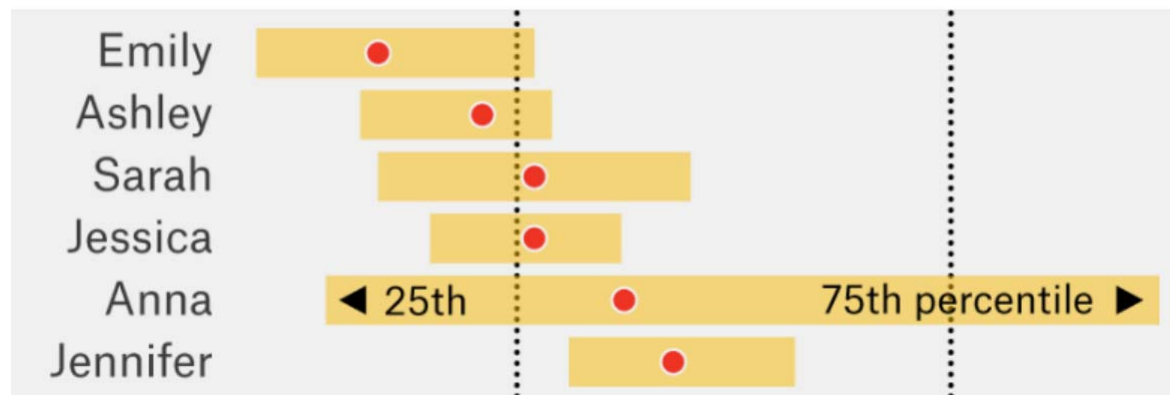


CompSci 101

Introduction to Computer Science



Aug 31, 2017

Prof. Rodger

Announcements

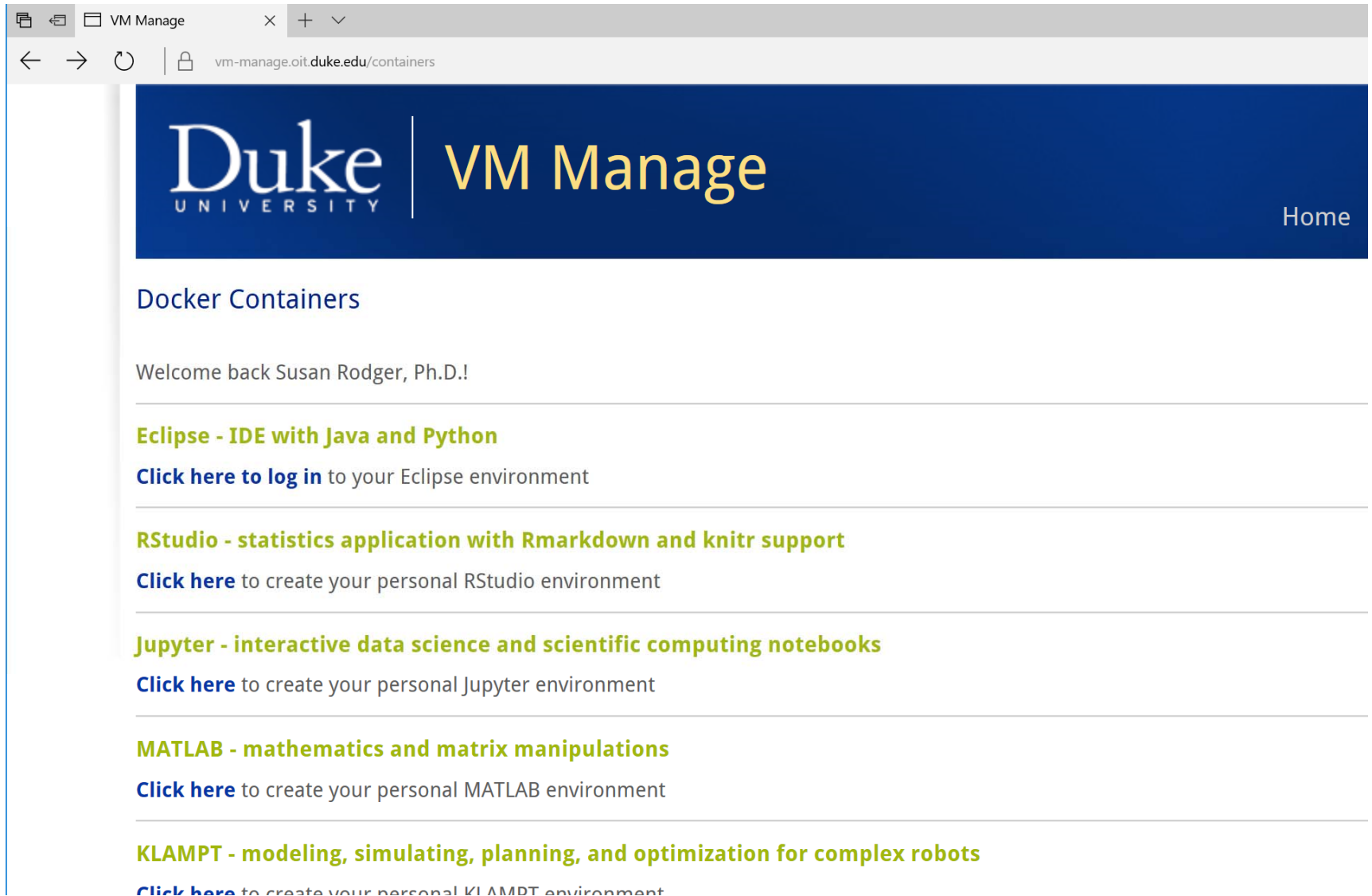
- Reading for next time on calendar page
 - RQ 2 due Tuesday
- Assignment 1 due Tuesday
 - Have fun with Blockly
- Plan for Today:
 - Algorithms, Problem Solving and Python

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

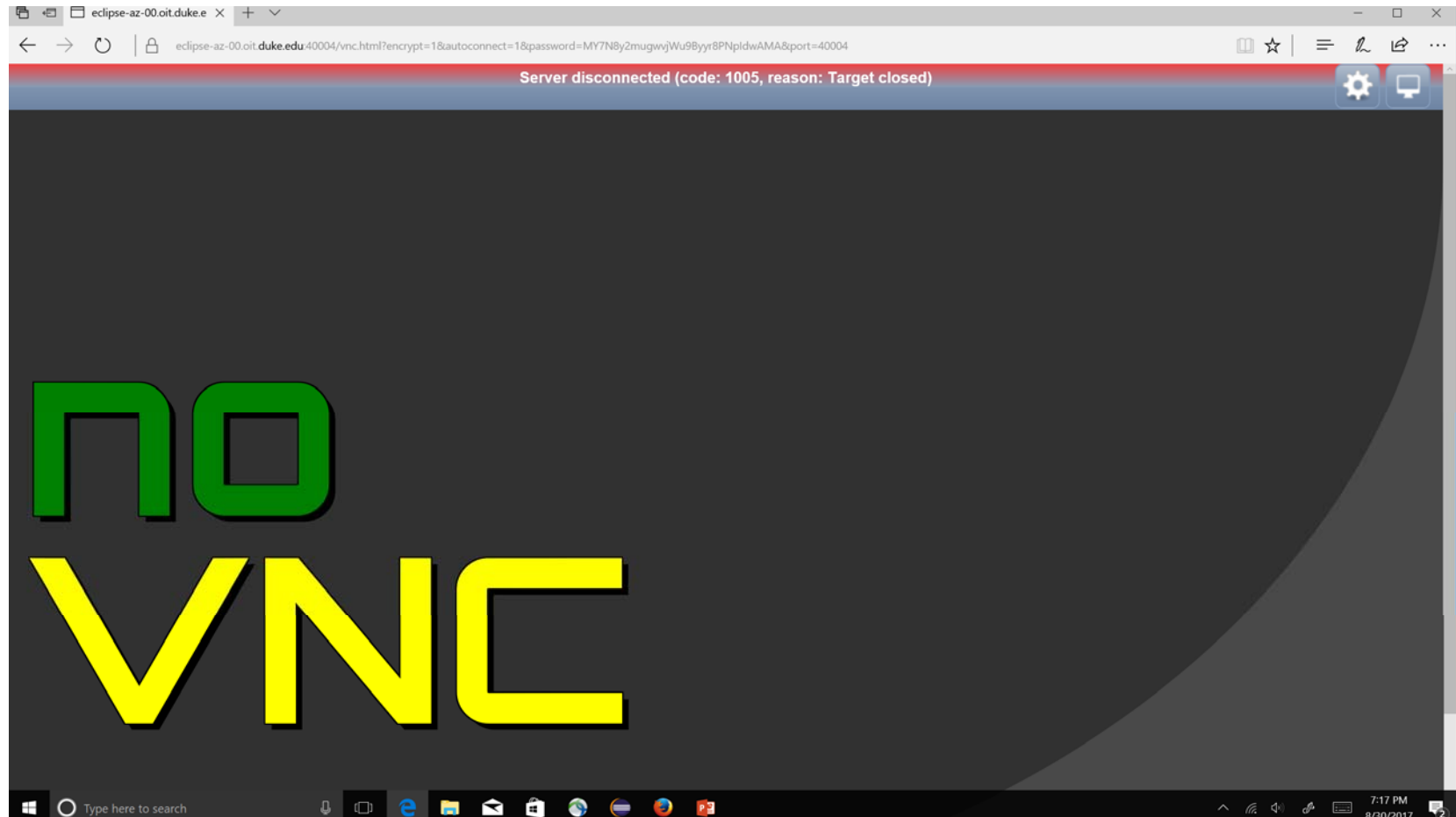
Software Failure



The screenshot shows a web browser window with the address bar displaying 'vm-manage.oit.duke.edu/containers'. The page features a dark blue header with the Duke University logo and the text 'VM Manage'. A 'Home' link is visible in the top right corner of the header. Below the header, the page is titled 'Docker Containers'. A welcome message reads 'Welcome back Susan Rodger, Ph.D.!'. The main content area lists several software environments with links to create or log into them:

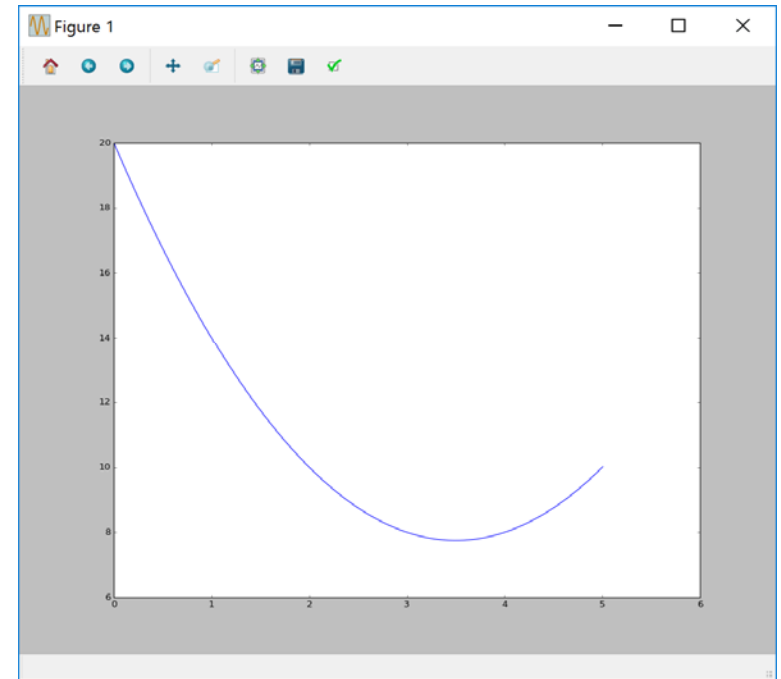
- Eclipse - IDE with Java and Python**
[Click here to log in](#) to your Eclipse environment
- RStudio - statistics application with Rmarkdown and knitr support**
[Click here](#) to create your personal RStudio environment
- Jupyter - interactive data science and scientific computing notebooks**
[Click here](#) to create your personal Jupyter environment
- MATLAB - mathematics and matrix manipulations**
[Click here](#) to create your personal MATLAB environment
- KLAMPT - modeling, simulating, planning, and optimization for complex robots**
[Click here](#) to create your personal KLAMPT environment

Software Failure

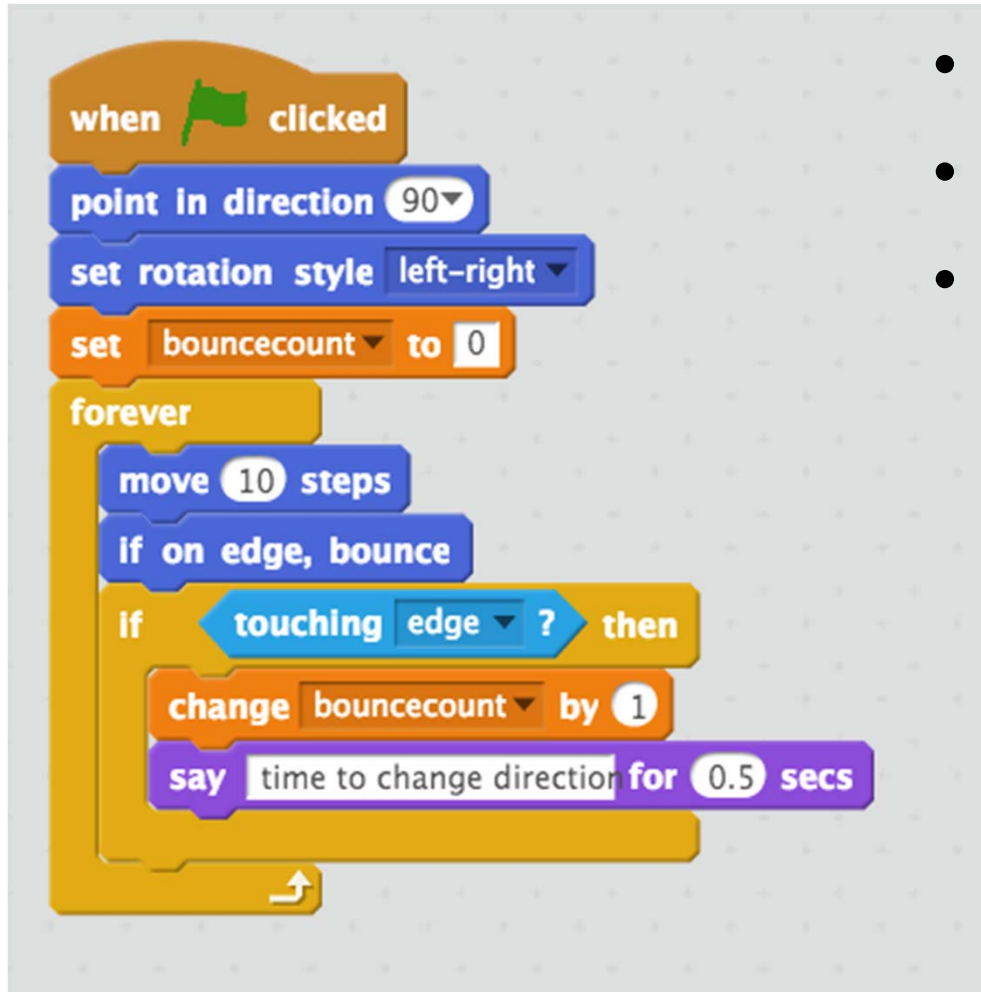


Lab 1 This Week Done!

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



Last Time Scratch program

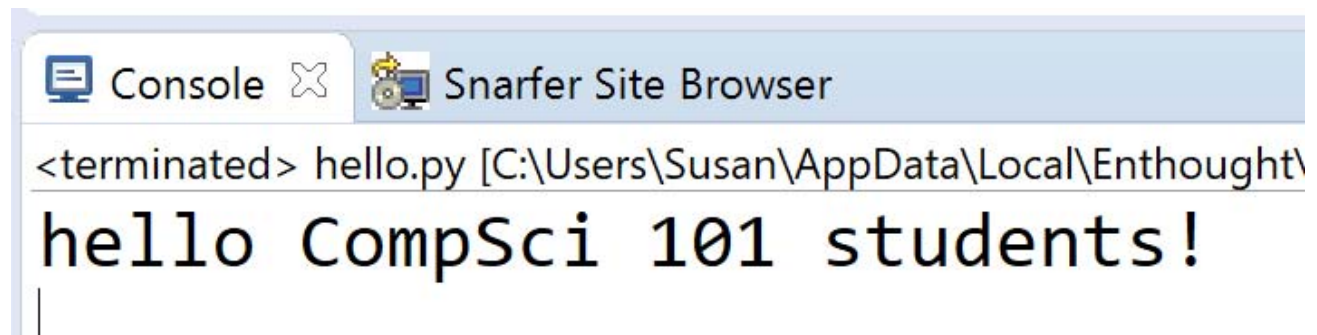


- "Hello World"
- Scratch Program
- Colors
 - Duke blue: motion
 - Mustard: control
 - Light blue: sensing
 - Orange: data
 - Purple: looks

Python code

hello.py

```
1 '''  
2 Created on Aug 28, 2017  
3  
4 @author: Susan  
5 '''  
6 print "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)
```

Woa!!!

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

bit.ly/101f17-0831-1

```
f = open("kjev10.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)
```

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>



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

compsci 101 fall 2017

Our Programming Environment

- Install 5 items or just use VM!



- Why Java? – not using

- Eclipse – platform for development



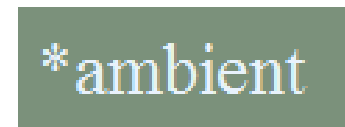
- Python – programming language
 - Pydev – Python IDE for Eclipse



- Canopy – python libraries

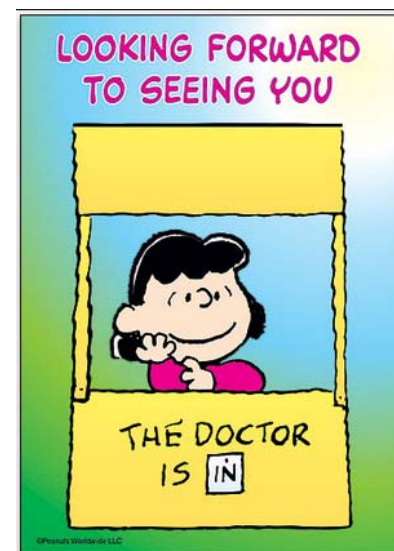


- Ambient – turnin/snarf files to/from Duke



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...

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

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>

Algorithm – Nate Silver and others

Politics

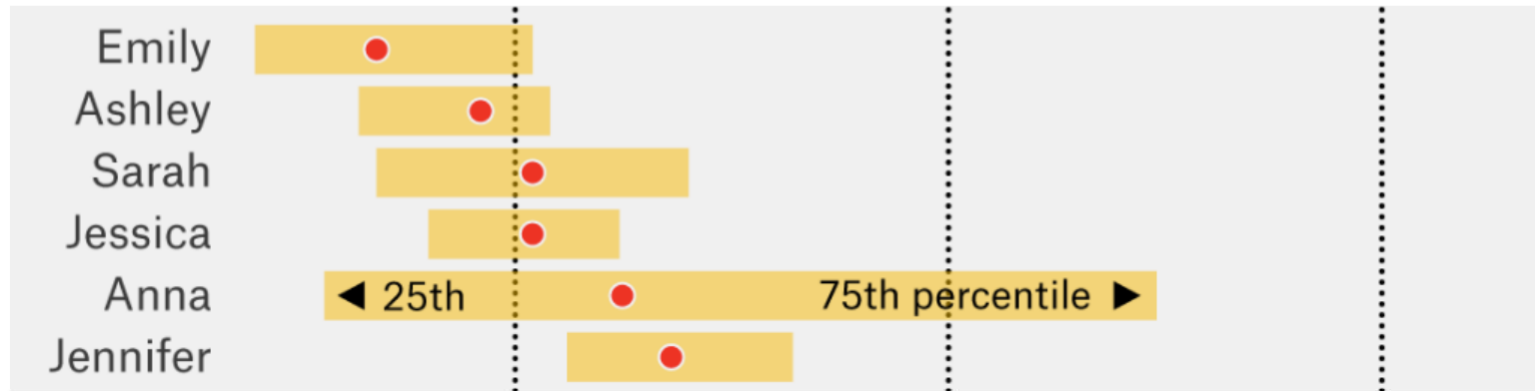
Sports

Science & Health

Economics

Culture

New episode: Politics podcast



MAY 29, 2014 AT 1:40 PM

How to Tell Someone's Age When All You Know Is Her Name

By [Nate Silver](#) and [Allison McCann](#)

Filed under ICYMI



RECOMMENDED

Voters Really Did Switch To Trump At The Last Minute

How The Golden Globes Changed The Oscars Race

How Much More Money Could 'Boys n the Bar' Make?

Who will win the presidency?



Chance of winning

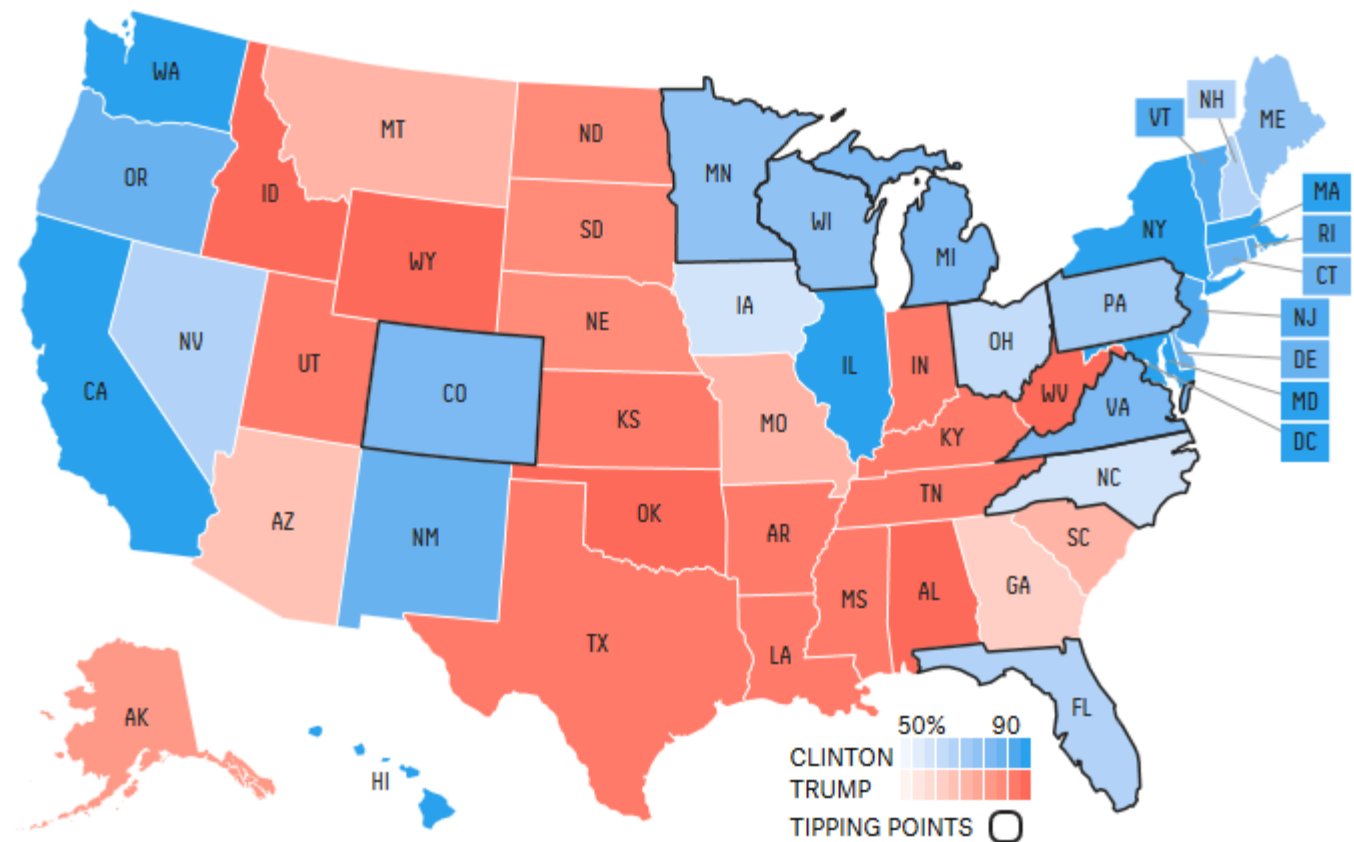


Hillary Clinton

73.8%

Donald Trump

26.1%



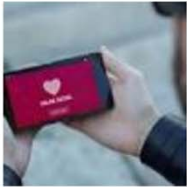
Google Algorithm – with News

← ⓘ https://www.google.com/search?q=algorithm&source=lnms&tbm=nws&sa=X&ved=0ahUKEwjDvs2i2oHWAhXDLYKHxcvDhAQ_AUICigB&biw=1537&bih=766

Google algorithm 🔍

All **News** Images Books Videos More Settings Tools

About 558,000 results (0.40 seconds)



Online dating: Can an **algorithm really match you with your dream ...**
Hindustan Times - 2 hours ago
A new research questioned whether data and **algorithm** can predict attraction between two people who have never met. Here's what they found ...



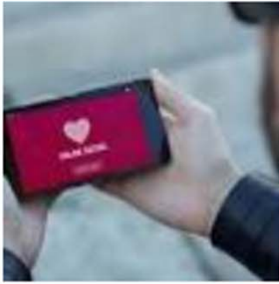
This genius **algorithm turns your name into an awesome musical ...**
Classic FM - Aug 30, 2017
Ever wondered what your name would sound like as a musical motif? You can now find out using Clarallel, an **algorithm** that reveals your ...



Algorithm could predict Alzheimer's risk years before symptoms occur
Medical News Today - Aug 27, 2017
In the new study, Dr. Rosa-Neto and team describe the development of an **algorithm** that could predict a patient's likelihood of progressing from ...



Amazon has an **algorithm that designs clothes by replicating human ...**
Quartz - Aug 25, 2017
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Algorithms that scale: An example

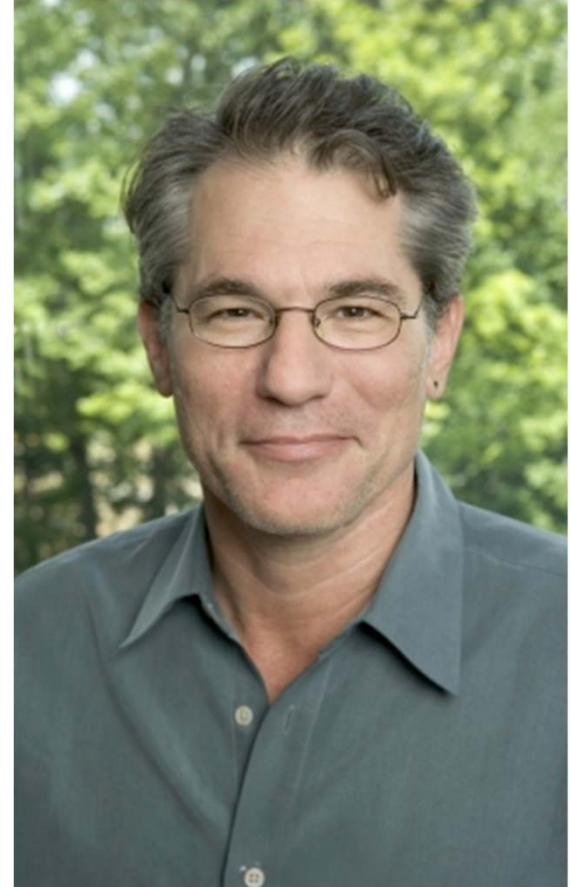
- Human Genome Project
 - Multiple approaches, relying heavily on computational power and algorithms
 - Combine reads of DNA sequences, we'll look at an illustrative example
- These combine bio/chemistry techniques with computational techniques to recreate the sequencing, e.g., CGATTCCG... from "live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

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

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

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