Lecture 18 – Dynamic Programming
Reading: KT Sections 6.1 and 6.2

Partial content of these slides have been obtained from the official lecture slides that accompany the textbook. A complete set of slides can be found at: http://www.cs.princeton.edu/~wayne/kleinberg-tardos/

Algorithm techniques

- Data structures
  - Use extra data structures
  - Exploit the structure to improve complexity

- Greedy algorithms
  - Build up a solution incrementally
  - Myopically optimizing some local criterion

- Divide and conquer
  - Break up a problem into independent subproblems
  - Solve each subproblem
  - Combine solutions to subproblems to form solution to original problem

- Dynamic Programming
  - Break up a problem into a series of overlapping subproblems
  - Build up solutions to larger and larger subproblems
A bit of history

**Bellman.** Pioneered the systematic study of dynamic programming in 1950s.

**Etymology.**
- Dynamic programming = planning over time.
- Secretary of Defense was hostile to mathematical research.
- Bellman sought an impressive name to avoid confrontation.