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 and Thursdays 2:00pm – 3:15pm CSIC 3120

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

Office hours: Tuesdays and Thursdays 3:30 – 4:30pm, or by appointment. For an appointment, just drop by my office, or call me, or send me an email 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).

Tentative 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
Feb 7	Displays and Cameras
Feb 12	Scientific Visualization
Feb 14	Information Visualization
Feb 19	Sampling and Filtering
Techniques	
Feb 21	Visual Summaries
Feb 26	Project proposal presentations, reports, and web pages
Feb 28	Project critiques and discussion
Mar 5	Interaction for Visualization
Mar 7	Multiresolution Techniques
Mar 12	Clustering
Mar 14	**Midterm Exam**
Mar 19 and 21	**Spring Break**
Mar 26	Data Analytics
Mar 28	Cache/Memory-aware Visualization
Applications	
Apr 2	Meshes, Graphs, and Network Layouts
Apr 4	Streaming Data: Financial, Ecological, Network, Sensors
Apr 9	Brain Imaging
Apr 11	Cell Imaging
Apr 16	GIS Visualization
Apr 18	Maps, Street views, and Laser scanning
Apr 23	Optical robotics
Apr 25	Climate simulations
Apr 30	Text Visualization
May 2	Social Network Visualization
May 7	**Project Presentations and Final Project Report**
May 9	Course Wrap-up
May 15	**Final Exam**, Wednesday, 10:30am – 12:30pm