Introduction

Data Structures and Algorithms

Aug. 28th, 2014

Jinho D. Choi

EMORY
UNIVERSITY

About Me

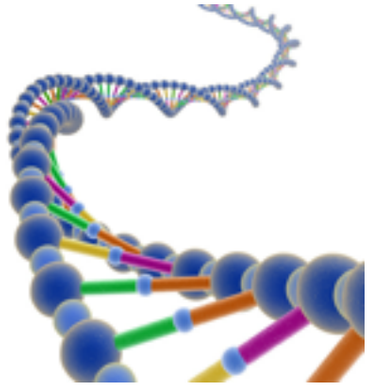
How should I call you?

Jinho

Jin

Geno

Gene



Or any other variation that sounds like me is fine.

Where are you from?

I've been all over,
but originally from

I'm
Gangnam
Style

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About My Research

What is your research?

Computational

Linguistics

Also known as Natural Language Processing.

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Contact

- Jinho's office hours
  - MW 1:30 - 2:30 P.M., MSC E414.
- Daniel's office hours
  - TR 4:00 - 5:00 P.M., MSC N414.
- Course webpage
  - http://mathcs.emory.edu/~cs323000
- Piazza page
  - https://piazza.com/emory/fall2014/cs323
- Github page
  - https://github.com/jdchoi77/emory-courses/wiki

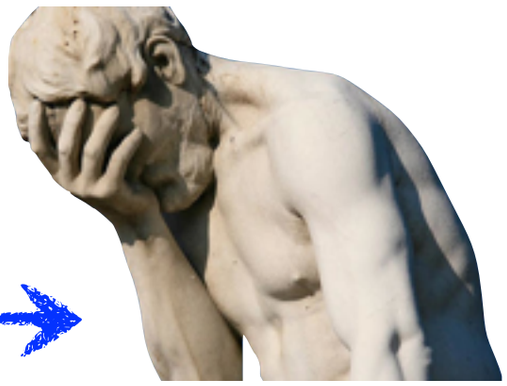
Preparation

- Textbook
  - Algorithms - 4th Ed., Sedgewick & Wayne.
  - http://algs4.cs.princeton.edu
  - /home/cs323000/share/docs/

- Prerequisites
  - CS 171 - Introduction to Computer Science II.
  - CS 224 - Mathematical Foundations of Computer Science.
- What to bring
  - Your laptop if you have one.
  - Lots of passion!

During Classes

- Lectures
  - Mostly by me, a few by our wonderful TA.
  - I'll put the slides right after each class.
- In-class exercises
  - We will have in-class exercises, followed by group discussions.
  - You will receive points (or extra credits) for some exercises, which will count toward the final grade.
- Attendance
  - Attendance is not required although if you miss many classes, you'll soon look like this.



  - If you feel like not getting enough challenges, please come to talk to me. Believe or not, I know how you feel!

Homework

- Assignments
  - 4 (or more) homework assignments involving Java programming.
  - Assignments must be submitted individually with your original work; any sign of cheating will not be well received.
  - Group discussions are allowed; please indicate names of your discussion group for each assignment.
  - Late submissions within a week will be accepted with the grading penalty of 10%. Late submissions after the first week will not be accepted (so don't let your pet eat your work).
  - It's a BAD idea to start doing homework the night before the due. I guarantee you won't be able to finish it even if you don't sleep.
  - Utilize your instructors as much as possible!

Exams and Grading

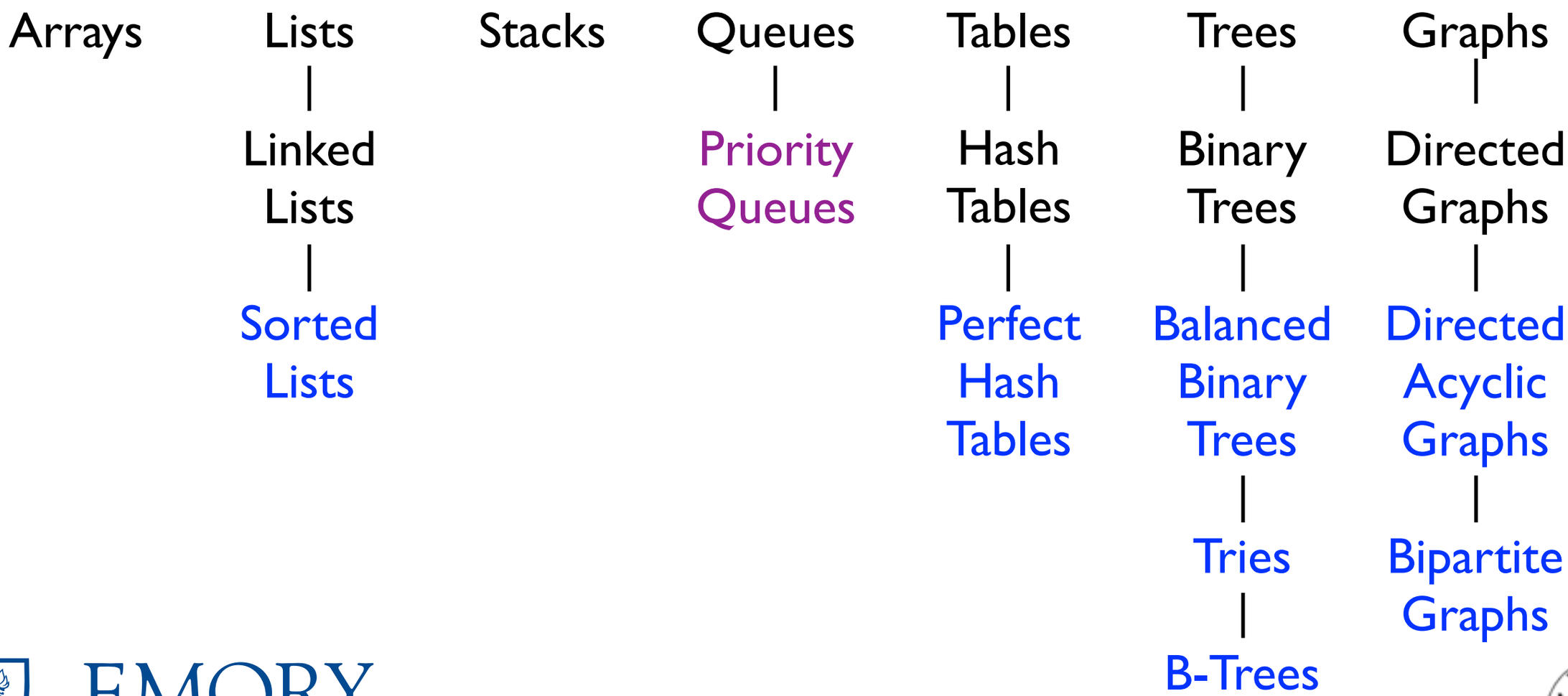
- Exams
  - One midterm exam: Oct. 21st, regular class hour and location.
  - Final exam: Dec. 17th, 8:00 - 10:30 A.M.
  - All exams must be taken promptly and cannot be rescheduled. Excuses for exam absences must be accompanied by a letter from the Office of Undergraduate Education.

- Grading
  - Homework assignments: 40%.
  - In-class exercises: 10%.
  - Midterm exam: 20%.
  - Final exam: 30%.

Questions?

Data Structures

- What is a data structure?
  - A structure in which data is organized in some efficient way of processing that particular data.
- What data structures are we going to cover?



Algorithms

- What is an algorithm?
  - A procedure that defines some effective way of processing data.
- What algorithms are we going to cover?

Select | *K*-max | Heap

Search | Sequential | Binary | BST

Sort | Selection | Insertion | Merge | Quick | Bucket | Radix

Hash | Separate | Chaining | Linear Probing | No Chaining

Span | Depth | First | Breadth First | Chu–Liu-Edmonds

Path | Prim | Kruskal | Dijkstra | A* | Topological Sort

Network Flow | Max-flow | Min-cut | Fork Fulkerson

Match | Maximal | Maximum

How To Choose?

- Aspects to consider:
  - What is the range of the input?
  - What is the maximum/minimum number of the input?
  - Does the input come with a certain pattern?
  - Is the order of the input important?
  - Can there be duplicated keys?
  - What are the most frequent operations?
    - Insert, delete, update, search, etc.

Before Next Class

- Getting started
  - https://github.com/jdchoi77/emory-courses/wiki/CS323:-Getting-started
- Search exercises
  - https://github.com/jdchoi77/emory-courses/wiki/CS323:-Search