CompSci 101
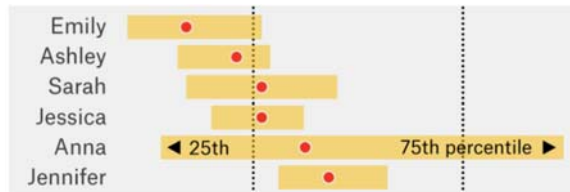# Introduction to Computer Science

Aug 31, 2017

Prof. Rodger

Announcements

- Reading for next time on calendar page
  - RQ 2 due Tuesday
- Assignment 1 due Tuesday
  - Have fun with Blockly

- Plan for Today:
  - Algorithms, Problem Solving and Python

Tips on Using the VM

- Each netid only one VM
- Kill the tab you are in when you are done!
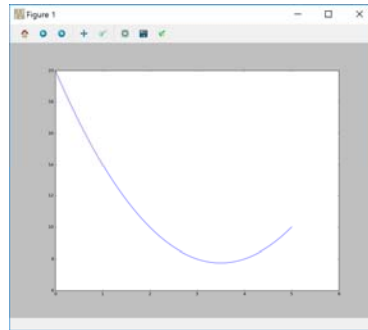- On Windows 10? Try Microsoft Edge
- OIT is making available a local VM

Software Failure

Lab 1 This Week Done!
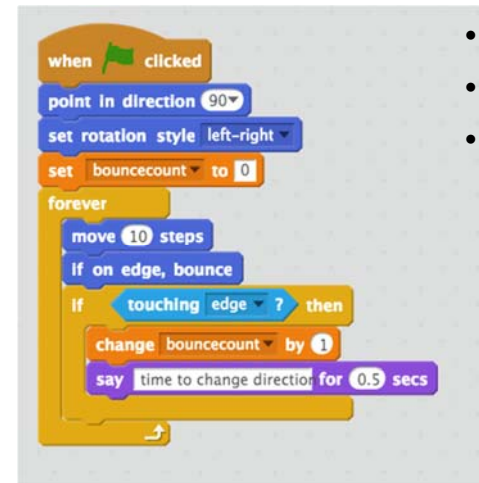
- Run the VM
- Modify Python program
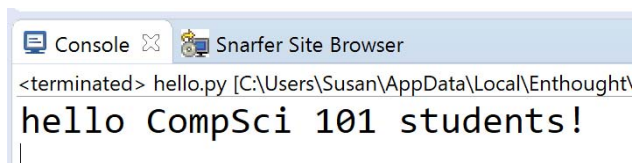- Scratch program for fun

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Last Time Scratch program

- "Hello World"
- Scratch Program
- Colors
  - Duke blue: motion
  - Mustard: control
  - Light blue: sensing
  - Orange: data
  - Purple: looks

Python code
hello.py

```
1  '''
2  Created on Aug 28, 2017
3
4  @author: Susan
5  '''
6  print "hello CompSci 101 students!"
```

Console   Snarfer Site Browser

<terminated> hello.py [C:\Users\Susan\AppData\Local\Enthought\

hello CompSci 101 students!

Python data reading code

```
f = open("kjv10.txt")
st = f.read()
total = len(st)
zc = st.count('z')
print "total # chars = ",total
print "number of z's",zc
for ch in 'aeiou':
    print ch, st.count(ch)
```

Explain Python data reading code
bit.ly/101f17-0831-1

```python
f = open("kjv10.txt")
st = f.read()
total = len(st)
zc = st.count('z')
print "total # chars = ",total
print "number of z's",zc
for ch in 'aeiou':
    print ch, st.count(ch)
```

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Daphne Koller, AI Pioneer, Educator

Computers learn to diagnose breast cancer? And more? *The Data Scientist on a Quest to turn Computers into Doctors*

•http://bit.ly/koller-cancer
•http://wrd.cm/1E9zFqy

KOLLER

On Coursera: "But to practice problem-solving, a student must first master certain concepts. By providing a cost-effective solution for this first step, we can focus precious classroom time on more interactive problem-solving activities that achieve deeper understanding — and foster creativity."

Coursera Founder, NY Times, December 5, 2011

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Our Programming Environment

- Install 5 items or just use VM!

- Why Java? – not using

- Eclipse – platform for development

- Python – programming language
  – Pydev – Python IDE for Eclipse

- Canopy – python libraries

- Ambient – turnin/snarf files to/from Duke

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How does one get help in CompSci 101?

- Consulting hours
  – Sunday-Thursday 7:30-11:30pm
- Office hours (prof, TAs)
- Collaborate with other students
- Piazza

LOOKING FORWARD TO SEEING YOU
THE DOCTOR IS IN

  – Ask questions
  – Do not post your code and ask what is wrong!
  – Post error message and line of code for error message
  – If added class late, may need to add yourself
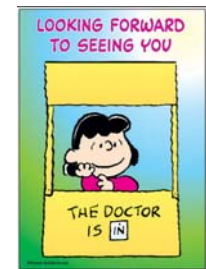
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How to succeed in Compsci 101

- Start assignments early, they'll take longer than you think
- Read the book, we'll build on it in class
- Collaborate well, but be sure you can do work on your own!
- Be curious, work hard at beginning, think carefully

Your goal is to …

- Get all assignments completed and turned in on time.

AND…

Algorithm

- Recipe
- Sequence of steps that constitute instructions
- Step-by-step procedure for calculations

Biscuits

Cookie Sandwich

Write an algorithm for making a cookie sandwich
bit.ly/101f17-0831-2

Cookie Sandwich should look like:

Here are your supplies:

Algorithm

- Recipe
- Sequence of steps that constitute instructions
- Step-by-step procedure for calculations

How do Netflix and Amazon know me?

- Compsci101 project: capable of implementation as a program, but much more basic
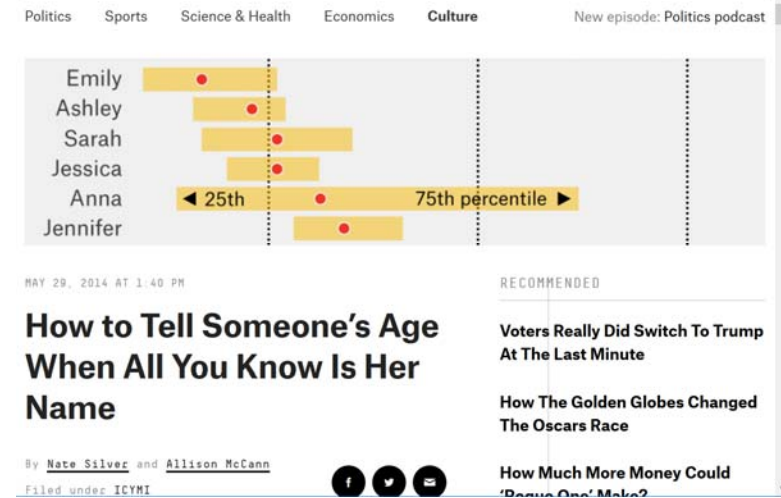
What does Nate Silver do?

http://53eig.ht/1tZy909

More on algorithms:

http://moreintelligentlife.com/content/features/anonymous/slaves-algorithm

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Algorithm – Nate Silver and others
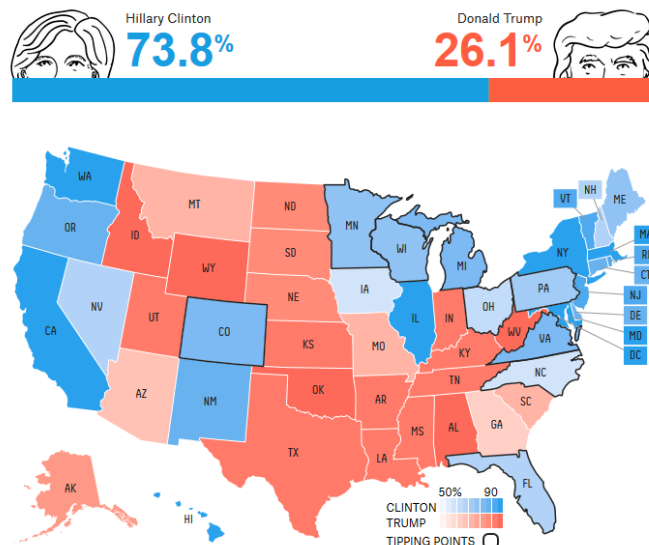
Google Algorithm – with News
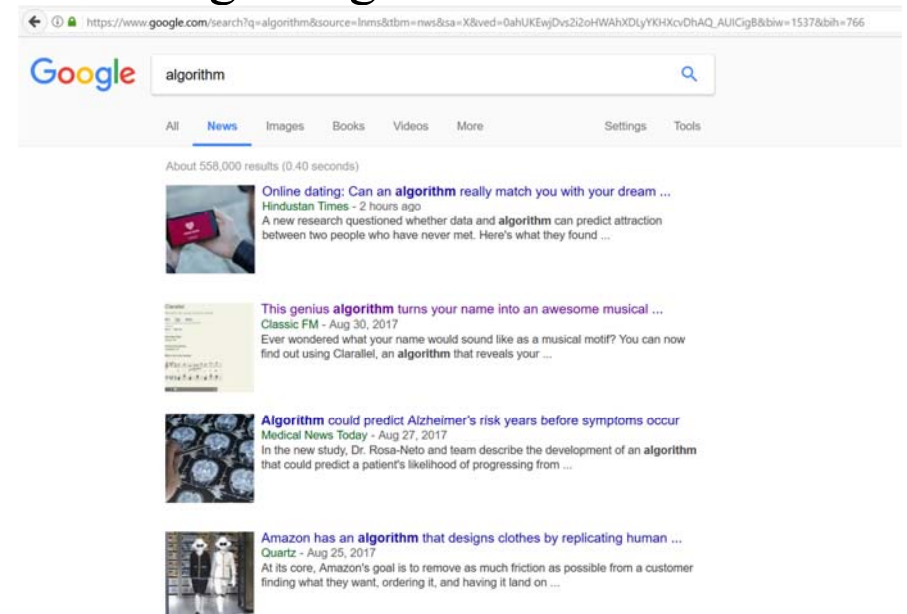
Algorithms that scale: An example

- Human Genome Project
  - Multiple approaches, relying heavily on computational power and algorithms
  - Combine reads of DNA sequences, we'll look at an illustrative example
- These combine bio/chemistry techniques with computational techniques to recreate the sequencing, e.g., CGATTCCG… from "live data", actual DNA.

Eugene (Gene) Myers

- Lead computer scientist/software engineer at Celera Genomics, then at Berkeley, now at Janelia Farms Research Institute (HHMI)

"What really astounds me is the architecture of life. The system is extremely complex. It's like it was designed." … " There's a huge intelligence there."

- BLAST and WG-Shotgun

Whole Genome Shotgun with words

olve problems.
ratively, create,
compsci101 we get t
01 we get to work colla
vely, create, and
s. In compsci1
y, create, and s
e get to work collabo
…

http://bit.ly/101f17-0831-3

- Creation algorithm
  - Take a phrase
  - Replicate it four times
  - Chop into "chunks"
    - 15-22 characters

- How to recreate original phrase?