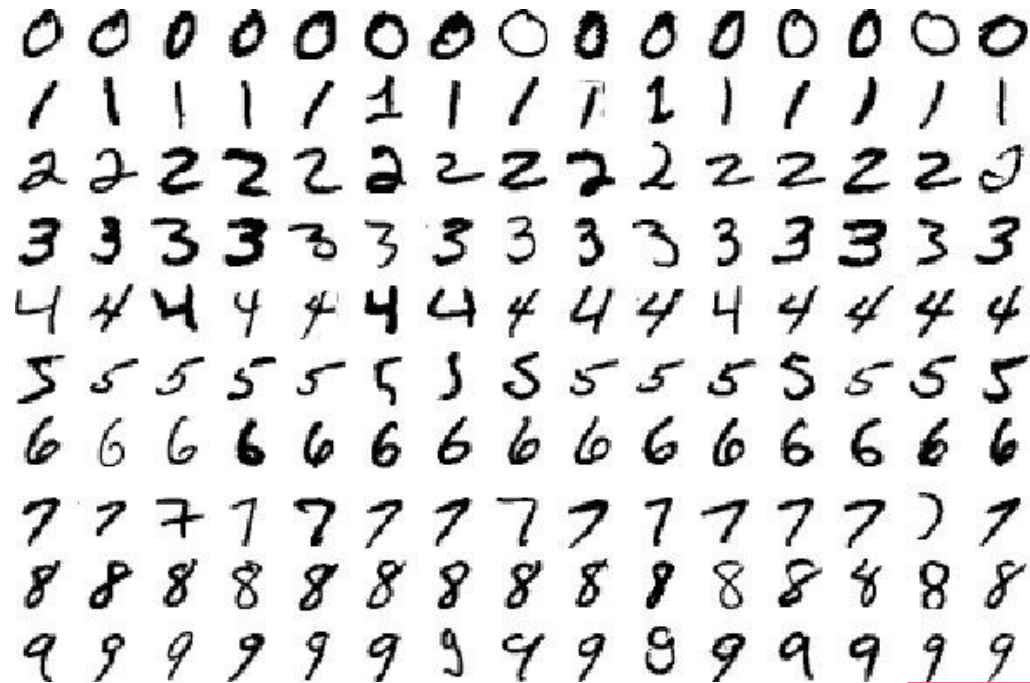


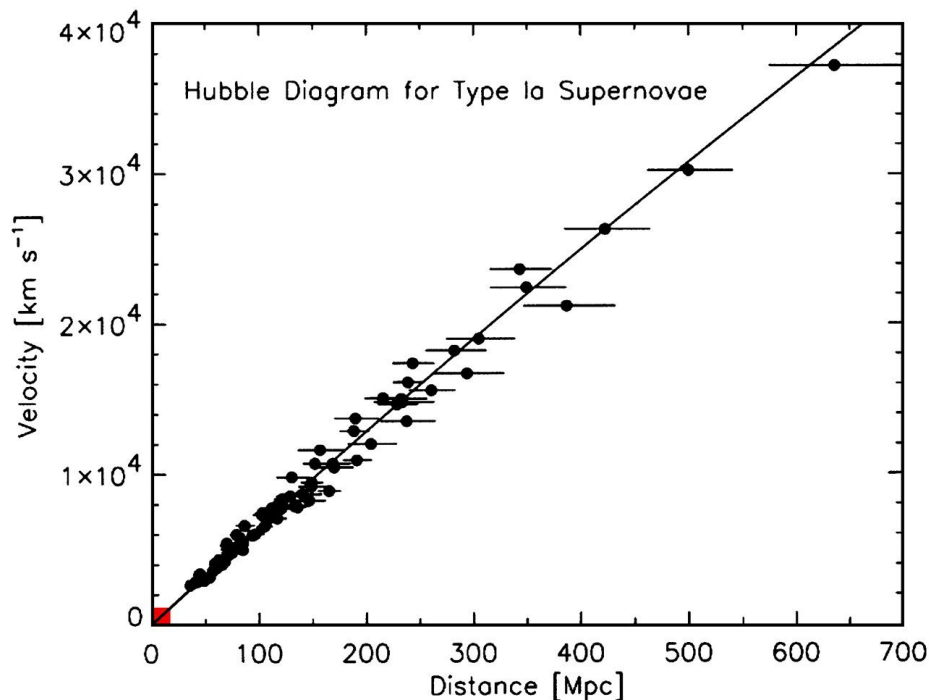
# Astro 9: Introduction to Scientific Programming (w/ Python)

Day 1 : Introduction

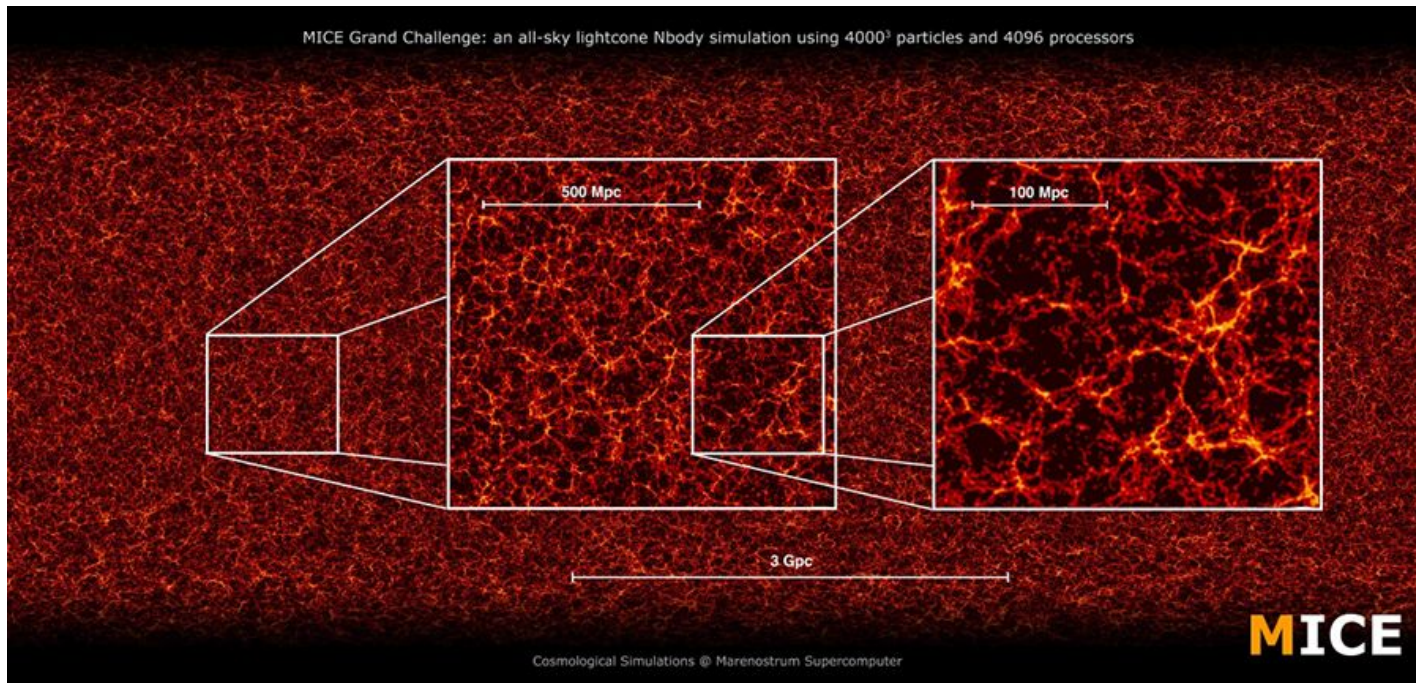
# Classic Examples of Scientific Programming: Classification



# Classic Examples of Scientific Programming: Regression



# Classic Examples of Scientific Programming: Modelling/Simulation



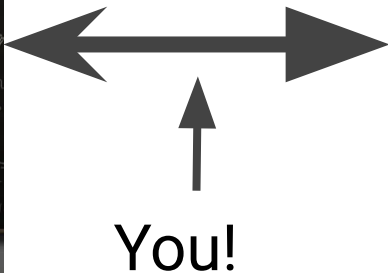
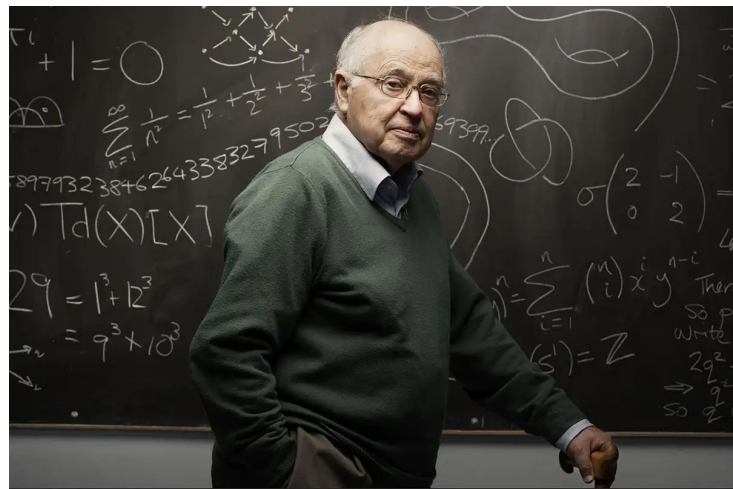
# Overview of Course: Goals

- 1) Be knowledgeable of the common techniques used in analysis of real world data.
- 2) Recognizing the limitations and strengths of a given method.
- 3) Be able to visualize and present the results.
- 4) Develop a “critical eye” towards data and techniques.



# How much theory?

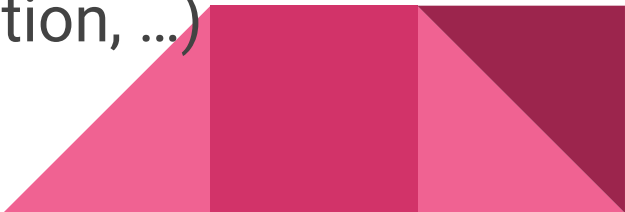
Focus of the course is on implementation, not theoretical underpinnings, but some math will be needed!



# How much theory?

Focus of the course is on implementation, not theoretical underpinnings, but some math will be needed!

Following knowledge assumed:

- 1) High comfort with single variable calculus.
  - 2) At least some knowledge of multivariable calculus.
  - 3) Some statistics (mean, standard deviation, ...)
- 

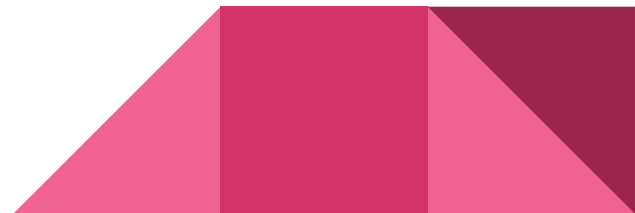
# Basic Logistics

Instructor: Ben Horowitz ([bhorowitz@berkeley.edu](mailto:bhorowitz@berkeley.edu))

Lectures: M/W/F

Office Hours: TBD!

No text (see website for readings)





# Basic Logistics: Grading

Homeworks (30%) : Assigned weekly (due Friday)

Final Projects (60%) : Independent creations

Participation (10%) : In-class group work



# Basic Logistics: Course Format

First 20-40 minutes will be short lecture-style presentation.

Rest of course will be focused groupwork exploring topics and beginning the homework.



# Basic Logistics: Homework Policies

- Submission will be via Github Classroom
- Working in (small) groups allowed
- No late submissions allowed
- Googling for resources allowed; don't google the problem exact problem statements though!

Due dates TBD!



# Basic Logistics: Final Project

Application of the tools and techniques we learned in class to some topic that interests you!

- Analysis Rigor
- Presentation
- Creativity

Start thinking about project early!

- “Proposal” due July 28th
- Project due last day of course



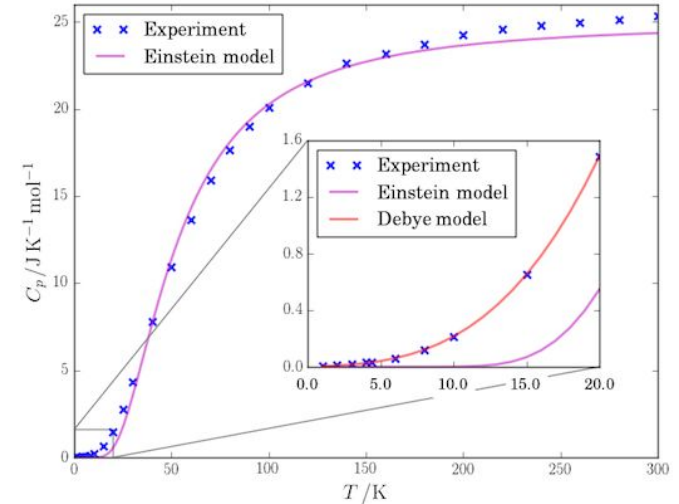
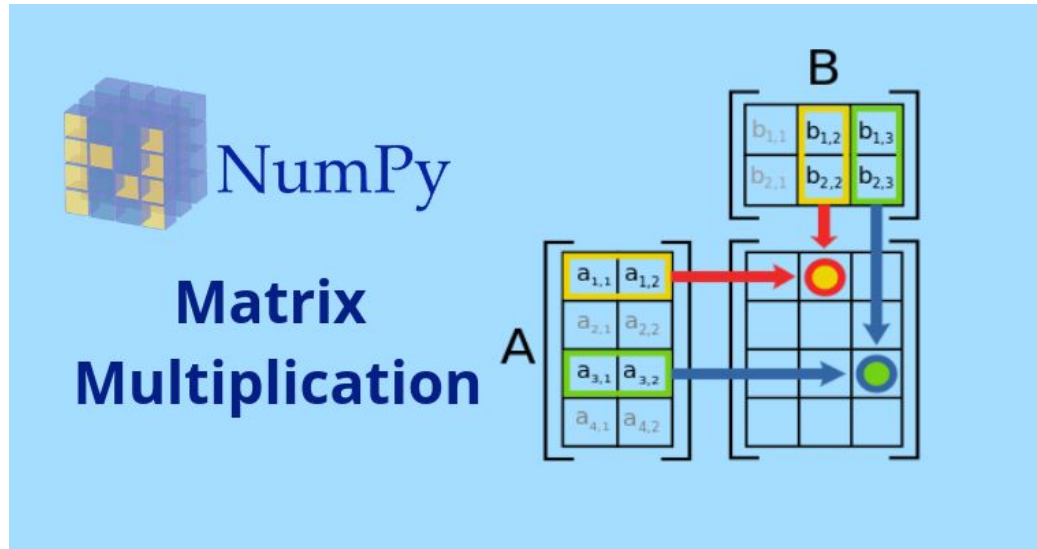
# My Motivation...

Course Success => My Success

Please give me continual feedback!



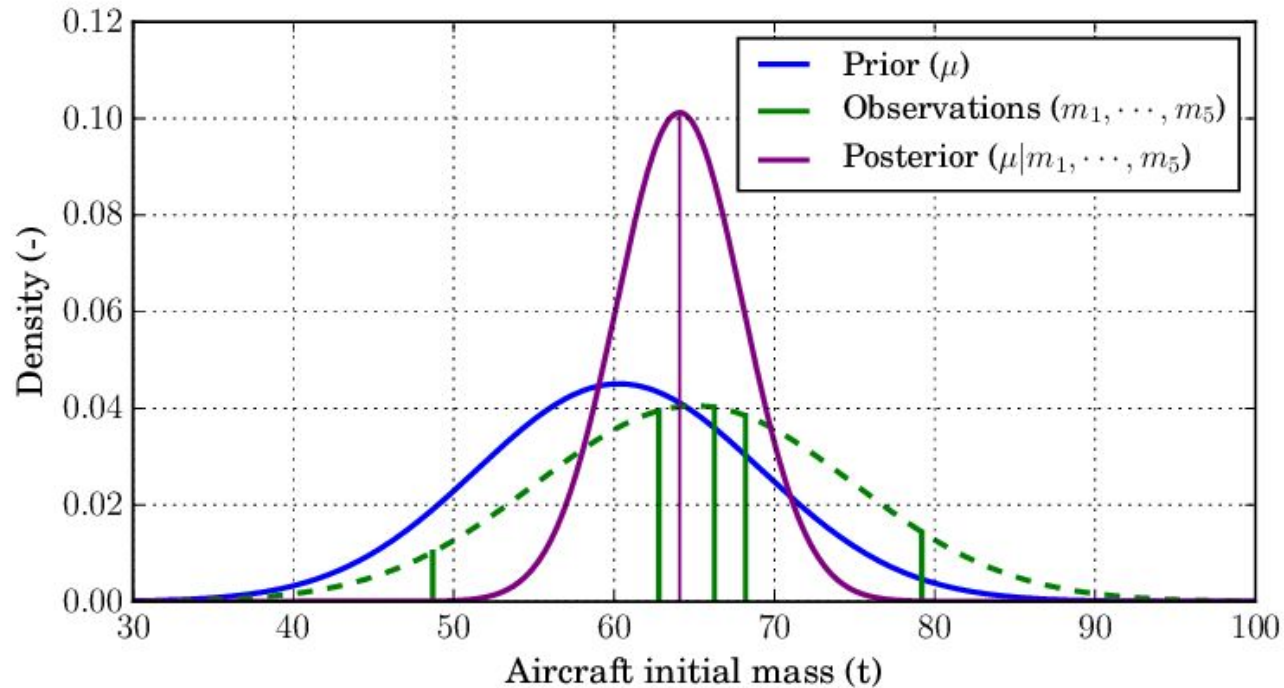
# Topics Covered: Numpy and Matplotlib



# Topics Covered: Data Manipulation/Visualization

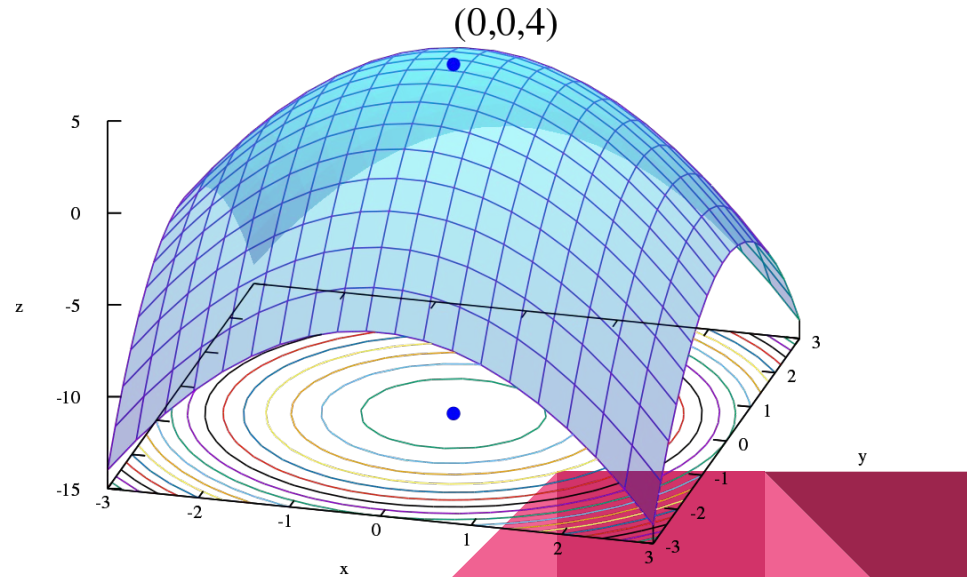
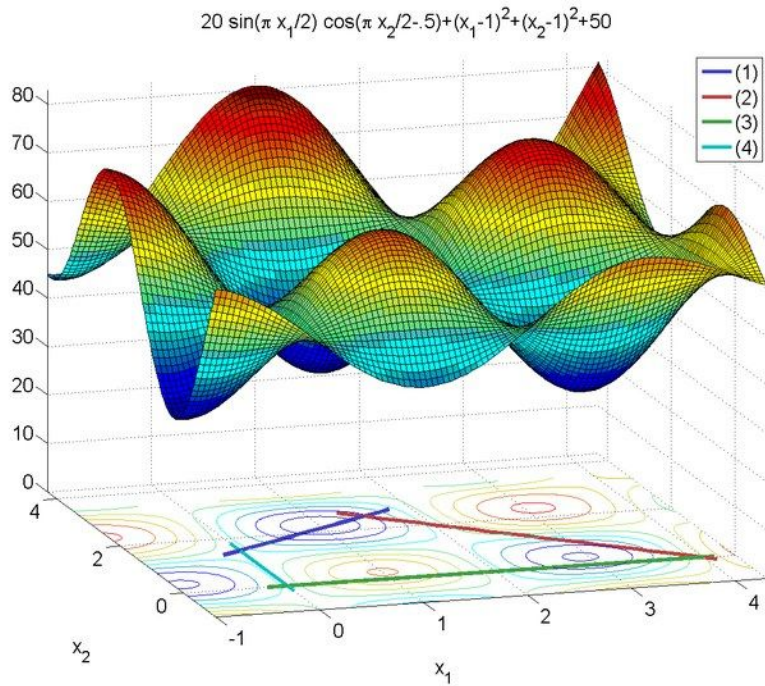


# Topics Covered: Bayesian Analysis (Hypothesis Testing)

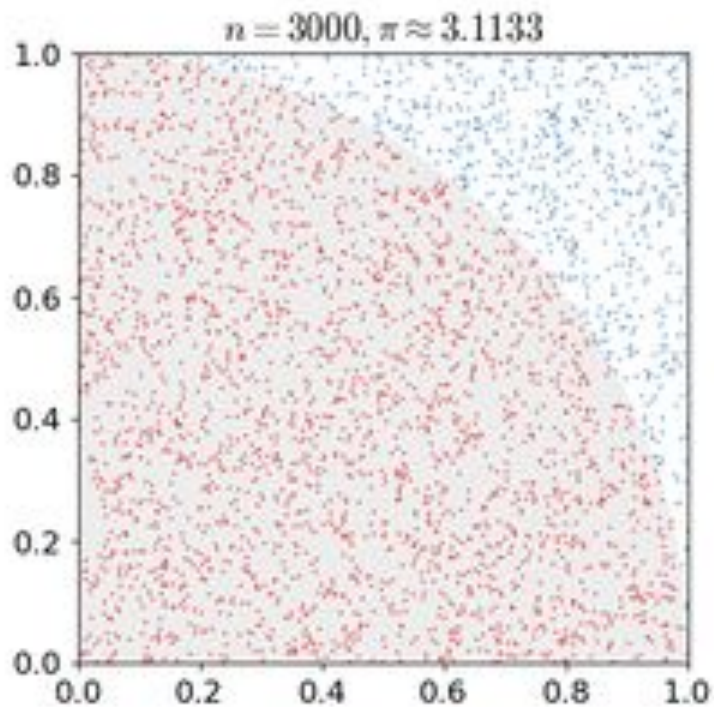




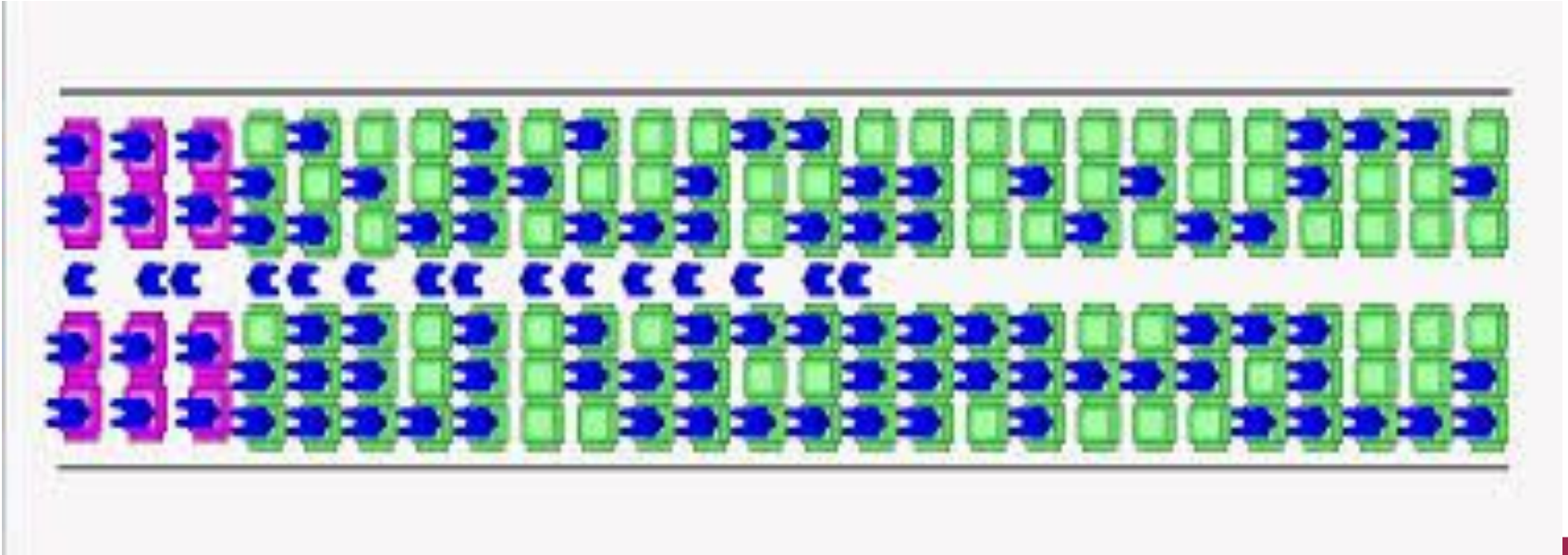
# Topics Covered: Optimization



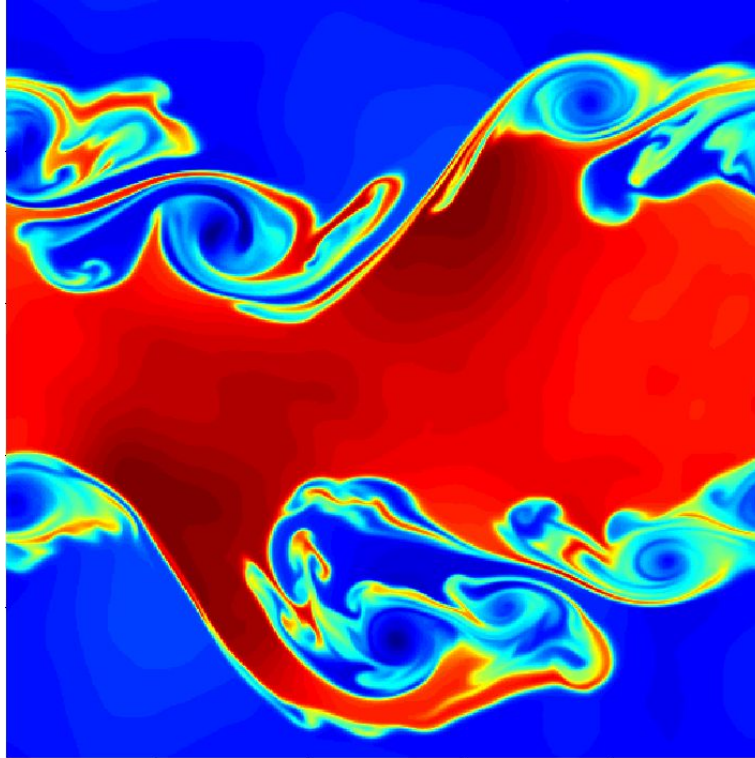
# Topics Covered: Sampling



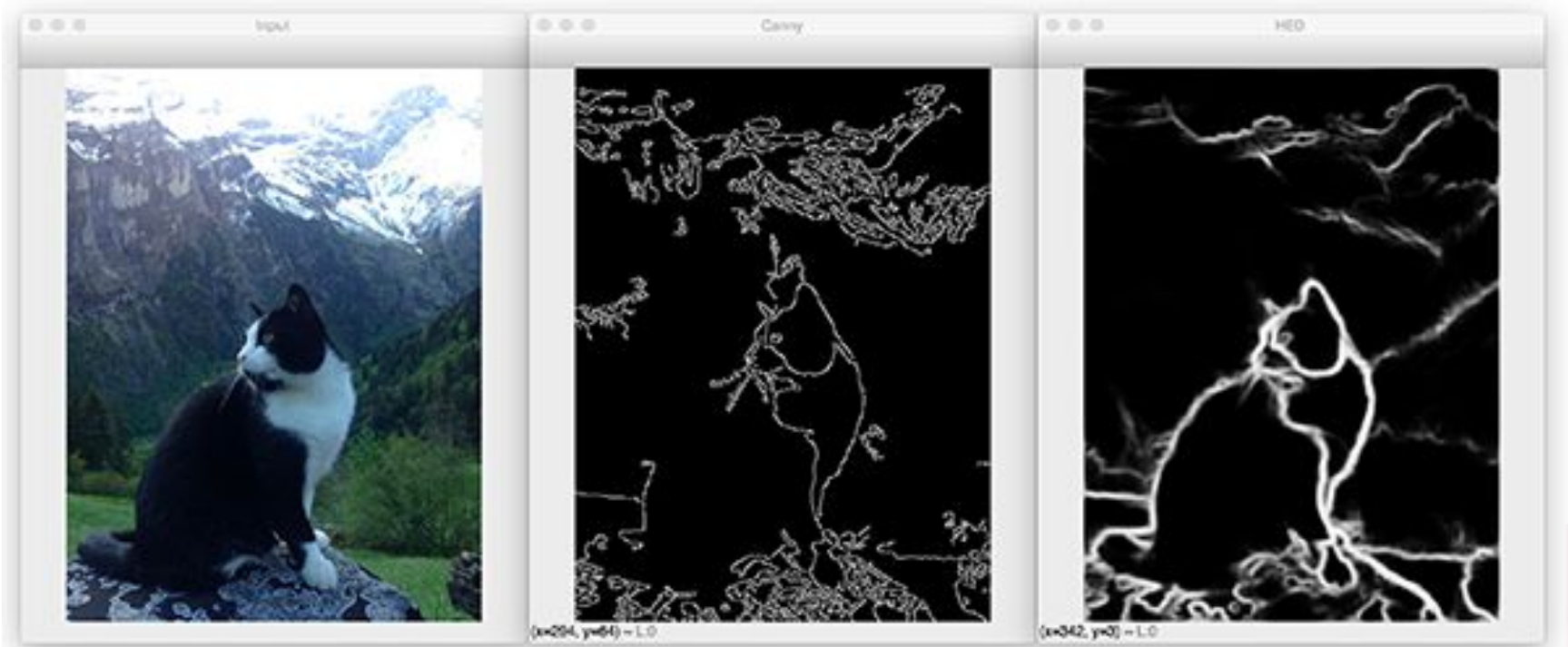
# Topics Covered: Agent-Based Modelling



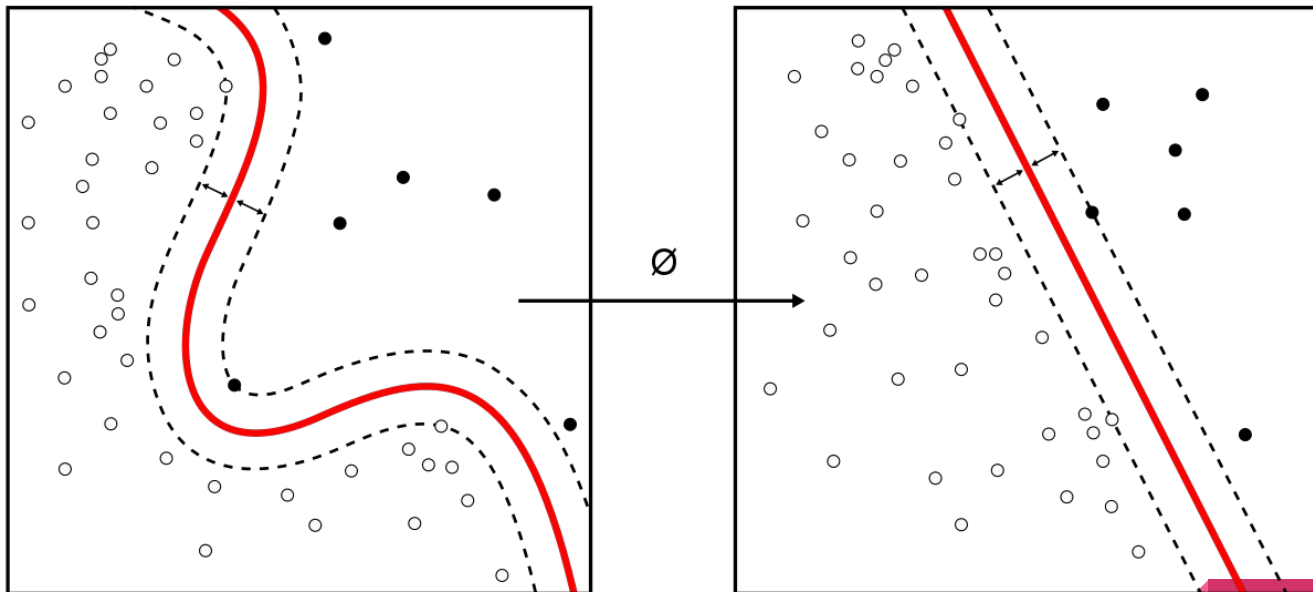
# Topics Covered: Differential Equations Solving



# Topics Covered: Image Analysis



# Topics Covered: Machine Learning

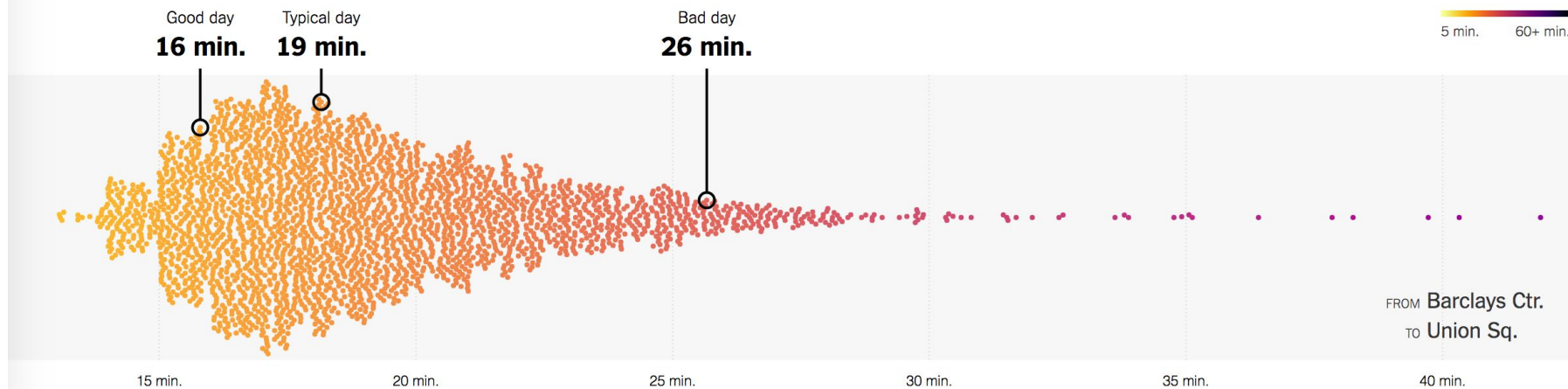




# Themes: Thinking Probabilistically

## A YEAR OF YOUR SUBWAY RIDES

The commute you searched for, from Atlantic Ave - Barclays Ctr. **2 3 B D N Q R** to 14th St. - Union Square **4 5 6 L N Q R W**, has a median trip time of about **19 minutes**.



New York Times (2019)

# Themes: Understanding Correlated Errors

Chance of winning

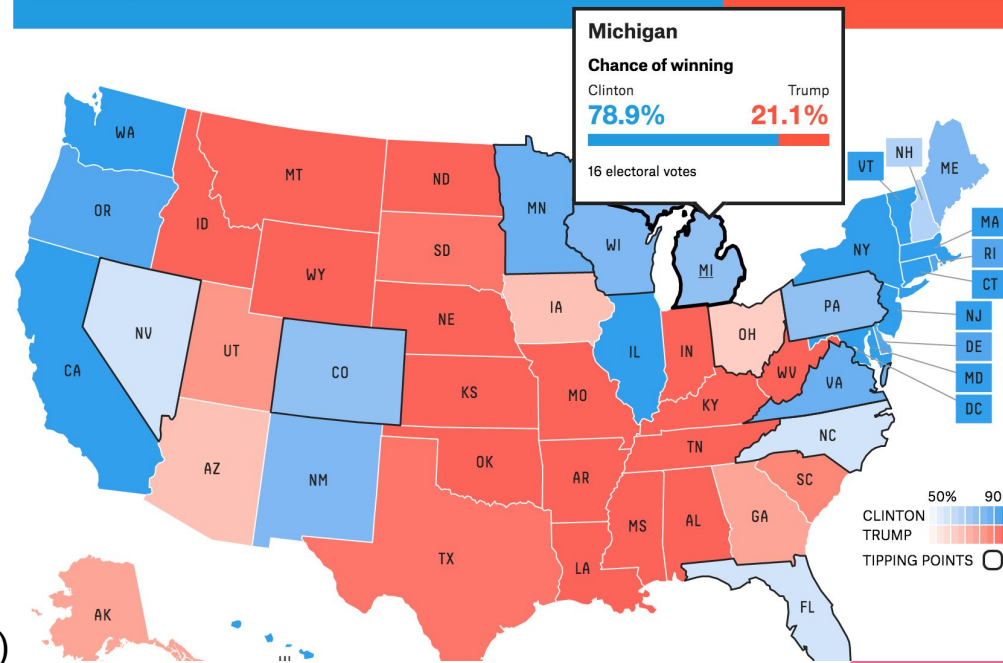


Hillary Clinton

71.4%

Donald Trump

28.6%




Five Thirty Eight (2016)



# Themes: Being Resourceful...



 Products

[Home](#)  
[PUBLIC](#)  
**[Stack Overflow](#)**  
[Tags](#)  
[Users](#)  
[Jobs](#)

## Histogram using gnuplot?

asked 9 years, 3 months ago

viewed 197,110 times

active 7 months ago

198

▲▼

[gnuplot](#) [histogram](#) [binning](#)

Ask Question

Temporary Course Home

bhorowitz.github.io/astro9

