Sample FUN Project Ideas for CS512-Spring 2016

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Useful Languages to know: C/C++, Java, JavaScript, Python (or Perl)

Goal: To become exposed to some of the current major algorithm classes that have become or are becoming predominant in applications. A sample project is in the Sample.pdf file under this resource tab.

Projects can be chosen from one of the following areas:

a. Deterministic Algorithm Animation and Algorithm Snippets
Expected Outcomes: Instructional Videos or Pseudo Code Driven Animation
Suggested Topics: From Sec 1.3, 1.4, and 1.5 of DVP: *Primality, Cryptography, Universal Hashing*
Max Flow-Linear Programming- Planarity – Graph Decompositions – Graph Drawing - NPCompleteness , Clustering.

b. Advanced Algorithm Sampler
Expected Outcome: Digital Literature Survey and Search Interface Prototype
Suggested Topics: Same as those listed in item a. above but in External Memory, Data Streaming, or Parallel and Distributed settings.

c. Dealing with NP-Completeness
Expected Outcome: Digital Literature Survey and Search Interface Prototype
Topics: Approximation Algorithms, Fixed Parameter Tractability.

d. *Adaptive Graph Mining*
Expected Outcome: Exploratory Data Driven Prototype *(Adaptive Navigation and Summarization).*

e. Massive Algorithmics
Expected Outcome: Library of Scalable Algorithms and Two Sample Applications.
Suggested Topics: Personalized Page Rank, Heavy Hitters, Near Neighbors Search, Similarity Search, Recommendation Systems, Deep Learning.

f. Scalable Algorithms Infrastructure
Expected Outcome: make Hadoop and MapReduce based environments operational.
Suggested References: BigTable, Dynamo, NoSQL, and Mongo.

***Final FUN Projects will be judged by a faculty panel. The best projects will be** added to the incoming "**MSCS Wall of Fame**" and will be introduced to **interested industry sponsors**. Initially, the projects will be monitored by the class Teaching Assistants. At later stages some faculty members may become involved in offering expert advice.

Guiding evaluation principles will be: the "value" of the extracted information from the chosen data set, the methods and models used the final application Interactivity, and the Project Utility and Novelty.

*Sample Project Types (A Non Exhaustive Guide)

a. Similarity Search

b. Recommender Systems

c. Collaborative Filtering

d. Data Retrieval and Topic Waves

e. Prediction and Verification

e. Apps for: Data Erasure, Nameless File Systems, Password Boxes,

Phonetic Lyrics Search, Sentence Completion,

Data Sets: Some typical data sets that may be considered include: data feeds from *Tweeter, YouTube*, *news streams, stocks, motion captured data*, *WordNet, joke collections*, movies, songs, *online encyclopedias* (*Ex: OEIS, Algorithm and Software repositories), transportation schedules, data analytics blogs, funding agencies, startups, computer science educational materials, internet of things, etc.*