DS2500
3/14-Fri π Day!

Admin

- HW4 out, due 3/21 9pm
- Lab 4 monday
- proposal grades out!
  - ↳ if ask for more info, give response in regrade, or email Laney

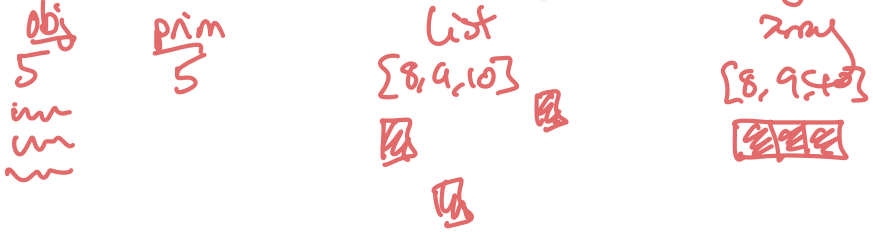
Agenda

1. Numpy + image generation
2. Real world data / viz ⇝ cd2d
   bit.ly/ds2500_gdrive
3. Python

1. numpy and image generation

↳ library that supports arrays, mathy computations

- similar to Python list, conceptually {~, ~, ~}
- specializes in numbers
- compared to lists, arrays are smaller + faster
  - ↳ primitives, contiguous memory



Numpy examples → import numpy as np

Create array

```
ray = np.array([7,8,9])
ray2d = np.array([[7,8,9],[20,22,24]])
ray3d = np.array([[[1,2],[3,4]],
                  [[5,6],[7,8]]])
```

Shape (tuple)

(3,)

(2,3)

(2,2,2)

↳

1,2	3,4
5,6	7,8

[[[1,2,3],[4,5,6]],
[[7,8,9],[10,11,12]]] (2,2,3)

z = np.zeros((3,4))
↳ shape

order = np.arange(5) [0,1,2,3,4]

* diff sizes?

numpy diffs

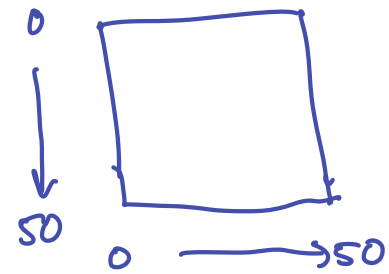
- all same datatype
- same size in dimension
- np.mean(), np.std(), np.linalg(), np.median(), np.fft()
- loop shortcuts (ex) ray1 + ray2
  ↳ add index values, create new ray

2. Real World Data (+viz)

↳ today: latlong.csv (48 states, has cap. locations)

goal: create image using numpy
convert lat/long to positions in the grid

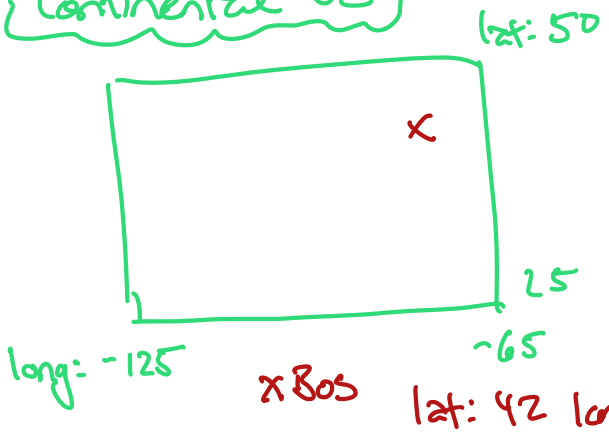
numpy grid



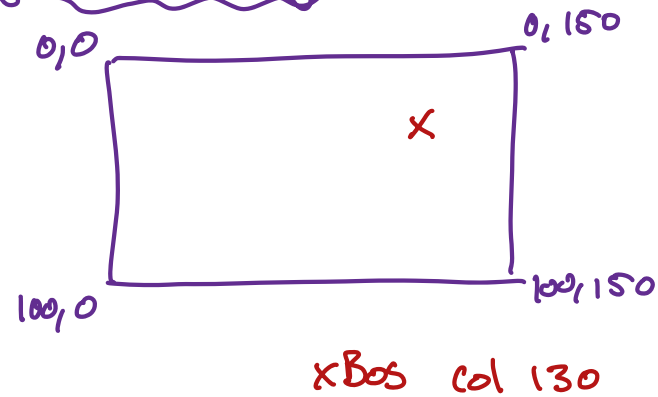
50,50,3 grid
row #: increases top to bottom
col #: increases left to right

given a lat/long, compute row/col
need: border values

Continental US



grid in numpy



raw 30

normalization: $\frac{x - \min}{\max - \min}$

longitude conversion

$$\frac{-71 - (-125)}{-65 - (-125)} = .9 \qquad (.9)(150) = 135$$

latitude conversion:

$$\frac{42 - 25}{50 - 25} = .68 \qquad 100 - (68)(100) = 32$$