University of Central Florida

SI@UCF CS Camp

Intro Competitive Programming

Final Project

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Overall Idea and Goal

- More difficult topics take more than one afternoon to make progress.
- Collaborating will increase the speed of learning
- Each group can present their work at the closing ceremony!

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Topic Suggestions

Each group (2 or 3 people per group) will choose one of these topics (preferably the first three), and spend Monday through Thursday of next week doing research on the topic, solving several related Kattis problems, and putting together a short (less than 10 minutes) presentation summarizing the work the team did. (This presentation should have a quick explanation of the algorithm at a high level followed by two example problems the team solved on Kattis using the algorithm.)

- Brute Force/Backtracking
- Breadth First Search
- Binary Search/Bisection
- 2D Geometry Intro
- Dynamic Programming Intro
- Binary Index Trees

Brute Force/Backtracking

- Uses Computer's Speed to Solve Problems
- Try each option
- Stop if a partial solution is unviable.

- Kattis Problems
  - aldursrodun
  - dreamer
  - anttyping
  - dancerecital
  - dobra
  - fruitbaskets
  - sudoku

Breadth First Search

- Systematic System to find shortest route.
- Works to find puzzle solutions with fewest # of moves
- Efficient Run Time

- Kattis Problems
  - horror
  - grid
  - interplanetarytunnels
  - modulosolitaire
  - onaveragetheyrepurple
  - erdosnumbers
  - fire2
  - safe
  - illiteracy
  - mazeman

Binary Search/Bisection/Ternary Search

- Works on increasing or decreasing functions
- Hard to solve backwards, easy to solve forwards
- Simplify a min/max problem to: can you do it?

- Kattis Problems
  - freeweights
  - hindex
  - suspensionbridges
  - expandingrods
  - carefulascent
  - monk
  - reconnaissance
  - zipline
  - cantor