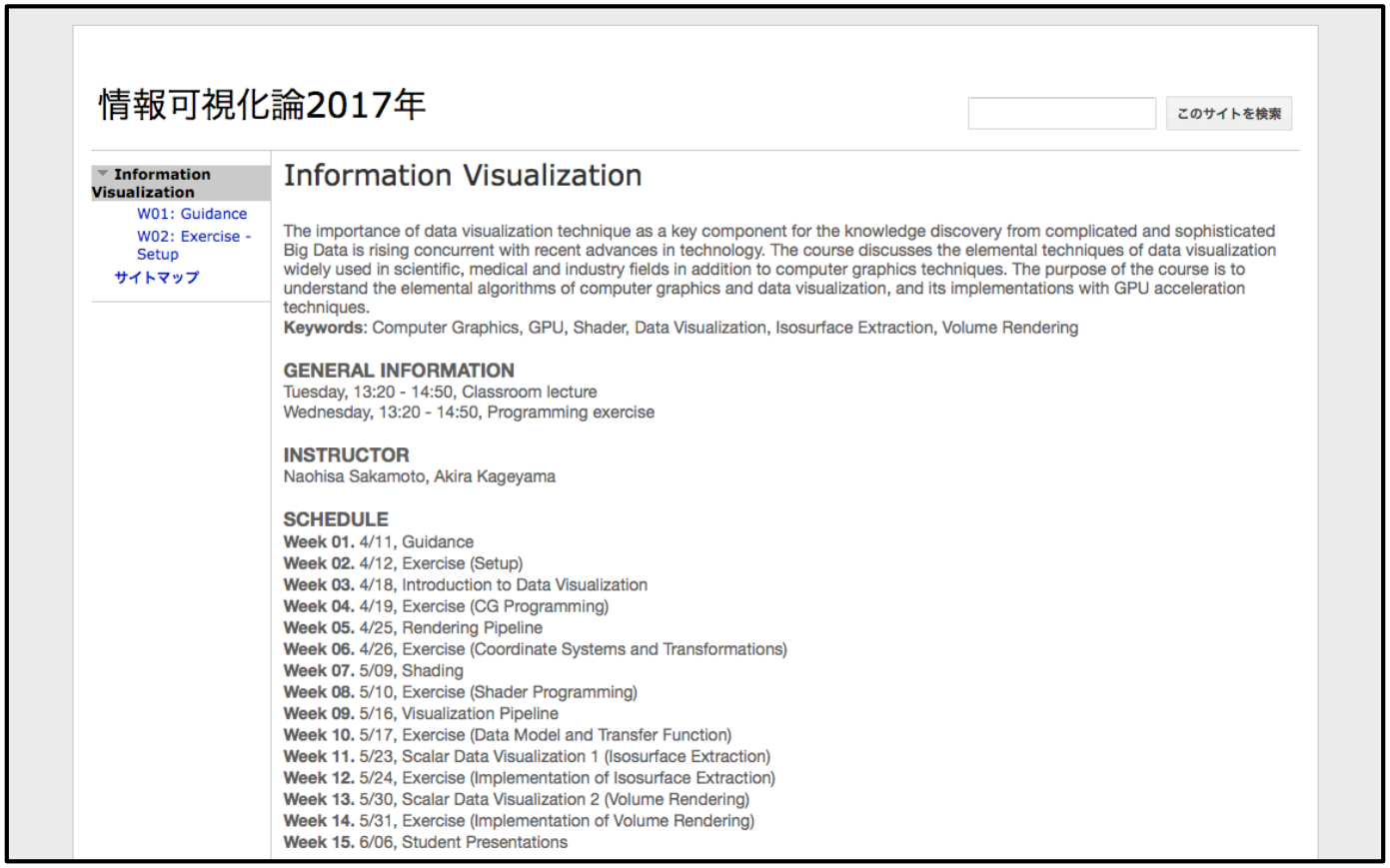
- W15 6/06 Student Presentation

Grading and requisites

- Grading is based on results of each exercise and one final report.
- Although JavaScript and Three.js will be used in the exercises, the experiences of JavaScript programming won’t necessarily be required.
- Textbooks will be appropriately instructed for each class.

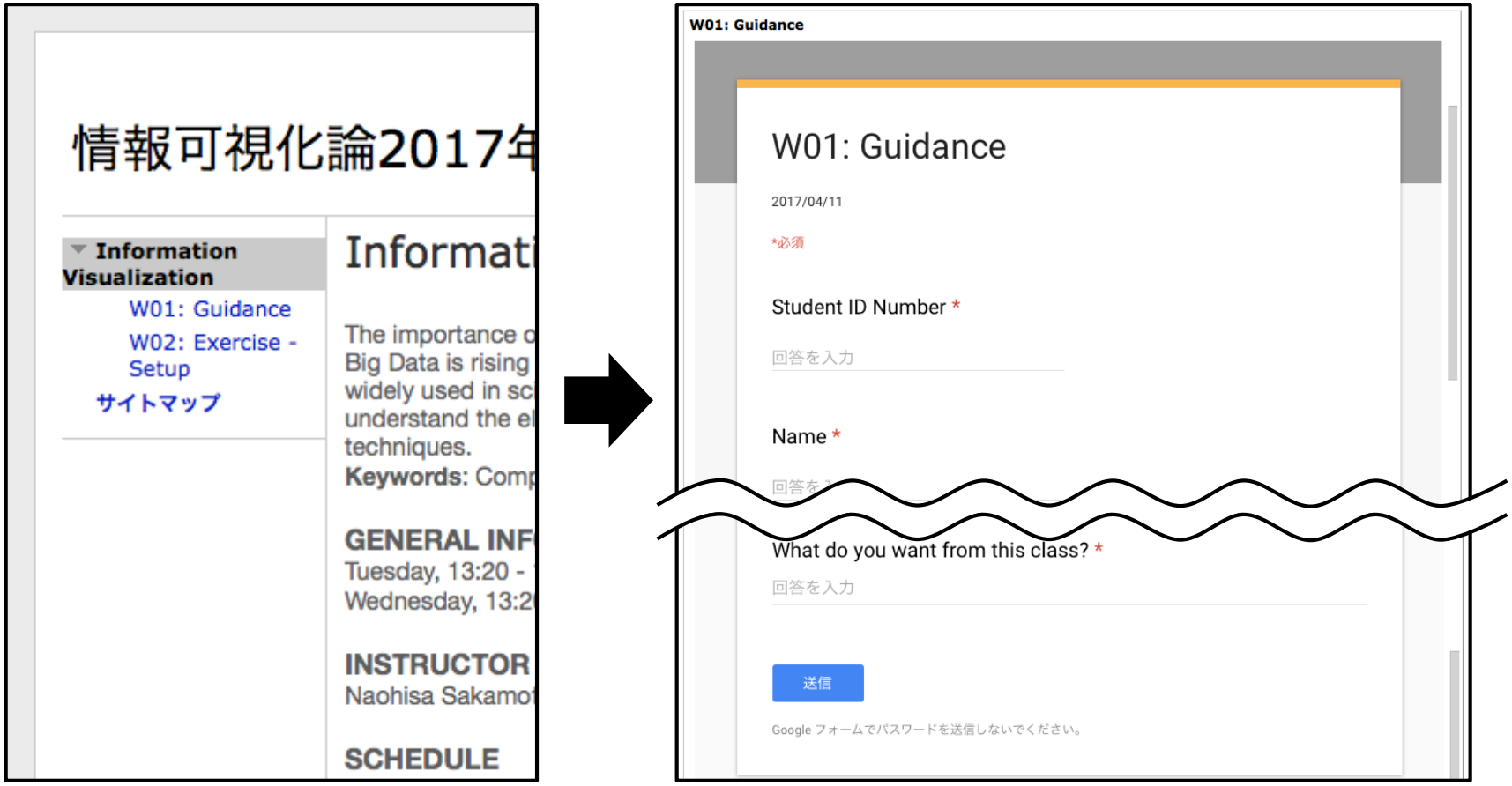
Website

- https://goo.gl/YM49ts
  https://sites.google.com/site/kobeinfovis2017



Polling

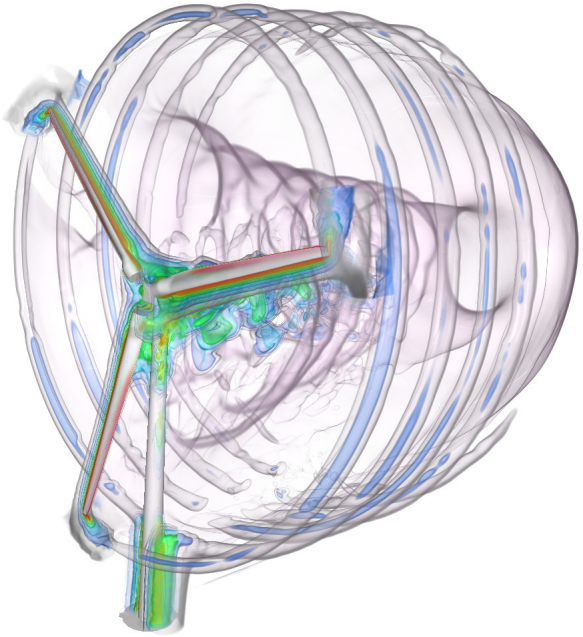
- Take the poll



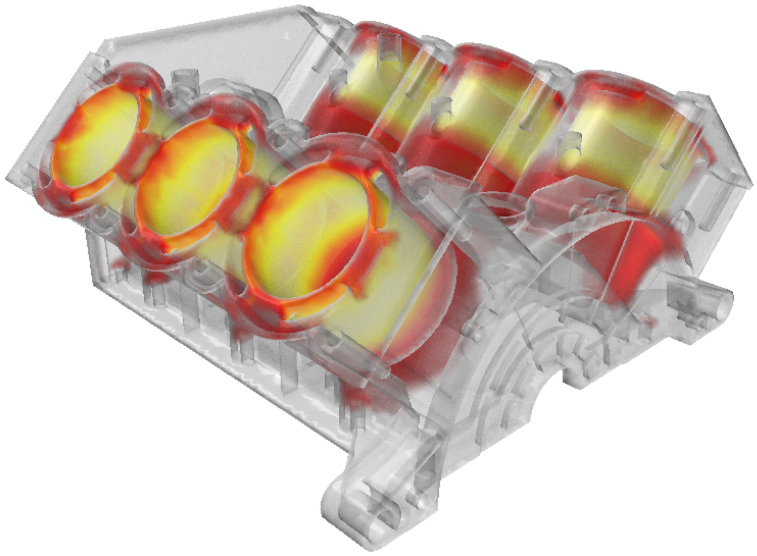
Goal

- Final goal of this course is to implement **Volume Rendering** method for the volume dataset with **JavaScript**.

[S.Bruckner, et al., EuroVis 2005]



[M.Shih, et al., LDAV2014]



[N.Sakamoto, et al., PacificVis (VisNotes) 2014]

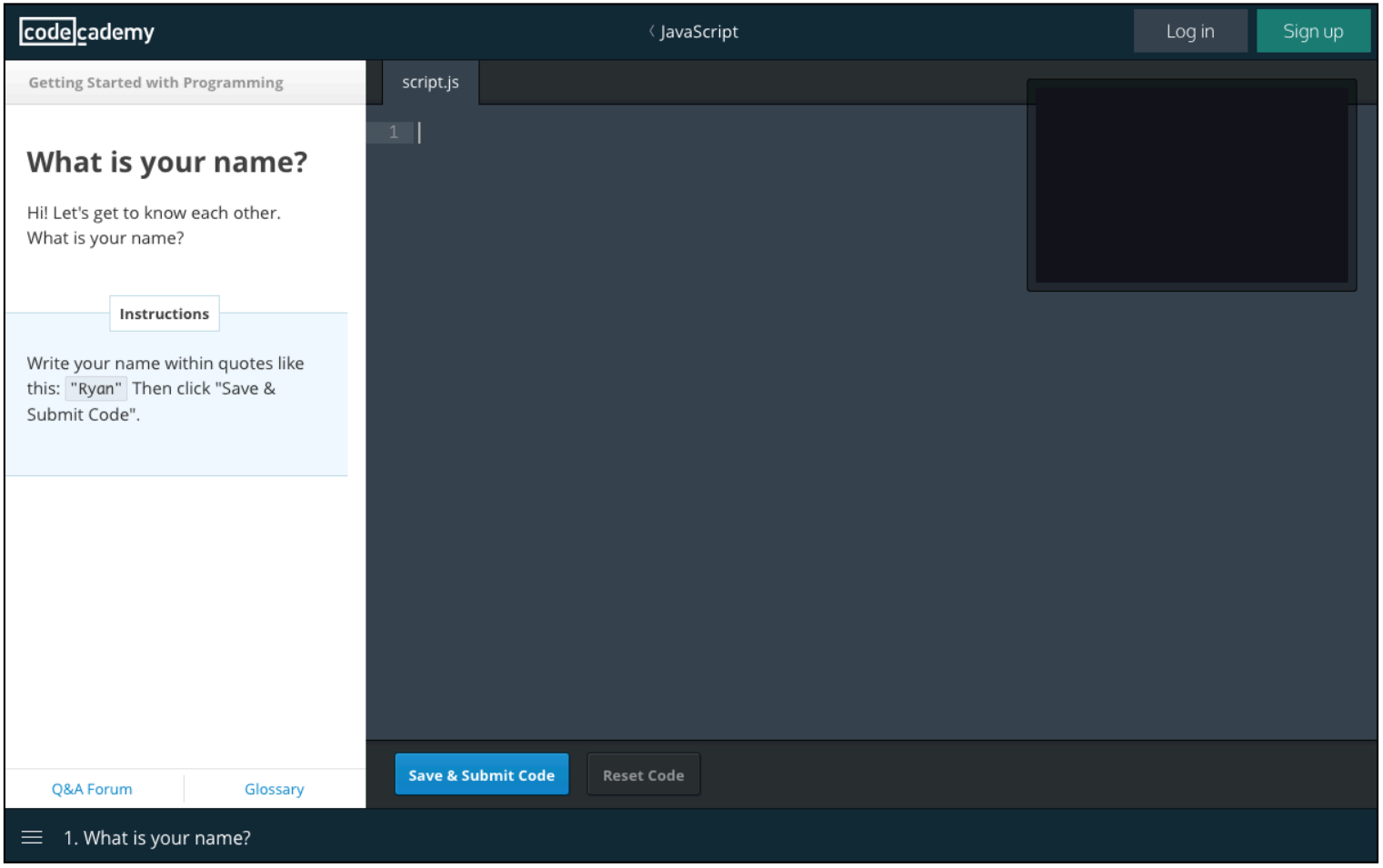
JavaScript

- A high level, dynamic, untyped and interpreted programming language
- Standardized in ECMAScript language specification

```
<html>
    <head>
        <title>Sample</title>
    </head>
    <body>
        <script>
            document.write(“Hello World!”);
        </script>
    </body>
</html>
```

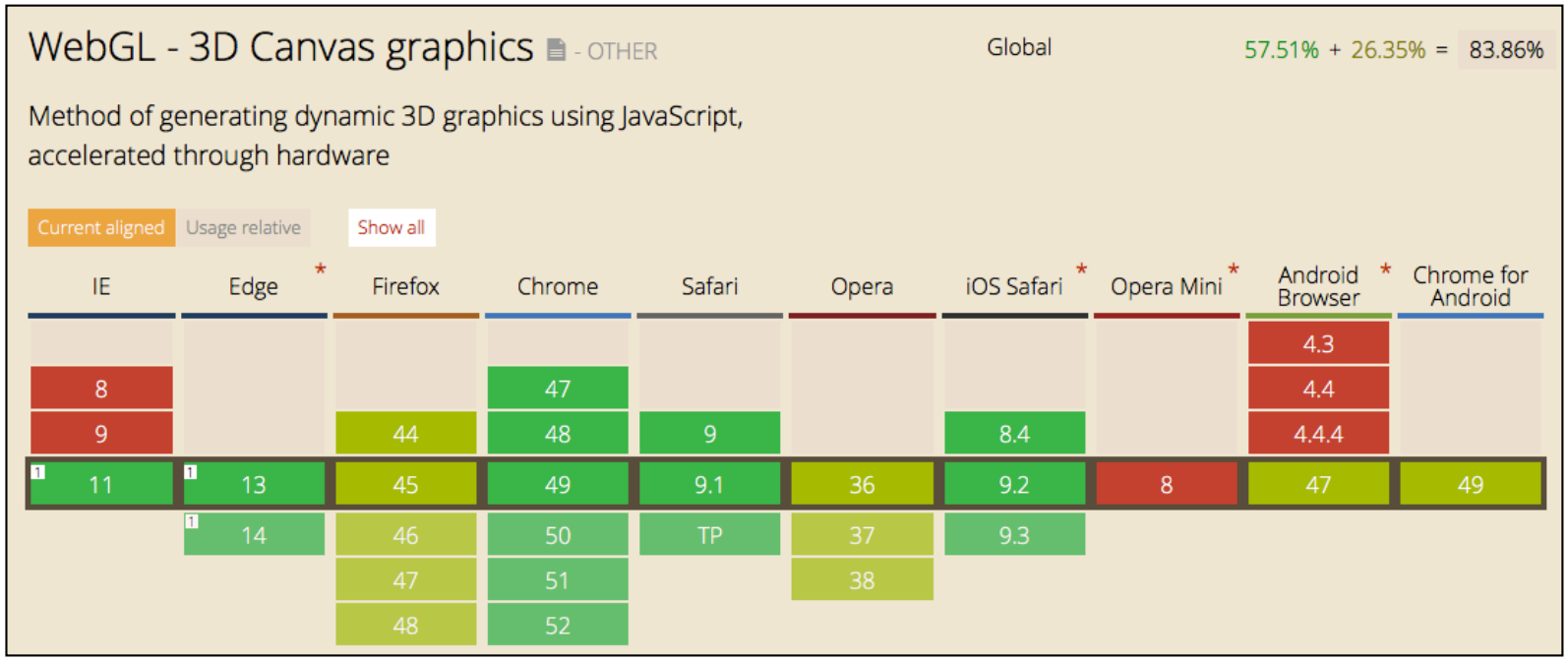
Code Academy

- www.codecademy.com



WebGL

- WeGL = Web Graphics Library
- JavaScript API for rendering interactive 2D and 3D graphics within web browser



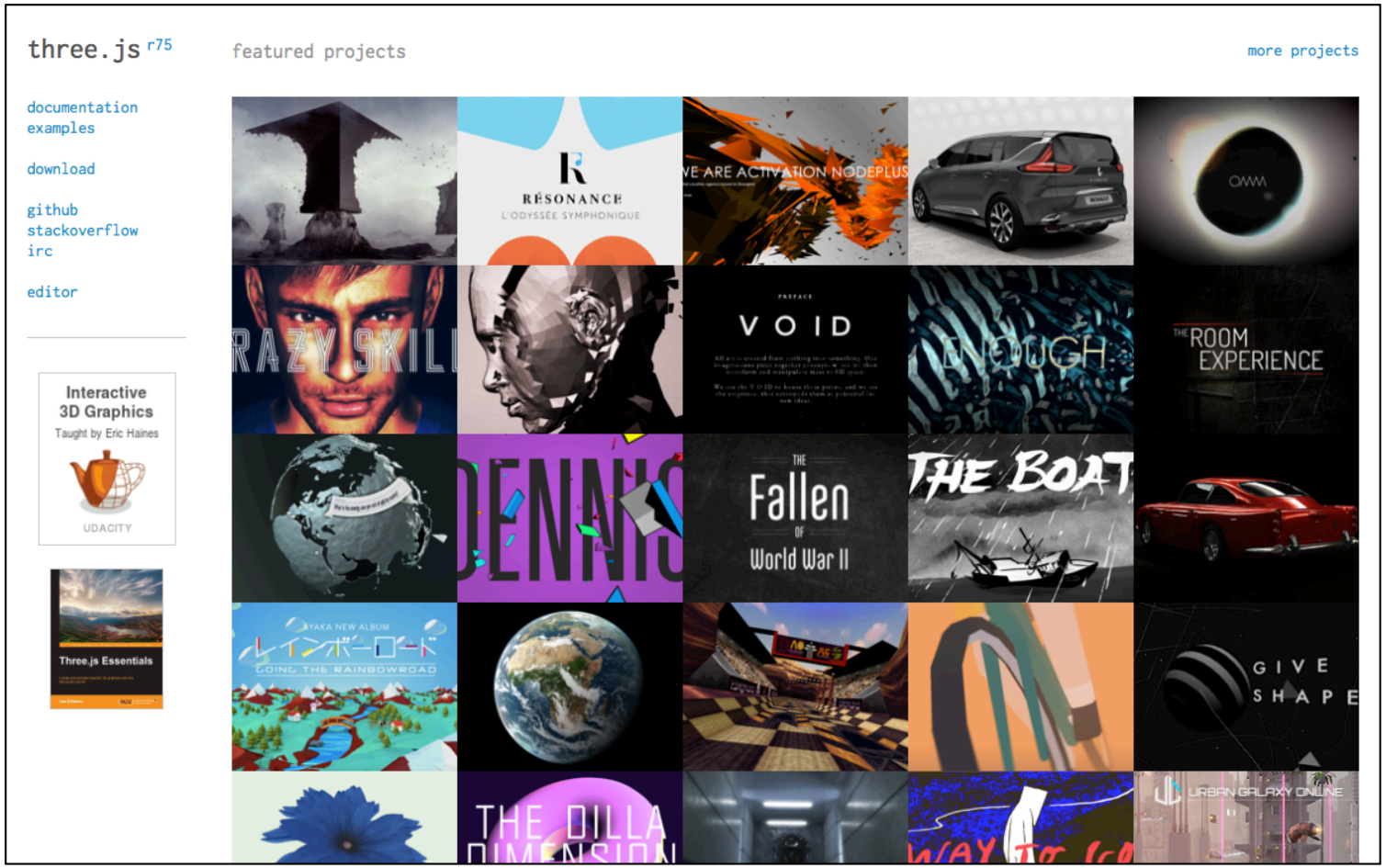
http://caniuse.com/#feat=webgl

Enable WebGL in Safari

- Safari 8 or later
  - WebGL is enabled by default
  - Menu bar : Safari > Preference (環境設定)

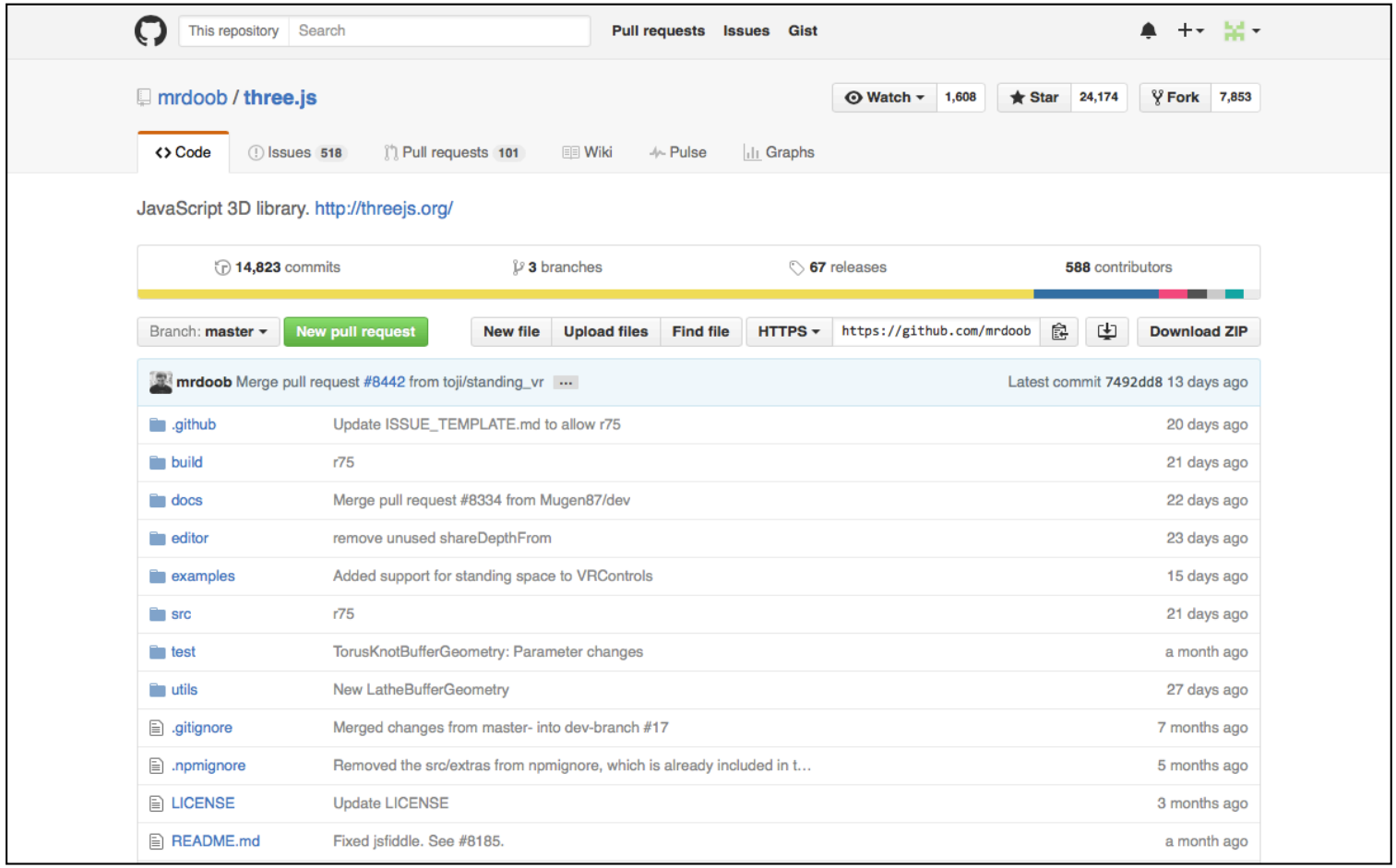
Three.js

- threejs.org



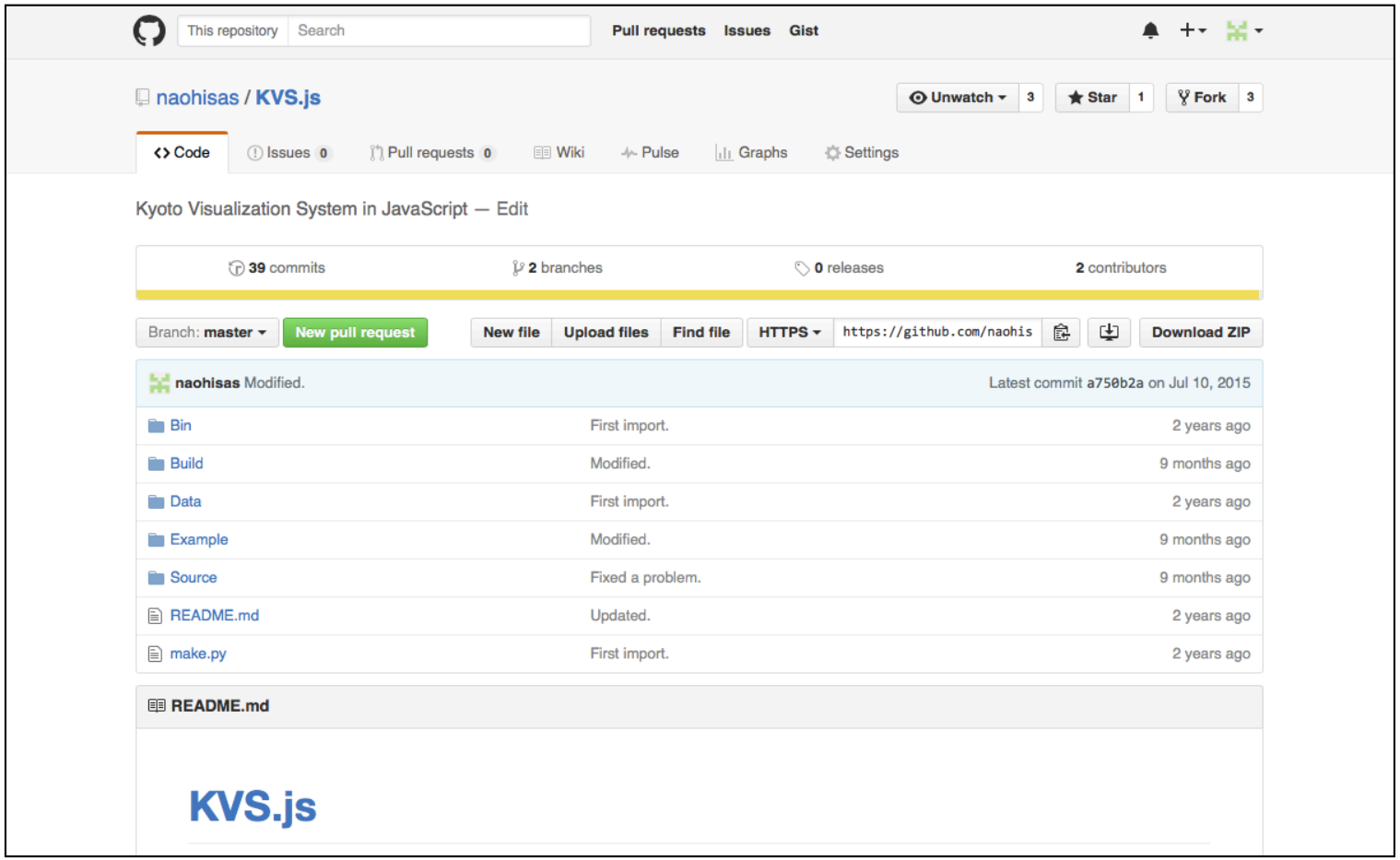
Three.js

- github.com/mrdoob/three.js



KVS.js

- github.com/naohisas/KVS.js



Polling

- Take the poll
  - Student ID Number
  - Name
  - What programming languages do you have experience with?
  - What do you want from this coarse?