

CMSC 828V – Visual Computing for Big Data Spring 2013

Course Overview: This course will equip you with foundations and techniques for visual understanding of Big Data. The course will cover recent advances in many-core and multi-core processors, displays, and interaction tools as they impact visual computing for big data. We will also survey long-standing foundational principles of human perception, sampling and filtering, multiresolution techniques, and visual knowledge discovery techniques. We will study case studies from a variety of application domains, such as the life sciences, finance, ecology, GIS, and social networks to understand solutions that have worked in the past in transforming massive datasets into meaningful visual representations that are easy to understand and communicate.

Lectures: Tuesdays 2:00pm – 4:45 pm AVW 2119

Professor: Amitabh Varshney, 2119 AVW, (301)405-6722, varshney@umiacs.umd.edu.

Office hours: By appointment. For an appointment, just drop by my office, or call my assistant Edna (5-6722), or send her an email (edna@umiacs.umd.edu) and we can fix up a time.

Texts: There is no textbook for this course but papers and weblinks will be posted on the class webpage

Prerequisites: One course in graphics, visualization, or HCI at grad or undergrad level.

Grading: Presentations: 20%, Midterm: 20%, Project: 30%, Final Exam: 30%

Final Exam: Final Exam will be 10:30am – 12:30pm on Wednesday, May 15

Academic Conduct: I expect high standards of professional conduct and ethics. All work that you submit in this course must be your own or approved in advance by the instructor.

Qualifying course for MS and PhD: This course will count towards PhD and MS qualifying coursework in the Visual and Geometric Computing area. The MS comprehensive course grade will be based on midterm and final exams (in the 40-60 ratio specified above).

Course Plan

Overview

Jan 24	Visual Computing Pipeline and Big Data Challenges
Jan 29	Visual Knowledge Discovery

Foundations

Jan 31	Perception and Saliency
Feb 5	Processor Advances: CPUs and GPUs Displays and Cameras
Feb 12	Scientific Visualization Information Visualization
Feb 19	Sampling and Filtering

Techniques

	Visual Summaries
Feb 26	Project proposal presentations, reports, and web pages Project critiques and discussion
Mar 5	Interaction for Visualization (sample midterm handed out) Multiresolution Techniques
Mar 12	Clustering
Mar 14	Midterm Exam
Mar 19 and 21	Spring Break
Mar 26	Data Analytics
Mar	Cache/Memory-aware Visualization

Applications

Apr 2	Meshes, Graphs, and Network Layouts Streaming Data: Financial, Ecological, Network, Sensors
Apr 9	Astronomical Data Visualization: <i>Ross Adelman</i> Cell Imaging: <i>Justin Wagner</i>
Apr 16	Bioinformatics Visualization: <i>Mahfuza Sharmin</i> Point clouds and Laser scanning: <i>Gregory Kramida</i>
Apr 23	GIS Visualization: <i>Hsueh-Chien Cheng</i> Climate simulations
Apr 30	Text Visualization Social Network Visualization: <i>Jonas Martinsson</i>
May 7	Project Presentations and Final Project Report Course Wrap-up
May 15	Final Exam , Wednesday, 10:30am – 12:30pm