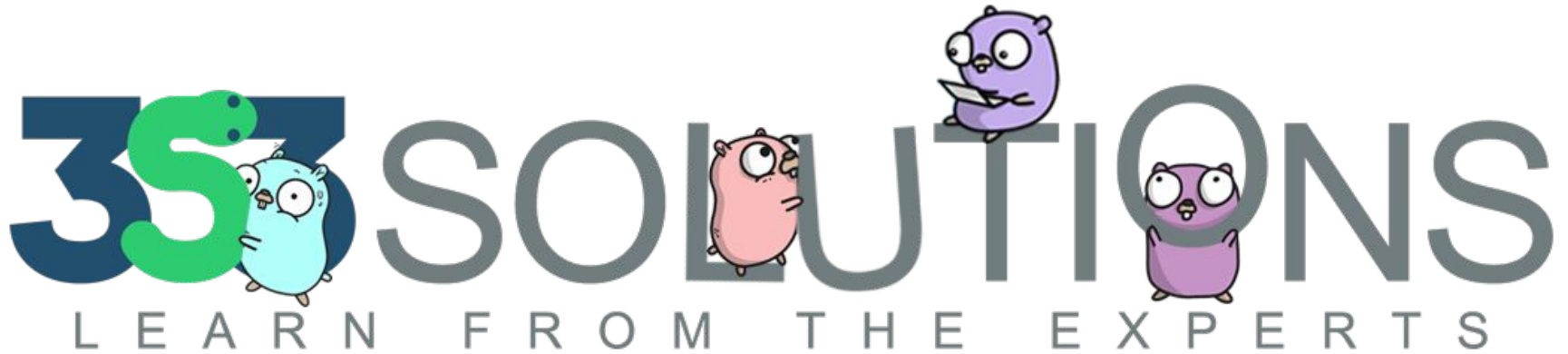


Simulations

For the Mathematically
Challenged

Miki Tebeka





$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

$$z = \frac{x - \mu}{\sigma} \qquad \rho_{X,Y} = \frac{\text{cov}(X, Y)}{\sigma_X \sigma_Y}$$

$$I(X; Y) = D_{KL}(P_{(X,Y)} || P_X \otimes P_y)$$

If you can write a
for-loop, you can do
statistics.

Jake Vanderplas

```
import random
```

The Base for Changes

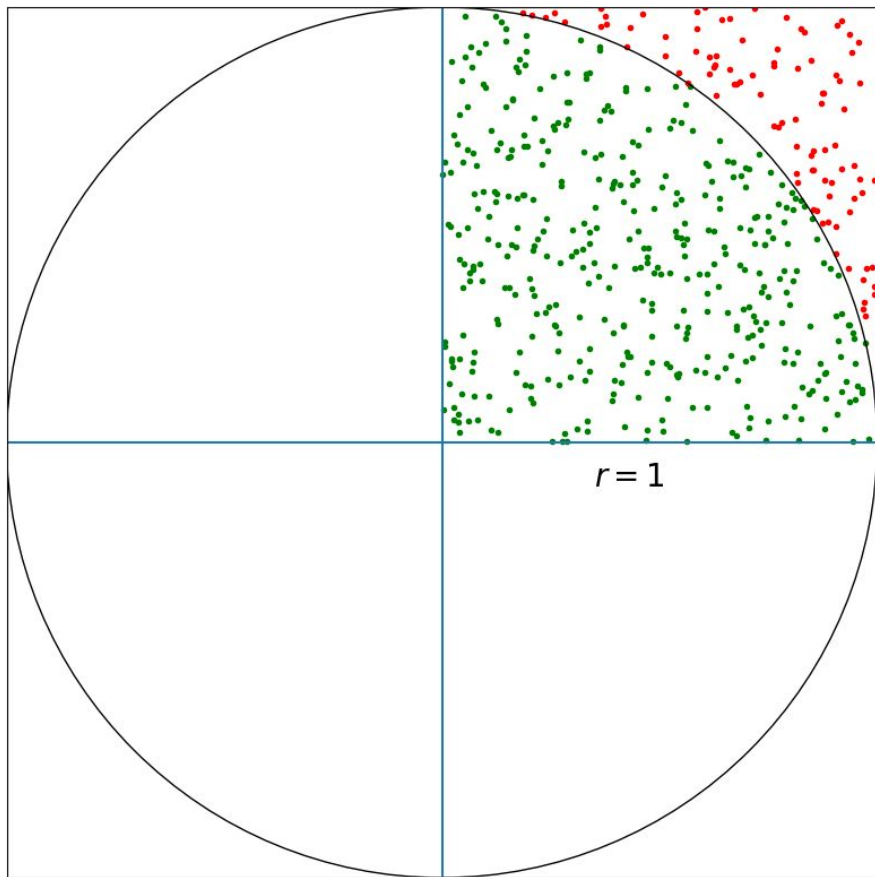
- Best Catan Tiles
- Calculating π
- [Birthday problem](#)
- [Sick or Not?](#)
- [Monty Hall problem](#)



CODE

`catan.py`

π



CODE

pi.py



CODE

`birthday.py`

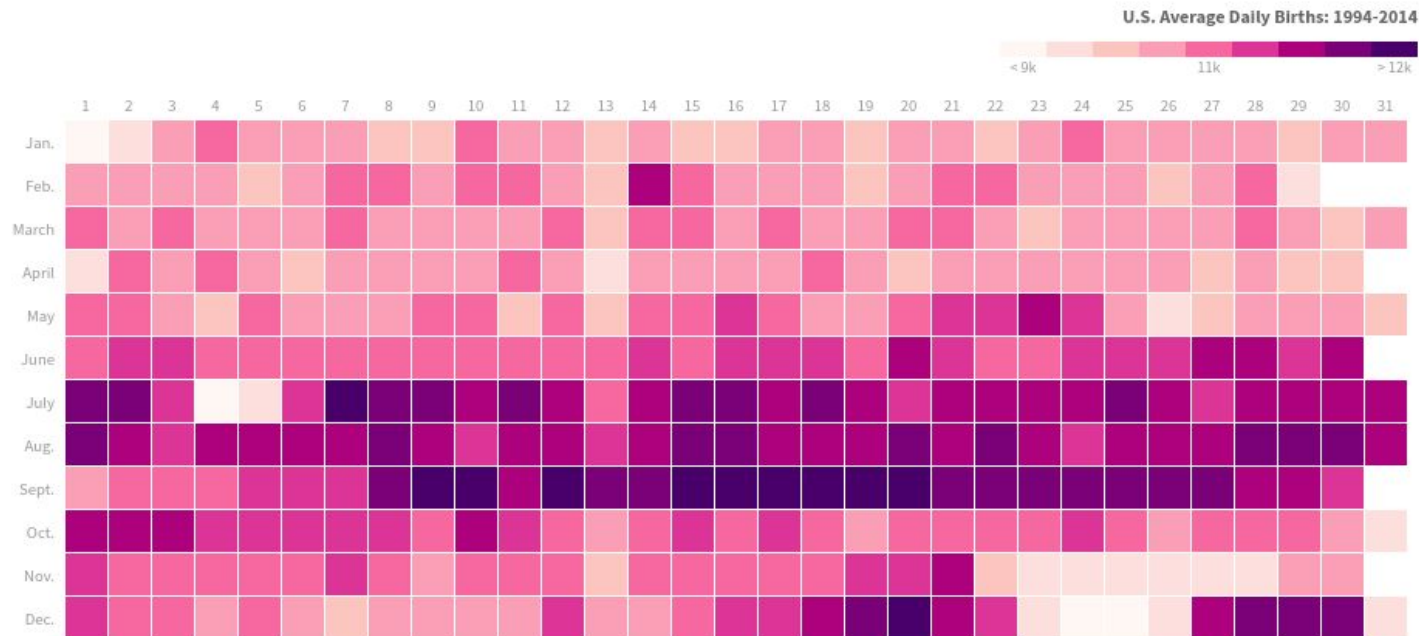
The chances of a piece of bread falling butter side down is directly proportional to the cost of the carpet.

COROLLARIES TO MISTER MURPHY...

All models are wrong, but some are useful. - George Box

HOW POPULAR IS YOUR BIRTHDAY?

Two decades of American birthdays, averaged by month and day.



<http://thedailyviz.com/2016/09/17/how-common-is-your-birthday-dailyviz/>

The test of a disease presents a rate of **5% false positives**. The disease strikes **1/1000 of the population**. People are tested at random, regardless of whether they are suspected of having the disease. **A patient's test is positive.** **What is the probability of the patient being stricken with the disease?**

	Predicted Sick	Predicted Healthy
Actual Sick	True Positive	False Negative
Actual Healthy	False Positive	True Negative

CODE

sick.py



CODE

monty.py

Learn More

[Statistics for Hackers](#)

- Jake Vanderplas

[Monte Carlo Simulation](#)

- Wikipedia

[SimPy](#)

- Discrete Simulation



PYPY

```
$ time python pi.py  
... 99% cpu 1:02.23 total  
$ time pypy3 pi.py  
... 98% cpu 4.838 total
```

Thank You

<https://github.com/tebeka/talks/tree/master/pyweb-sim>



PYTHON BRAIN TEASERS
EXERCISE YOUR MIND

```
1 class Player:
2     # Number of players in the Game
3     count = 0
4
5     def __init__(self, name):
6         self.name = name
7         self.count += 1
8
9
10 p1 = Player('Parzival')
11 print(Player.count)
```

WHAT WILL THIS CODE PRINT?

30 MIND BENDING TEASERS & SOLUTIONS
MIKI TEBEKA