ArsDigita University
Month 5: Algorithms   - Professor Shai Simonson

General Description

Algorithms are well-defined procedures for solving specific problems. We study techniques for the design and analysis of efficient algorithms, emphasizing methods useful in practice. We also study methods to identify and handle problems that may have no efficient solutions.

Algorithms can be categorized according to methodology, and according to application. We study the different methodologies - divide and conquer, dynamic programming, and greedy strategy. We study a variety of applications from the following broad list: sorting, ordering and searching, graph algorithms, geometric algorithms, mathematical (number theory, algebra and linear algebra) algorithms, and string matching algorithms.

We study algorithm analysis - worst case, average case, and amortized, with an emphasis on the close connection between the time complexity of an algorithm and the underlying data structures. The flip side of analyzing the time complexity of efficient (polynomial time) algorithms is coping with intractability. We study NP-Completeness, and learn how to identify the frontier between versions of a problem that have efficient algorithms and those that are NP-complete. Techniques such as approximation and probabilistic algorithms are studied for handling the NP-Complete problems.

Lectures and Recitations

Lectures will about two hours every morning starting at 9:30AM, with review recitations of one or two hours each afternoon starting at 1:00PM. The text is *Introduction to Algorithms* by Cormen, Leiserson and Rivest. Required readings from the text are posted on the syllabus.

Problem Sets

There will be six problem sets. The due dates will be announced in class. Solutions to the problem sets will be posted soon after the grading for that problem set is complete.

Exams

There will be two exams on Sundays, February 11 and 25.

Special

There will be a regular lecture on Sunday February 4 at noon.