6.006 Lecture 26: The BIG picture

- the big picture (MIT courses)
- Important, fascinating, inspiring algorithms
No algorithm? Hard Problems
undecidability 6.01?
NP-completeness & other classes 6.046, 6.841
lower bounds 6.006, 6.841, others
crypto, authentication, economic equilibria

Techniques: Divide & Conquer
Data structures 6.851, ... graph algorithms
6.251, 1.262 (optimization (under constraints))
6.256, 6.859 dynamic programming
randomization 6.046, 6.856, ...
greedy algorithms 6.046

metrics correct/incorrect 6.006
optimal 6.006 ...
close to optimal: approximate 6.046, 6.851
numerically stable: 6.337
sensible/pleasing/mimics human performance 6.856
all other courses

Assumptions:
Problem domain:
- networking 6.266
- simulation 6.336
- imaging 6.334
- speech recognition 6.345
- inference 6.438
- graphics 6.837
- vision 6.866
- crypto 6.857
- geometry 6.858

Assumptions:
Hardware and/or system:
- large memory/single CPU/reliable 6.006
- many CPUs: parallel 6.337
- unreliable components: distributed 6.852
- limited total memory: streaming 6.854
- limited fast memory: caching 6.851, 8.54
- quantum 6.446/18.436
Most important (=transformative) & fascinating algorithms (always a subjective list; students will suggest algos)

- Fast Fourier Transform
- Google's page rank (an SVD algorithm)
- Lempel-Ziv-W & other data compression
- RSA
- Diffie-Hellman key exchange
- Newton's method
- Simplex & Interior Point for Linear Programming
- Viterbi
- Alpha-Beta search,
- Strassen