

CS367 Lecture 30

Wednesday 6 August 2014

Announcements/Reminders:

- Final tomorrow in **Psych 113** (regular class hour)

Last class:

- Graphs (cont'd)
 - Breadth-First Search
 - Dijkstra's Shortest Path Algorithm

Today:

- Graphs (finish)
 - Topological Ordering
- Course Review
- Course Evaluations

Dijkstra's Algorithm (cont'd)

Sketch of proof of key step:

Run-time analysis

Operations: insert, removeMin, decreaseEstimate

Using arrays:

Using min-heaps:

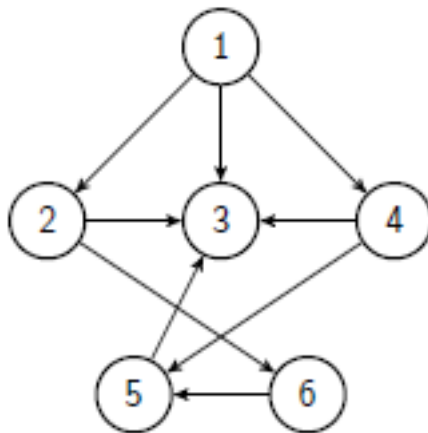
Using Fibonacci heaps:

Applications

Topological Ordering

Problem:

Example:



1
4
2
6
5
3

1
2
6
4
5
3

...

Topological Ordering (cont'd)

Algorithm:

Course Overview

Data Structures (DS) and Abstract Data Types (ADTs)

Algorithms

Complexity

Java Concepts

Data Structures (DS) and Abstract Data Types (ADTs)

Layout

Linear:

- 1 predecessor (all except first) and 1 successor (all except last)
- DS: array, chain of linked nodes, circular structures
- ADTs: List, Linked List, Stack, Queue, Deque, Hashtable

Hierarchical:

- 1 predecessor (except root) and 0, 1, or more successors
- DS: Tree nodes, heap
- ADTs: Trees (general, binary, search, etc.), Priority Queues

Graphical:

- 0 or more predecessors, successors. Can specify source, sink, start, end
- DS: vertices stored in list/map, edges stored in adj. matrix/list
- ADT: Graph (undirected/directed, weighted/unweighted)

Style of operation

Position-oriented: operations occur at a specific position

- List
- Stack
- Queue
- Tree (general, binary)

Value-oriented: operations occur at position determined by key value

- Heap
- BST, balanced trees
- Map, Set
- Graph

“Hybrid”:

- Priority Queue
- Hashtable

Algorithms

Operations on ADTs/data structures:

Recursion

Searching

Hashing

Sorting

Complexity

Time, Space Complexity:

Worst case, best case, average case:

Determining Complexity of Algorithms/Code:

- Non-recursive
- Recursive

Java Concepts

Reference Types

Command-line arguments

Generic Types

Exceptions

Iterators

Interfaces

Java Collections Framework