CS 100: Algorithms and Search

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Week 7-1

Mini-exam 2 Back

Statistics

Stat	Val	Perc.
Count	69	
Max	40.00	100.00
Avg	32.30	80.75
Median	35.00	87.50
Stddev	7.71	19.28

Bins

Range	Count	
90 - 100	31	
80 - 89	15	
70 - 79	9	
60 - 69	6	
50 - 59	2	
40 - 49	2	
30 - 39	2	
20 - 29	1	

Questions?

Logistics

Midterm Grades

- Post over the weekend
- ▶ Based on HW 1-3, Mini-exam 1&2, In-class
- Advisory only

HW 4 Due Friday 5pm

- ▶ Pair assignment
- Processing lists
- Mini-web search

Reading

- Pattern Ch 5: Algorithms And Heuristics
- Pattern Ch 6: Memory, Information, and Secret Codes
- Zyante: None

Goals Today

- Algorithms, Heuristics, Complexity
- ► Search Problems

Sock Sorting: In-class Exercise



Source

Problem

- ► Here's a bunch of socks
- ► Someone "sort" them
- Restriction: Cannot dump all socks on the table

Everyone Else

- Write down the algorithm the sorter uses
- Work in pairs or threes
- Include your Names and NetIDs

Here's a Second Way

- Chris will sort the socks
- ► On the same sheet
 - Write down the algorithm you observe Chris Use
 - ► How is it different from the first algorithm?
- Discuss in 5 minutes



Source

Which Sock Algorithm is Better?

"Better"?

- What's the notion of better for this sock sorting?
- Which algorithm would you choose for each of the following situations?

Algorithms:

- 1. Search the Basket
- 2. Put on the Table

Scenario 1: Replicates

- Basket has 100 total socks
- ▶ 25 pairs of blue (50 socks)
- ▶ 25 pairs of red (50 socks)

Scenario 2: All Orphans

- ▶ Basket has 100 total socks
- ▶ 5 pairs of blue (10 socks)
- ▶ 5 pairs of red (10 socks)
- ▶ 80 dissimilar socks (80 socks)

Scenario 3: All Unique

- ▶ Basket has 100 total socks
- There are 50 different colors of socks (including Chartreuse)
- ► There is one pair of each color (100 socks)

Socks

Python Lists are good to model this

- ▶ "Pattern" initial example of algorithms: sorting socks
- ► File socks.py encodes two versions of sorting socks
- ▶ Uses functionst that change lists
 lst1.append(thing) # add thing to the end of list 1
 thing = lst2.pop(3) # remove 3rd item, assign to thing
- ► Compare to "Pattern" pg 77-78 to see if you follow the logic
- Somewhat complex problem, too hard for a HW

Make sure to turn in your participation sheets

- Names and NetIDs of all group members
- Worth credit for grade

I couldn't Remember

- Wanted a particular album from my stack of CDs
- Shelf is roughly alphabetical by artist
- Could not remember the name of the artist
- Did remember the album was something like "Now He Sings, Now He Sleeps"
- ► Genre: jazz, piano trio
- How do I find the CD?
- Discuss with a neighbor



Source

Searches

Linear Search

- Start at the beginning
- Examine, each item sequentially against the search query
- If the query matches the item, report where it is located and quit
- When all items have been scanned report that nothing matched

Question

- Are these algorithms or heuristics?
- ▶ What's an algorithm? What's a heurstic?
- ▶ What's the difference?

Alternative: "Indexed" Search

- Know a better starting point
 - ► The artist's name starts with 'C'
 - ► CDs organized by name
- Search items sequentially at that starting point
- When it's obvious item is not present bail out
 - ► At 'D' artists, CD must be in the car

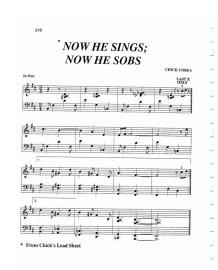
Chick



- ► Google query "now he sings now he sleeps jazz piano"
- ► Results: Now He Sings, Now He Sobs by Chick Corea
- ► Chick = 20 Grammy wins, 59 nominations
- He's kind of a big deal

Music and Programming

- Have a lot in common
- Both written down in a coded form
- A language that is opaque to the uninitiated
- Both involve conditionals, repetition, jumps
- Static and dynamic behavior
- ▶ The code is not the action
- Surprising action comes from simple code
- Encoding dynamic as static is difficult



Bigger Questions

- ► How did Google know?
- ► How does Google work?
- ▶ Tell me in a few minutes
- ► Use google search to help you

Next Time

- ► Mini assignment: Be able to describe how google search works next time, worth some big bonus cards
- HW 4: Python lists due Friday
- Computers that are Connected
- ► Encryption and Compression