

CSE 5311: Advanced Algorithms

RESEARCH TOPICS

Several research project topics are briefly described below. You are expected to select one of these topics for your project. However, in exceptional circumstances I am also willing to consider other programming proposals that you may have on your own, provided they have a very strong relation to the contents of this course. Once you have selected a topic, please make appointments with me and/or Arjun/Muhammed asap to discuss the requirements of your topic in more detail.

Intermediate Project Checkpoint:

At the project checkpoint, you will be required to submit a **status report** for approval. The status report should be a rough draft of a document that should contain:

1. A brief discussion of some of the papers that you have read on the topic. If you are also planning a programming component, please include a description of the planned architecture of your system.
2. An outline of what remains to be done. This should include what other papers you intend to read, as well as what conclusions/results you hope to arrive at. While I will give you guidance in specifying the basic requirements of your research, I urge you to be ambitious and creative on your own. You may wish to read up about your topic in more detail, and may even plan to implement and experiment with several competing algorithms. Initiative shown by you at this stage will be rewarded.

Final Research Presentation:

Once the research project is completed, the following is expected of you:

1. A presentation of your research survey/findings in class. Please prepare the slides in advance and have them approved by Arjun/Muhammed and/or me beforehand. We shall put up the slides on the class webpage.
2. You should also hand in a completed project report, which is essentially a polished version of the status report, but should also include your work in the second half of the project. If you have a programming component, include your experimental results, e.g. charts of running time versus input size, etc.
3. If you have a programming component to your research project, please demonstrate your project to me and/or Arjun/Muhammed, in which you show the various features of your system, such as its correctness, efficiency, etc. You should be prepared to answer detailed questions on the system design and implementation during this demo. You should also turn in your code and associated documentation (e.g. README files) so that everything can be backed up for future reference.

Research Topics

1. Approximation Algorithms for the Traveling Salesman Problem
2. Randomized Algorithms and their applications to well-known NP-Problems
3. Dimensionality Reduction techniques with applications in Nearest Neighbor Search and Clustering
4. Graph Spanners and Geometric Spanners
5. Approximate Query Processing in Databases
6. Database Searching and Information Retrieval

7. Algorithms in Sensor Networks and/or Peer-to-Peer Networks.
8. Advanced algorithms for bipartite and generalized matchings