CSCI 39594: Advanced Visual Tools

3 hrs, 3 credits. Department of Computer Science, Hunter College, City University of New York.

Table of Contents

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Details

Field	Value
Instructor:	Wole Oyekoya
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Phone:	(212) 396-6837
Office hours:	Mondays and Thursdays, 10:00am-11:00am
Semester:	Fall 2019
Section:	CSCI 39594
Class Sessions:	Mondays and Thursdays, 11:10am-12:25pm
Classroom:	HN-C107

Course Description

The course will introduce students to various software and toolkits spanning multiple areas of visualization, which includes 3D (Immersive VR), Information and Scientific Visualization. It will cover basics of how to present data through meaningful visualizations to support decision making. Students will learn how to gain keen insight into complex data sets by learning about tools and resources to visualize the expected and discover the unexpected in their data.

Learning Outcomes

Students completing this course will be able to: - Understand fundamental concepts of scientific and information visualization; - Use visualization software and tools in the processing and analysis of data from various sources; - Combine tools for data manipulation and visualization, to collect, and clean data; - Create visualizations of data that are effective for analysis; - Analyze and critique examples of visualizations; - Choose the most effective visual display for displaying results to diverse audiences

Outline and Schedule of Course Topics

Please note that this schedule is tentative and is meant to serve only as a guide:

- Introduction to Visualization
- Visualization Challenges
- Advanced Visual Analytics with Tableau
- Machine Learning with R/Python and Tableau
- Data Visualization with D3.js
- Information Visualization with Gephi
- Scientific Visualization with ParaView
- Scientific Visualization with VisIt
- Scientific Visualization with VMD
- 3D Visualization and VR/AR/MR
- Immersive 3D Visualization Displays

Prerequisites

- CSCI 23500: Software Analysis and Design II or equivalent.
- CSCI 26000: Computer Architecture II or equivalent.
- MATH 15500: Calculus with Analytic Geometry II or equivalent.

Textbooks and Materials

- Tufte, Edward R. The visual display of quantitative information. Vol. 2. Cheshire, CT: Graphics press, 2001.
- Agrawala, Maneesh, Wilmot Li, and Floraine Berthouzoz. "Design principles for visual communication." Commun. ACM 54.4 (2011): 60-69.
- Tableau, https://www.tableau.com/
- D3.js, https://d3js.org/
- Zhu, Nick Qi. Data visualization with D3. js cookbook. Packt Publishing Ltd, 2013.
- Paraview, https://www.paraview.org/
- Ayachit, Utkarsh. The paraview guide: a parallel visualization application. Kitware, Inc., 2015.

Grading

Category	Percentage
Project	50%
Participation	10%
Final Exam	40%

Key Dates

Event	Date
One-page Project Proposals due	September 17th @ 10am
Project Updates	Weekly
Project Submission	December 6th @ 12 noon
Final Exam	December 16, 11:30 am - 1:30 pm

Project

The course will include one group project. Each goup of four will implement a visualization application, which could be based on one of the three areas: (i) Information Visualization, (ii) Scientific Visualization, and (iii) Immersive Visualization. You will will analyze a dataset of your choice using one of the tools that will be taught in class. You can also use other visualization tools, with permission. Each group will be responsible for acquiring data, surveying existing visualization methods, and visualizing your chosen data. A one-page project proposal needs to be submitted that includes the names of individuals within each group, source of dataset and an outline of weekly milestnes. The deliverable will include a short report (~3-5 pages) and an application demo.

Notes

- **Deadlines** and **due dates** for projects will be assigned in class.
- **Late submissions will be penalized.**
- No extensions will be given.

Exams

TBD

Attendance

Attendance is expected for *each and every class* meeting.

Academic Violations

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. Special attention is given to CONTRACT CHEATING (this is where students have work completed on their behalf which is then submitted for academic credit).

Discussion and Q&A

This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates and myself. Rather than emailing questions to me, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, please email them.

Join our class page here for up to date annoucements.

Email

Emails to the instructor must be via a CUNY email addresses for FERPA reasons. Please post all class-related discussion on Piazza. Also, please ensure that your *correct* email address is entered into the CUNY Blackboard.

Bulletin Board

You should check the Blackboard site regularly, since all class material will be posted there. Please make sure you have configured Bb to use your *CUNY email address*. You are responsible for any email the instructors might send there.

Computer Science Facilities & Labs

All computer science students can use any of the general-purpose labs throughout Hunter College. In addition, computer science majors and students enrolled in CSCI courses can an obtain an account on the Computer Science Department Network. More information can be found on the Computer Science Department's website.

Counseling & Wellness Services

Counseling & Wellness Services (CWS) provides mental health, health and wellness services aimed at enhancing students' quality of life and maximizing personal and academic growth and development. More information can be found on the Counseling & Wellness Services website.

Special Needs

Students with special needs should see me for accommodation.

ADA Compliance

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and / or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical and / or Learning) consult the Office of Accessibility located in Room E1124 to secure necessary academic accommodations. For further information and assistance please call (212-772-4857)/TTY (212-650-3230).

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

FERPA gives parents certain rights with respect to their children's education records. These rights transfer to the student when he or she reaches the age of 18 or attends a school beyond the high school level. Students to whom the rights have transferred are "eligible students."

- Parents or eligible students have the right to inspect and review the student's education records maintained by the school. Schools are not required to provide copies of records unless, for reasons such as great distance, it is impossible for parents or eligible students to review the records. Schools may charge a fee for copies.
- Parents or eligible students have the right to request that a school correct records which they believe to be inaccurate or misleading. If the school decides not to amend the record, the parent or eligible student then has the right to a formal hearing. After the hearing, if the school still decides not to amend the record, the parent or eligible student has the right to place a statement with the record setting forth his or her view about the contested information.
- Generally, schools must have written permission from the parent or eligible student in order to release any information from a student's education record. However, FERPA allows schools to disclose those records, without consent, to the following parties or under the following conditions (34 CFR § 99.31):
    - School officials with legitimate educational interest;
    - Other schools to which a student is transferring;
    - Specified officials for audit or evaluation purposes;
    - Appropriate parties in connection with financial aid to a student;
    - Organizations conducting certain studies for or on behalf of the school;

- Accrediting organizations;
- To comply with a judicial order or lawfully issued subpoena;
- Appropriate officials in cases of health and safety emergencies; and
- State and local authorities, within a juvenile justice system, pursuant to specific State law.

Schools may disclose, without consent, "directory" information such as a student's name, address, telephone number, date and place of birth, honors and awards, and dates of attendance. However, schools must tell parents and eligible students about directory information and allow parents and eligible students a reasonable amount of time to request that the school not disclose directory information about them. Schools must notify parents and eligible students annually of their rights under FERPA. The actual means of notification (special letter, inclusion in a PTA bulletin, student handbook, or newspaper article) is left to the discretion of each school.

For additional information, you may call 1-800-USA-LEARN (1-800-872-5327) (voice). Individuals who use TDD may use the Federal Relay Service.

Or you may contact us at the following address:

Family Policy Compliance Office U.S. Department of Education 400 Maryland Avenue, SW Washington, D.C. 20202-8520

Sexual Misconduct

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College reaffirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationships. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444).

b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123. CUNY Policy on Sexual Misconduct Link: http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf

Syllabus Change Policy

Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice. Students will find out about changes to the syllabus via class attendance.

Instructor Biography

Wole Oyekoya is an Associate Professor in the Computer Science Department at Hunter College. He received his Ph.D. from University College London in 2007 for work on eye tracking for image search and retrieval. Prior to joining CUNY, he worked at Clemson University as the Director of Visualization from July 2015 to August 2019, where he was also an Adjunct Assistant Professor with School of Computing. Prior to that, he worked for Advanced Research Computing (Visualization group), Virginia Tech as a Visualization and Virtual Reality Specialist from November 2013 to June 2015. He worked as a Research Associate at Middlesex University on medical image retrieval, followed by the Virtual Environments and Computer Graphics group at University College London. His research expertise includes visualization, virtual reality, eye tracking and visual perception.