

CompSci 101

Introduction to Computer Science

0	['Susan']
1	['Jackie']
2	['Mary']
3	['Eric']
4	['Jack']

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1

Nov 1, 2016
Prof. Rodger

Announcements

- Reading and RQ due next time
- APT 6 due today, APT 7 out
 - Do more APTs to catch up....
- APT QUIZ 2 – Nov. 6-8
- Next Assignment out Thursday
- Lab this week!
- Today:
 - Processing data – how to organize it?
 - enumerate

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2

Lab this week! - Odds with poker!



ACM Programming Contest

- Need volunteers to help on Saturday Nov 5 from 11:20am to 6pm. (includes food)
- Contest
 - Team of three, one computer, 6-8 problems, 5 hours
 - Problems “APT-like”
- See Piazza post for how to sign up

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4

Registration time...

- What CS courses can you take next?
 - CompSci 201
 - CompSci 230
 - CompSci 230 is prereq for CompSci 330
 - CompSci 201 is prereq for many electives

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5

When Halloween and Computer Science COLLIDE!

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6

CS Concepts Coming Alive

- What data structure is this?



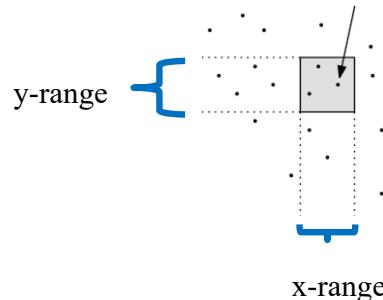
YARN,
in the
shape
of a
binary
tree.
Subtree
made
of mole
cules
ki...

What is it?

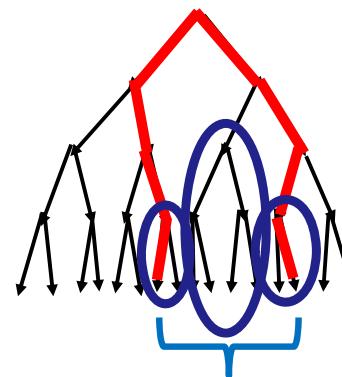


2D-range tree

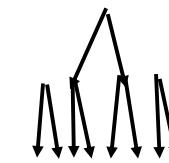
- Search in x-y plane
- Main tree organized by x-values
- Subtree organized by y values



Binary Search tree of points in the plane – sorted by X-value



In the x-range



Each subtree organized by y-value

Search each subtree by y-value

Problem: Longest Name

Given a **list of names** (one word only) and a **letter** (assume names start with capital letter, and letter is capital)

names = ['Helen', 'Bob', 'Bart', 'Hugh']

Find the **longest name** that **starts with** that letter

Code for longest name

```
def longestName(alist, letter):  
    longest = ''  
    for name in alist:  
        if letter == name[0] and  
            len(name) > len(longest):  
                longest = name  
    return longest
```

How do you modify to find the location (position) of the longest name?

Problem: Find the **position** of the longest name that starts with that letter
bitly/101f16-1101-1

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13

Enumerate

- An iterator, generates a sequence
- Generates **tuples** of (index, item)
- Used with **for** loop to get both **index** and **item**
- `for (index,item) in enumerate(somelist):`
 - You get both at the same time!

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14

Solve previous problem with
enumerate

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15

Problem: Popular Name

- Given a list of names, determine the **most popular first name** and print that name with all of its last names.
- Input: Names are always two words, names are in a file. If multiple names are on the same line they are separated by a “:”
- Output: Most popular first name, followed by a “:”, followed by corresponding last names separated by a blank

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16

Example Input File with 5 lines

Susan Smith:Jackie Long:Mary White
Susan Brandt
Jackie Johnson:Susan Rodger:Mary Rodger
Eric Long:Susan Crackers:Mary Velios
Jack Frost:Eric Lund

Corresponding Output

Susan: Smith Brandt Rodger Crackers

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17

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18

How might one organize the data
to solve this problem?

How many different ways
to solve this problem?

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19

What do you need to solve this
problem?

bit.ly/101f16-1101-2

One way to solve

- Create a list of unique first names
- Create a list of lists of last names that are
associated with each first name

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20

Example – two lists

Unique First names	Corresponding Last names
0 'Susan'	0 ['Smith', 'Brandt', 'Rodger', 'Crackers']
1 'Jackie'	1 ['Long', 'Johnson']
2 'Mary'	2 ['White', 'Rodger', 'Velios']
3 'Eric'	3 ['Long', 'Lund']
4 'Jack'	4 ['Frost']

21

Example – two lists

Unique First names	Corresponding Last names
0 'Susan'	0 ['Smith', 'Brandt', 'Rodger', 'Crackers']
1 'Jackie'	1 ['Long', 'Johnson']
2 'Mary'	2 ['White', 'Rodger', 'Velios']
3 'Eric'	3 ['Long', 'Lund']
4 'Jack'	4 ['Frost']

22

Jackie in position 1
Jackie's last names in position 1

Now can we solve the problem?

- Compute those two lists that are associated with each other
 - List of unique first names
 - List of corresponding last names
- Compute the max list of last names
- Now easy to print the answer.
- See popular.py

Look at the code for popular.py
www.bit.ly/101f16-1101-3

- Which datafile is read in?
- What format is namelist in?
- Write the code for uniqueFirstNames

Write the code: www.bit.ly/101f16-1101-4

- allLastNames
- correspondingLastNames
- printFirstWithLasts

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25

Finish

```
maxnum = max([len(item) for item in lastNames])
print maxnum
lastIndex = [index for (index, v) in
enumerate(lastNames) if len(v) == maxnum]
print "first name with most last names is:"
```

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26

Another way – list of lists

First word in each list is a first name
The rest are last names.

0	[‘Susan’, ‘Smith’, ‘Brandt’, ‘Rodger’, ‘Crackers’]
1	[‘Jackie’, ‘Long’, ‘Johnson’]
2	[‘Mary’, ‘White’, ‘Rodger’, ‘Velios’]
3	[‘Eric’, ‘Long’, ‘Lund’]
4	[‘Jack’, ‘Frost’]

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27

Expanding the Problem

- Suppose we want to read from multiple data files
names1.txt, names2.txt, names3.txt

See processFiles in popular.py

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28