CS 593: Knowledge Discovery in Databases

Stevens Institute of Technology

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Course Requirements

Recommended Prerequisites:

- **Familiarity with the principals of statistics and probabilities and Data Mining; for example, completion of MGT 502 (no credit).**

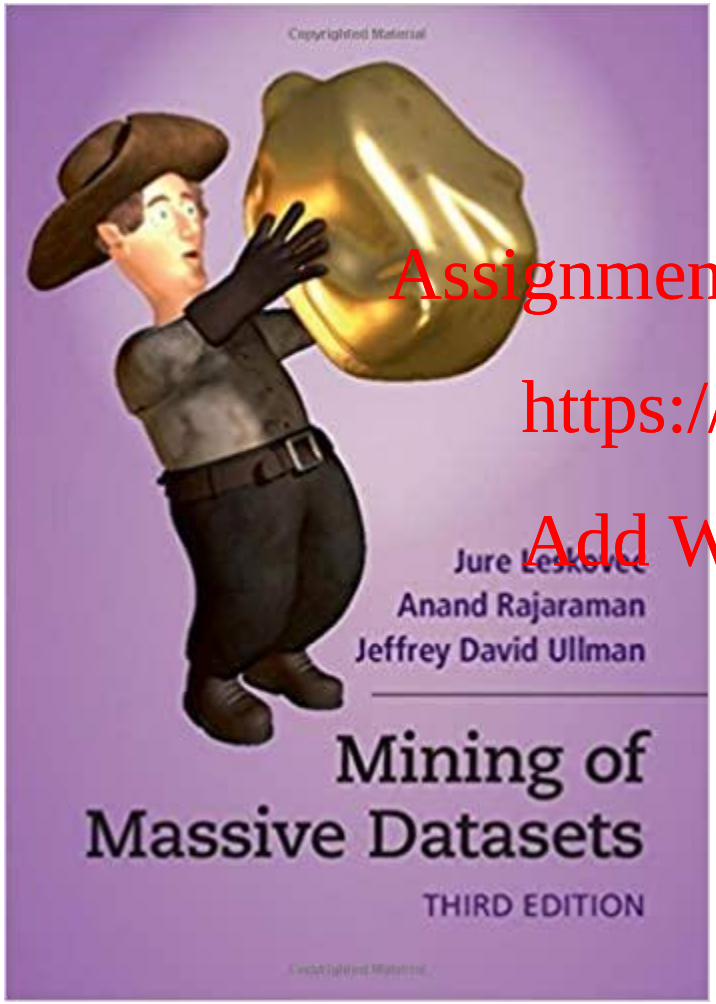
Optional Hardware and Software:

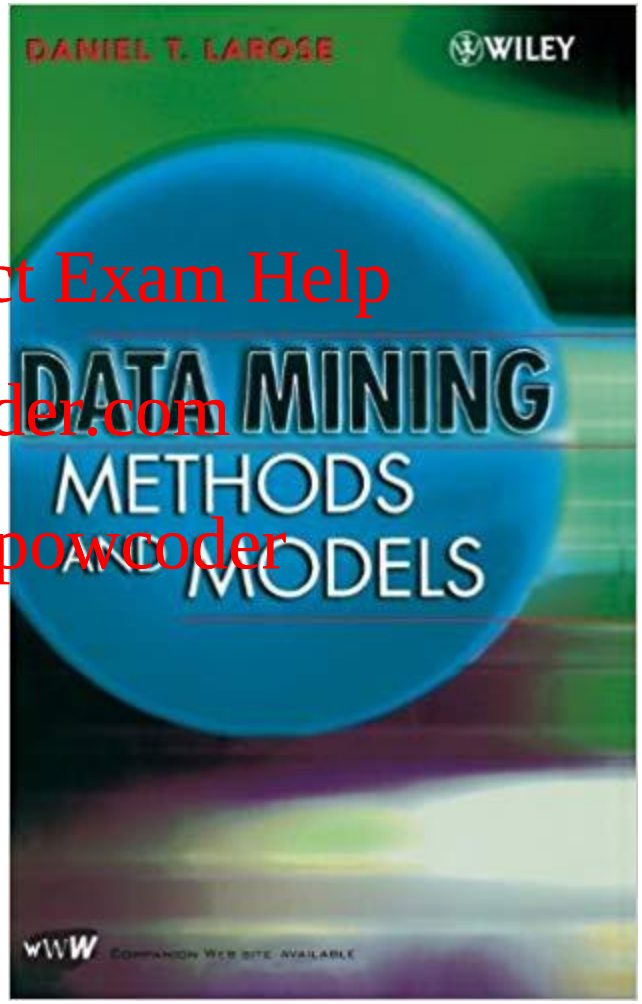
- **Lap top with internet access and ability to install software (admin rights).**
- **Students will be installing SAS on their computers**

Books, Notes, and Manuals:

- Data Mining, Methods and Models, D. T. Larose, Wiley–Interscience, Latest Edition
- Mining of Massive Datasets, A. Rajaraman, J.D Ullman, Stanford University, Cambridge University Press, Third Edition
- Lecture Notes and Handouts
- Real world projects and case studies

Text books





Course Overview

Big Data refers to data sets whose volume (amount of data collected, number of data sources), velocity (rate at which data is collected) and variety (heterogeneity of data and data sources) are so extreme that advanced Data Mining Algorithms are needed to process and discover useful patterns in data for actionable intelligent decisions, in a reasonable amount of time. The purpose of this course is to introduce theoretical as well as practical aspects of advanced, as well as, well established algorithms for mining massive datasets. Topics include: Naïve Bayes & Bayesian Networks, Stream Data Mining, Big Data Definition,Dimension Reduction techniques e.g. Principal Component Analysis (PCA), and recommendation systems.

Course Schedule

Introduction	**Week 1**
Linear Algebra Review **Intro to SAS**	**Week 2**
Intro to SAS (continued) and **Basic Statistics Review,**	**Week 3**
Principal Component Analysis and **Factor Analysis**	**Week 4**
Introduction to Big Data , Massive Data sets **Map-Reduce,** **Relational Algebra in Big Data environment**	**Week 5**

Course Schedule

Big Data , Massive Data sets (continued) **Linear Algebra in Big Data environment** **Recommendation System**	**Week 6**
Mining Data Streams And Sensor Data	
Link and Social Network Analysis	**Week 7**
Affinity and Market Basket Analysis	**Week 8**
Linear Regression	**Week 9**
Multiple Linear Regression	**Week 10**
Logistic Regressions	**Week 11**
Special Topics	**Week 12**
Student Projects and Final Exam	**Week 13 &14**

Assignments and Grading

Assignments	Grade Percent
Exercises	30%
Mid-term	20%
Final	20%
Final project /research paper	30%
Total Grade	**100%**

Project Case Study

Project:
A real world data mining project (problem statement, data, methodology/algorithm), software, execution and analysis, references, documentation, and presentation). The problem statement, sample data, relevant methodology/algorithm).

Case Study:
A case study from literature/books, prepare and deliver a comprehensive presentation including, problem statement (‘profound question’), data source(s), methodology, data mining, result, suggestions for future work, and references.