Python for Data Science

numpy:
Satellite Image Example

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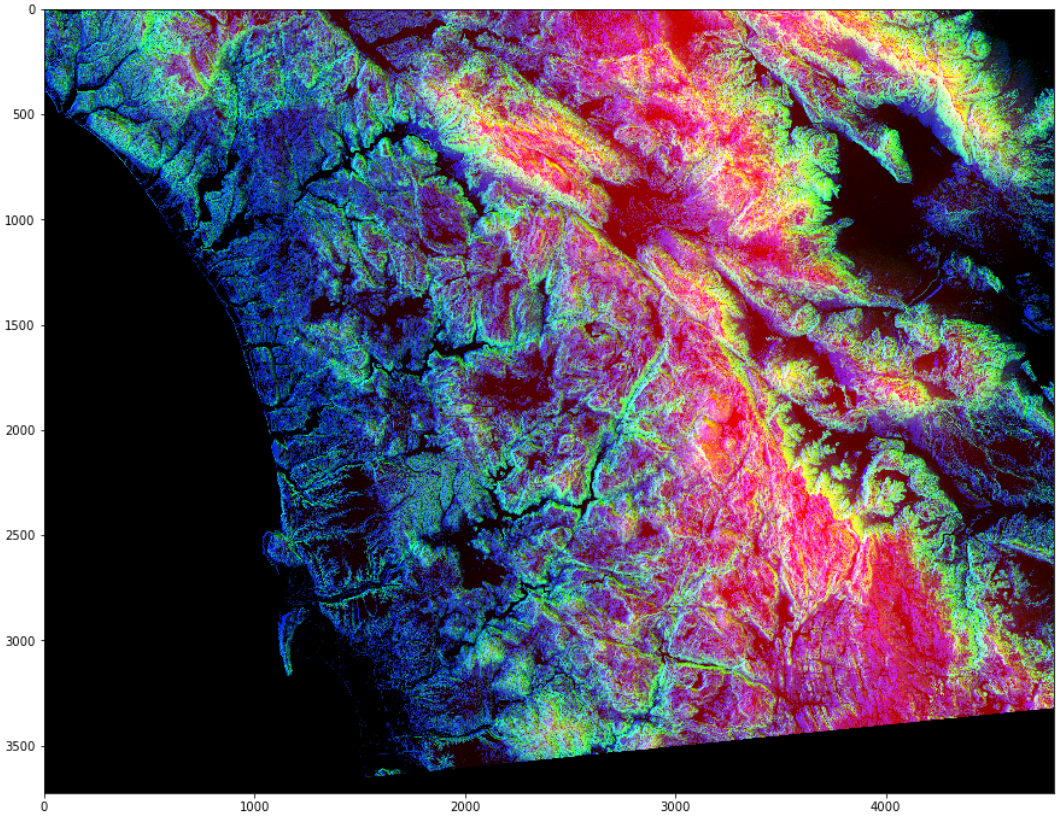
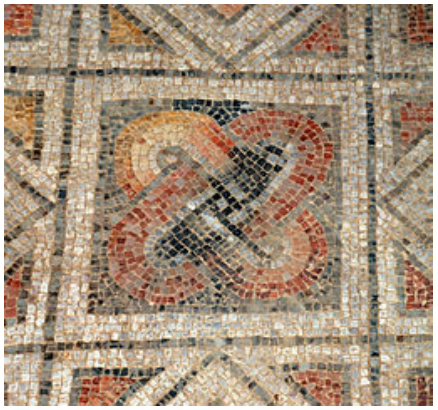
- Describe what satellite image data is and how it helps fighting fires
- Apply basic methods in numpy for image processing

How do computers handle images?

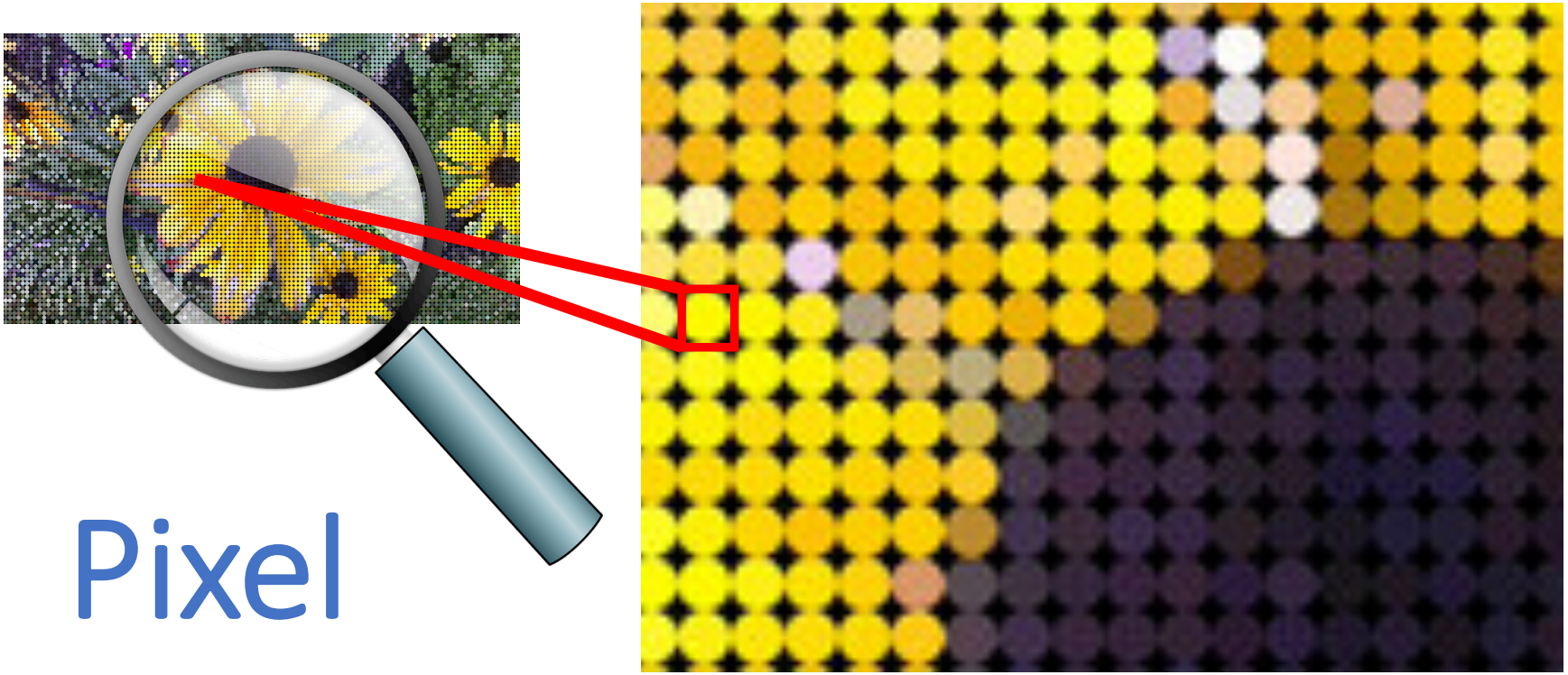


https://www.landfire.gov/

Computer images are composed of tiny squares.

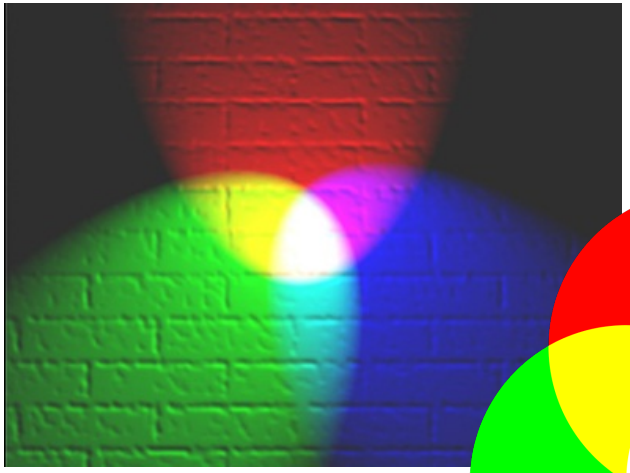


Smaller tiles → Smoother image

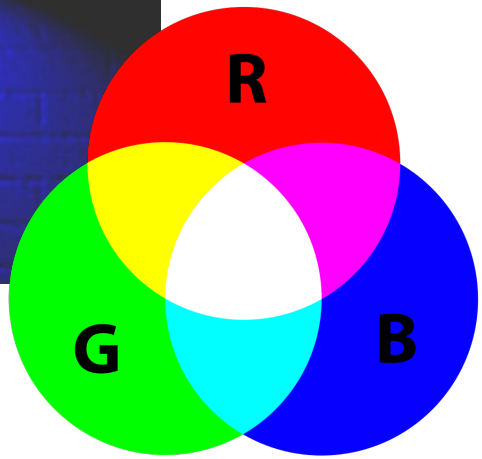


Pixel

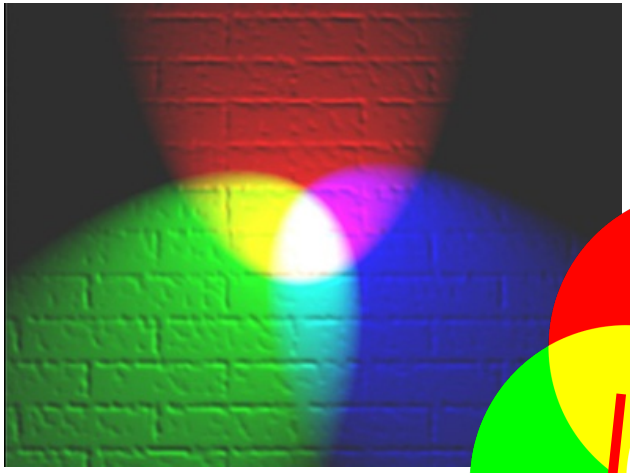
- Each square is called a pixel
  - No varying color within a square



RGB Images

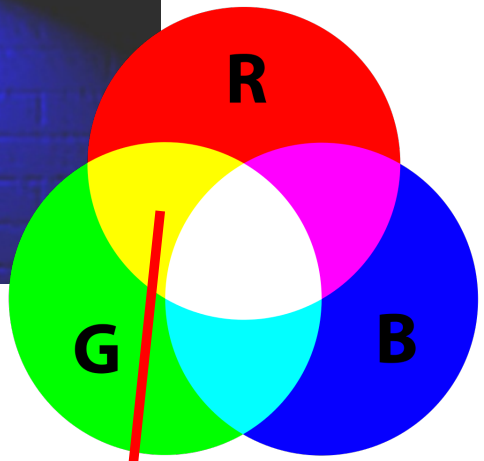


1 pixel → Three 8-bit numbers representing R, G and B values

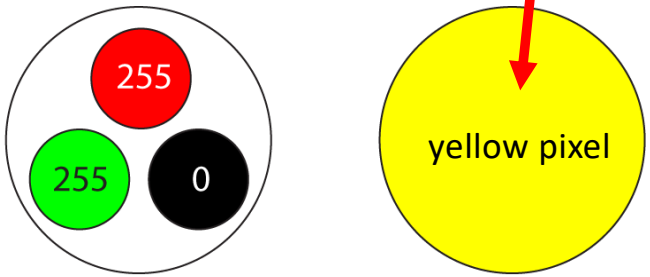


RGB Images

8-bit → 0 - 255

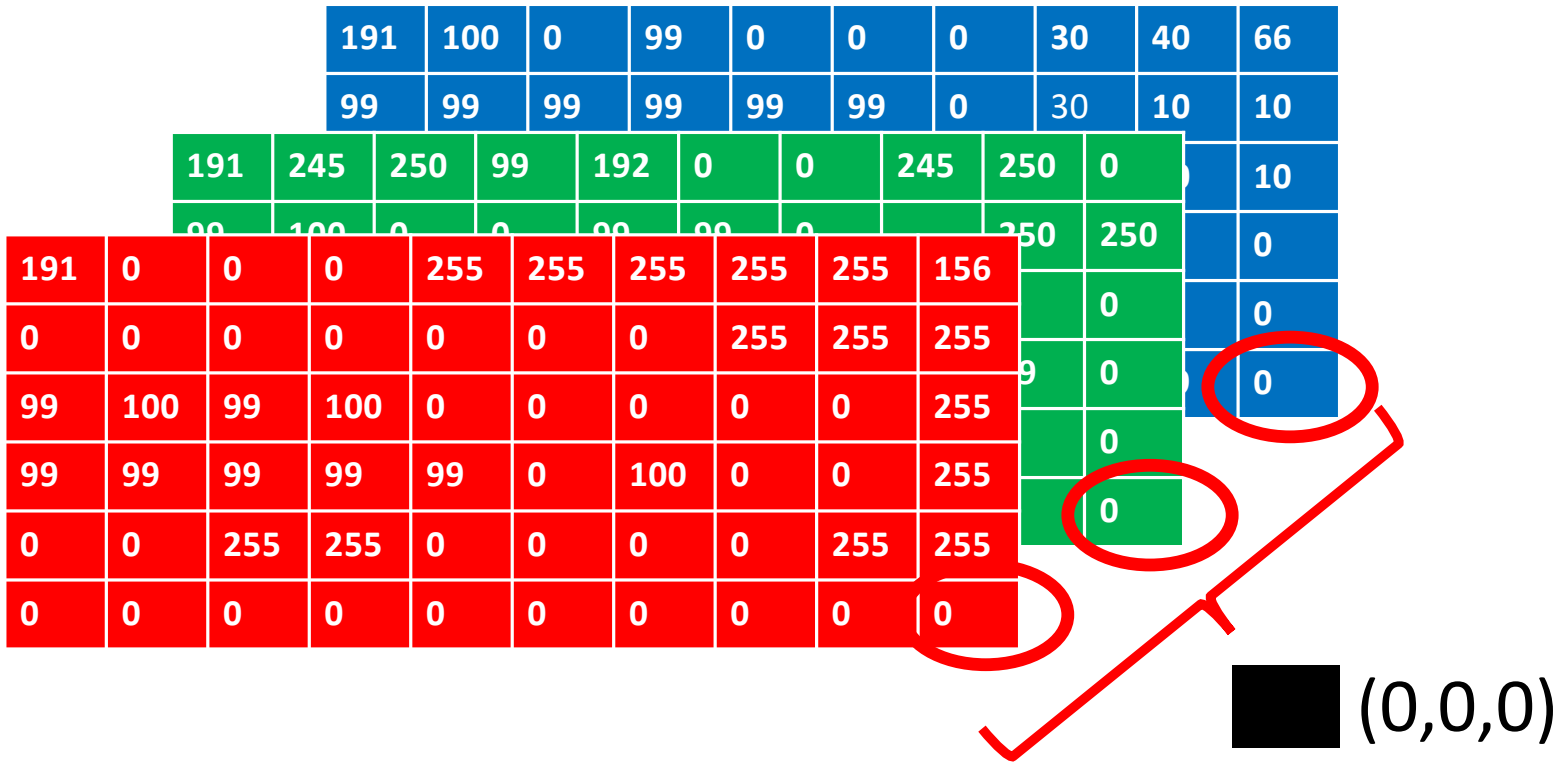


R, G, B	Corresponding Color
0, 0, 0	Black
255, 255, 255	White
255, 0, 0	Red
0, 255, 0	Green
0, 0, 255	Blue

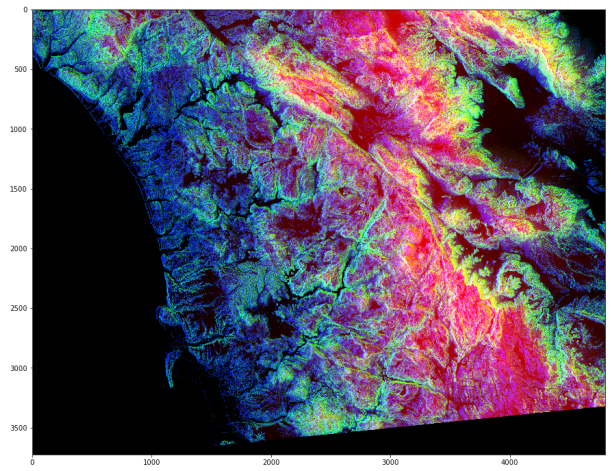


256x256x256 = 16.8M colors

ndarray → [Height X Width X 3]



RGB Images in Python



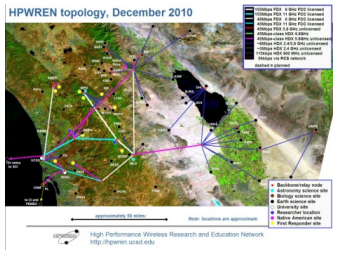
Importing an RGB image into Python

```
from skimage import data

photo_data = misc.imread('./wifire/sd-3layers.jpg')

type(photo_data)
```

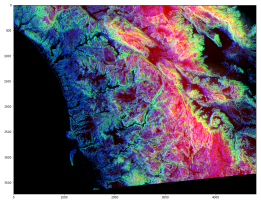
```
Numpy.ndarray
```

Python for Data Science

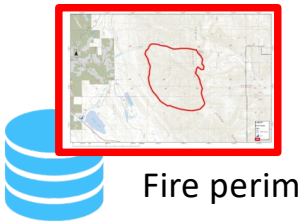
Fire Modeling in WIFIRE



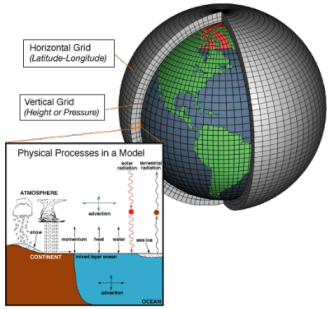
Real-time sensors



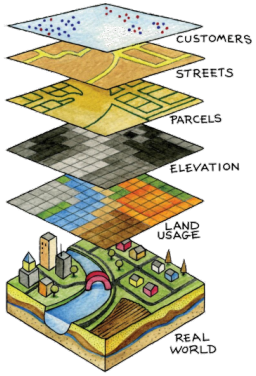
Periodical fuel updates



Fire perimeter

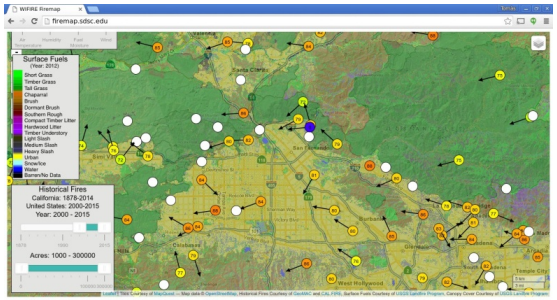


Weather forecast



Landscape data

Monitoring & fire mapping



WIFIRE is funded by NSF 1331615.

http://wifire.ucsd.edu

Live Coding