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
Lab 1 This Week Done!

- Run the VM
- Modify Python program
- Scratch program for fun

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

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

Python data reading code

```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)
```

Woo!!!
Am I suppose to understand all that code right now!!!!

No!!!
We will learn all that over The next month!

Explain Python data reading code

```python
f = open("kjv10.txt")
st = f.read()
total = len(st)
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```
Daphne Koller, AI Pioneer, Educator

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

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

http://wrd.cm/1E9zFqv

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
  – 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

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…

• Understand the code you turn in.
• Be able to explain the code you turn in.

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

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

Who will win the presidency?

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

• Creation algorithm
  – Take a phrase
  – Replicate it four times
  – Chop into "chunks"
    • 15-22 characters
• How to recreate original phrase?

From Algorithms to Code

• An algorithm that scales needs to run on a computer --- programming to the rescue!
• Extensive libraries help with programming
  – Brain or Neuroscience
  – Engineering and Mathematics
  – Genomics
  – Graphic User Interfaces, …
• We are using Python, extensible and simple