CSE6392
Advanced Topics in Scalable Searching and Optimization
Dept. Computer Science and Engineering
Dr. Junzhou Huang

[ Administrative Basics | Course Description | Outline of Lectures ]

Administrative Basics

Lecture  WH 221 | Friday 4:00-6:50 PM

Instructor  Junzhou Huang | ERB 650 | Office hours: Friday 1:00-4:00 PM

Request  Basic math and programming background; Basic learning and vision background preferred

Textbook  None

Course Description

This course will provide an overview of the current state-of-the-art of big data searching techniques in computer vision, machine learning and data mingelearning by studying a set of cutting-edge advanced topics in these areas. Several selected research topics reflect the current state in these fields. The main objective of this course is to review cutting-edge searching& learning research in big data through lectures covering the underlying statistical & mathematical concepts and representative algorithms, paper reading, and implementation. The instructor will work with students on building ideas, performing experiments, and writing papers. Students can decide to submit his/her results to a learning/mining/vision related conference, or just play with funs.

The course is application-driven and includes advanced topics in imaging, learning and vision, such as different imaging techniques and advanced learning tools in different applications. It will also include selected topics relating to the emerging compressed sensing and sparse learning theory and techniques. The course will provide the participants with a thorough background in current research in these areas, as well as to promote greater awareness and interaction between multiple research groups within the university. The course material is well suited for students in computer science, computer engineering, electrical engineering and biomedical engineering.

Optional Project

Outline of Lectures

| Week 1. | Fri Jan 20: Introduction |

http://ranger.uta.edu/~huang/teaching/CSE6392.htm
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<th>Week 2.</th>
<th>Fri Jan 27: Math Basics, Least Square and PCA (Slides)</th>
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<th>Week 3.</th>
<th>Fri Feb 3: Optimization Basics and Gradient Methods (Slides)</th>
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<th>Week 4.</th>
<th>Fri Feb 10: Scalable Searching Via Hierarchical Kmean Tree (Slides)</th>
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<th>Week 5.</th>
<th>Fri Feb 17: Scalable Searching Via Locality-sensitive Hashing (Slides)</th>
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<th>Week 6.</th>
<th>Fri Feb 24:</th>
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<th>Week 7.</th>
<th>Fri Mar 3:</th>
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<th>Week 8.</th>
<th>Fri Mar 10:</th>
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<th>Week 9.</th>
<th>Fri Mar 17: Spring Break</th>
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Week 10. | Fri Mar 24:  
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Week 11. | Fri March 31:  
Week 12. | Fri Apr 7:  
Week 13. | Fri Apr 14:  
Week 14. | Fri Apr 21:  
Week 15. | Fri Apr 28:  
Week 16. | Fri May 5:  

**Paper List:**

**Scalable Optimization:**


Deep Learning


Generative Representation

5. I. Sutskever, O. Vinyals, Q. V. Le, "Sequence to Sequence Learning with Neural Networks", NIPS 2014

Segmentation

2. Seunghoon Hong, Hyeonwoo Noh, Bohyung Han, "Decoupled Deep Neural Network for Semi-supervised Semantic Segmentation", NIPS 2015

http://ranger.uta.edu/~huang/teaching/CSE6392.htm
Detection

8. Zhe Zhu, Dun Liang, Songhai Zhang, Xiaolei Huang, Baoli Li, Shimin Hu, "Traffic-Sign Detection and Classification in the Wild", CVPR 2016

Graph Learning

1. Mikael Henaff, Joan Bruna, Yann LeCun, "Deep Convolutional Networks on Graph-Structured Data", 2015
8. Vladimir Golkov, et. al., "Protein contact prediction from amino acid co-evolution using convolutional networks for graph-valued images", NIPS 2016

Other Information

Americans with Disabilities Act

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112 -- The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans With Disabilities Act - (ADA), pursuant to section 504 of The Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens. As a faculty member, I am required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.

Academic Integrity

http://ranger.uta.edu/~huang/teaching/CSE6392.htm

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It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)

**Grade Appeal Policy**

If you do not believe a grade on a particular assignment is correct, you may appeal the grade in writing (email) within 5 class days. Grade appeals must be appealed to the appropriate GTA firstly, then to your instructor if necessary. Please refer to the UTA Catalog for the detailed guide of grade appeals.

**Student Support Services Available**

The University of Texas at Arlington provides a variety of resources and programs to help you develop academic skills, deal with personal situations, better understand concepts and information related to their courses, and achieve academic success. These programs include major-based learning centers, developmental education, advising and mentoring, personal counseling, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 or visit www.uta.edu/resources for more information and appropriate referrals.

**Academic Integrity**