Outline

Quiz

Regular expressions

- using python
- Regex artists

Homework review

Cool media art pieces

Prof. Angela Chang

Lecture 10: Quiz & Regular Expressions 2

Fall 2017. Oct 11

CODE, CULTURE, AND PRACTICE

Quiz (30 minutes)

Helpful hints:

Python code is designed to be readable. Read each line using your finger so you can focus carefully on the words.

What happens in the function, stays in the function!

Range and Slices handle up to three arguments:

sequence [start_index : end_index : step_index]

range (start_index , end_index , step_index)

Leonard Richardson

Swapping the dialogue between two different texts

ALICE'S ADVENTURES IN THE WHALE

Leonard Richardson

Alice's Adventures in the Whale is a generated novel created by Leonard Richardson. His script (accessible here for the code-savvy and adventurous) replaces all dialogue in one novel with dialogue from another — in this case, *Alice's Adventures in Wonderland* and *Moby-Dick; or, The Whale*. We present this excerpt for your enjoyment.

CHAPTER V.
"Advice from a Caterpillar"

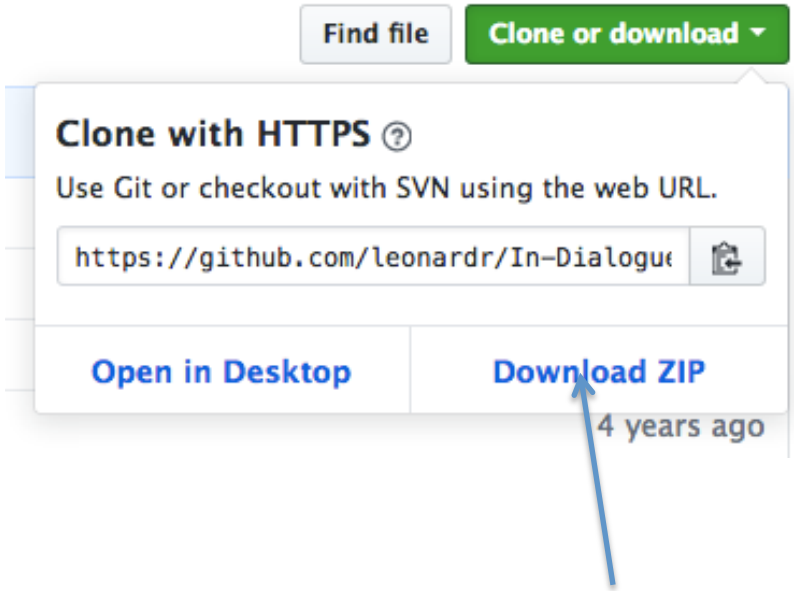
The Caterpillar and Alice looked at each other for some time in silence: at last the Caterpillar took the hookah out of its mouth, and addressed her in a languid, sleepy voice. "I say, pull like god-dam," said the Caterpillar.

This was not an encouraging opening for a conversation. Alice replied, rather shyly, "There she slides, now! Hurrah for the white-ash breeze! Down with the Yarman! Sail over him!"

http://wagsrevue.com/20/fiction/richardson1

Download the source here:

https://github.com/leonardr/In-Dialogue/



Lecture10_RegexAndImages.ipynb

Once the source is downloaded to your directory…

Read the instructions on the webpage for how to run it

1.Download source
2.Look at readme
3.Download source text from gutenberg
4. Run scripts to get output.

In Dialogue

a 2013 NaNoGenMo project

by Leonard Richardson

"In Dialogue" extracts the dialogue from Project Gutenberg ebooks and provides a tool for replacing all the dialogue from one text with dialogue from another.

The NaNoGenMo entry itself is in two parts found in the entry/ directory, and can also be read on my web site.

To generate your own texts, run `0-extract-dialogue.py`, then `1-generate-book.py`. The `1-generate-book.py` script will show you which texts are available.

You can add new texts by downloading Project Gutenberg files into the raw/ directory. For example, these commands will add "Oliver Twist" to the list of available texts:

```
$ wget http://www.gutenberg.org/ebooks/730.txt.utf-8 -O raw/730.txt.utf-8
```

```
$ ./0-extract-dialogue.py
```

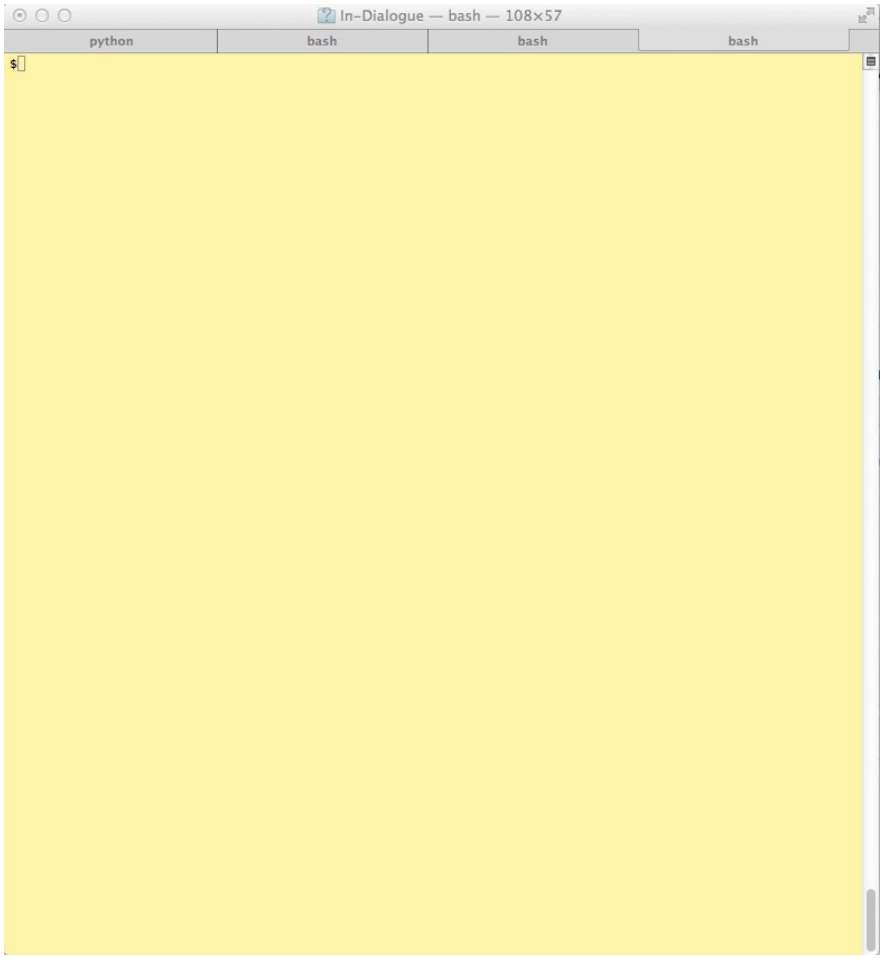
Then, this command prints the text of "A Christmas Carol", with all the dialogue replaced with dialogue from "Oliver Twist":

```
$ ./1-generate-book.py "A Christmas Twist" 46 730
```

Trying it out on the command line

1.Download source
2.Look at readme
3.Download source text from gutenberg
4. Run scripts to get output.

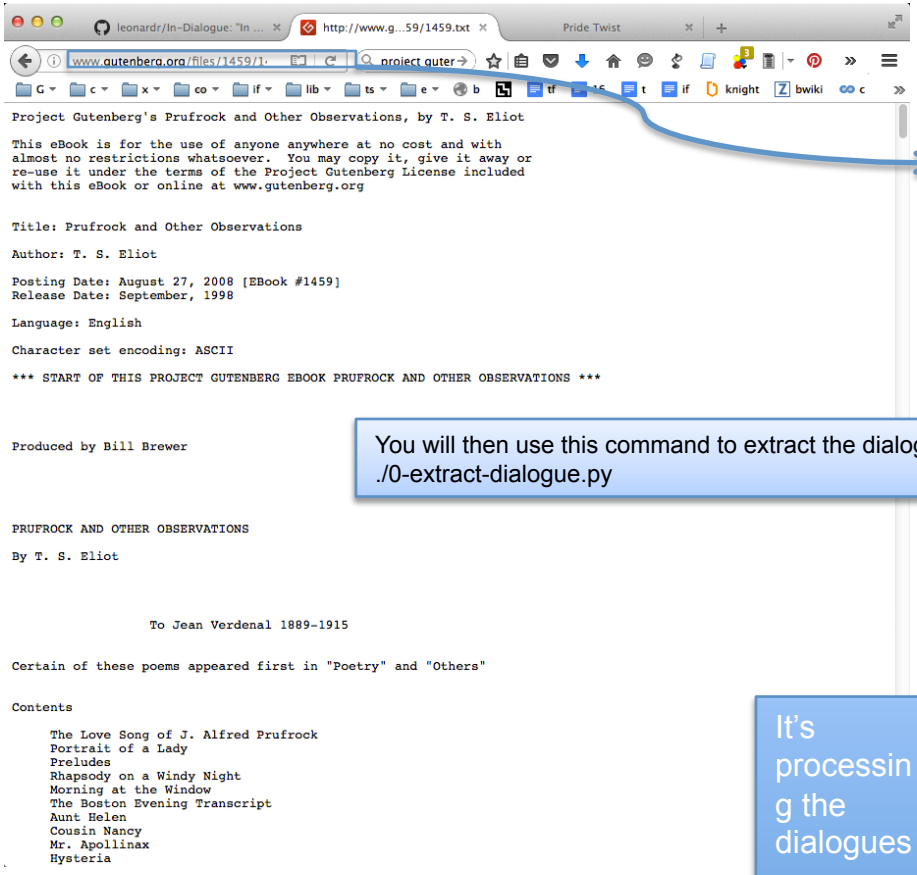
Used wget to download source



Errors:
Needed a source directory
Misunderstood how to run it.

Youtube walkthrough for this step

Go to Project Gutenberg and get more texts*, save to raw directory (see video in next slide):



```
Project Gutenberg's Prufrock and Other Observations, by T. S. Eliot

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almost no restrictions whatsoever.  You may copy it, give it away or
re-use it under the terms of the Project Gutenberg License included
with this eBook or online at www.gutenberg.org


Title: Prufrock and Other Observations

Author: T. S. Eliot

Posting Date: August 27, 2008 [EBook #1459]
Release Date: September, 1998

Language: English

Character set encoding: ASCII

*** START OF THIS PROJECT GUTENBERG EBOOK PRUFROCK AND OTHER OBSERVATIONS ***


Produced by Bill Brewer



PRUFROCK AND OTHER OBSERVATIONS

By T. S. Eliot



                To Jean Verdenal 1889-1915


Certain of these poems appeared first in "Poetry" and "Others"


Contents

     The Love Song of J. Alfred Prufrock
     Portrait of a Lady
     Preludes
     Rhapsody on a Windy Night
     Morning at the Window
     The Boston Evening Transcript
     Aunt Helen
     Cousin Nancy
     Mr. Apollinax
     Hysteria
```

You use the wget command to get the texts off Gutenberg
wget (Gutenberg URL) -O (filename in raw/ directory)
wget http://www.gutenberg.org/files/1459/1459.txt -O raw/1459.txt.utf-8

*make sure you use the same naming scheme

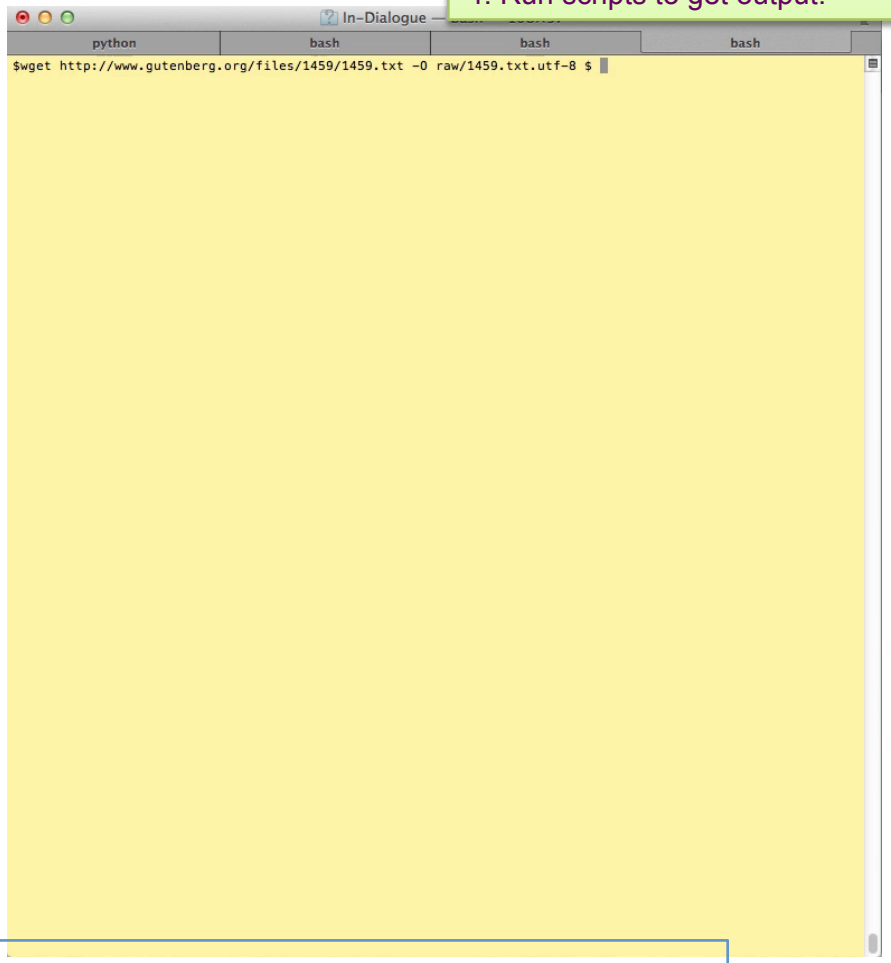
You will then use this command to extract the dialogue:
./0-extract-dialogue.py

It's processing the dialogues

```
anjchangmacbookpro:In-Dialogue anjchang$ ./0-extract-dialogue.py
Processing 11.txt.utf-8
 EBOOK ALICE'S ADVENTURES IN WONDERLAND ***           ALICE'S ADVENTU
 Single quotes. (533 single, 2 double)
Processing 12.txt.utf-8
 EBOOK THROUGH THE LOOKING-GLASS ***           THROUGH THE LOOKING-GL
 Single quotes. (633 single, 3 double)
Processing 1342.txt.utf-8
 EBOOK PRIDE AND PREJUDICE ***     Produced by Anonymous Volunteers
 Double quotes. (0 single, 1249 double)
Processing 1459.txt.utf-8
 EBOOK PRUFROCK AND OTHER OBSERVATIONS ***     Produced by Bill Brewer
 Double quotes. (0 single, 0 double)
Processing 1727.txt.utf-8
 EBOOK THE ODYSSEY ***     Produced by Jim Tinsley          THE O
 Double quotes. (7 single, 466 double)
Processing 2701.txt.utf-8
 EBOOK MOBY DICK; OR THE WHALE ***     Produced by Daniel Lazarus and Jones
 Double quotes. (6 single, 969 double)
Processing 46.txt.utf-8
 EBOOK A CHRISTMAS CAROL ***     Produced by Jose Menendez     A CHRIS
 Double quotes. (1 single, 434 double)
Processing 730.txt.utf-8
 EBOOK OLIVER TWIST ***     Produced by Peggy Gaugy and Leigh Little.  HTML
 Single quotes. (2625 single, 5 double)
anjchangmacbookpro:In-Dialogue anjchang$
```

Go to Project Gutenberg and get more texts*, save to raw directory (see video):

1.Download source
2.Look at readme
3.Download source text from gutenberg
4. Run scripts to get output.



Helpful commands:
(command) > file.txt
redirects output from the command line to a file
cd – change to directory
mkdir –make a new directory
ls – list files on Mac
dir – list files on PC
pwd – print working directory (Mac)
open . -- open finder on Mac
explorer . -- open explorer on Windows

Youtube walkthrough video for this step

Merge the two books in your command line:
./1-generate-book.py "A Christmas Twist" 46 730 > ChristmasTwist.html
./1-generate-book.py "Pride Twist" 1342 730 > Pride_Twist.html

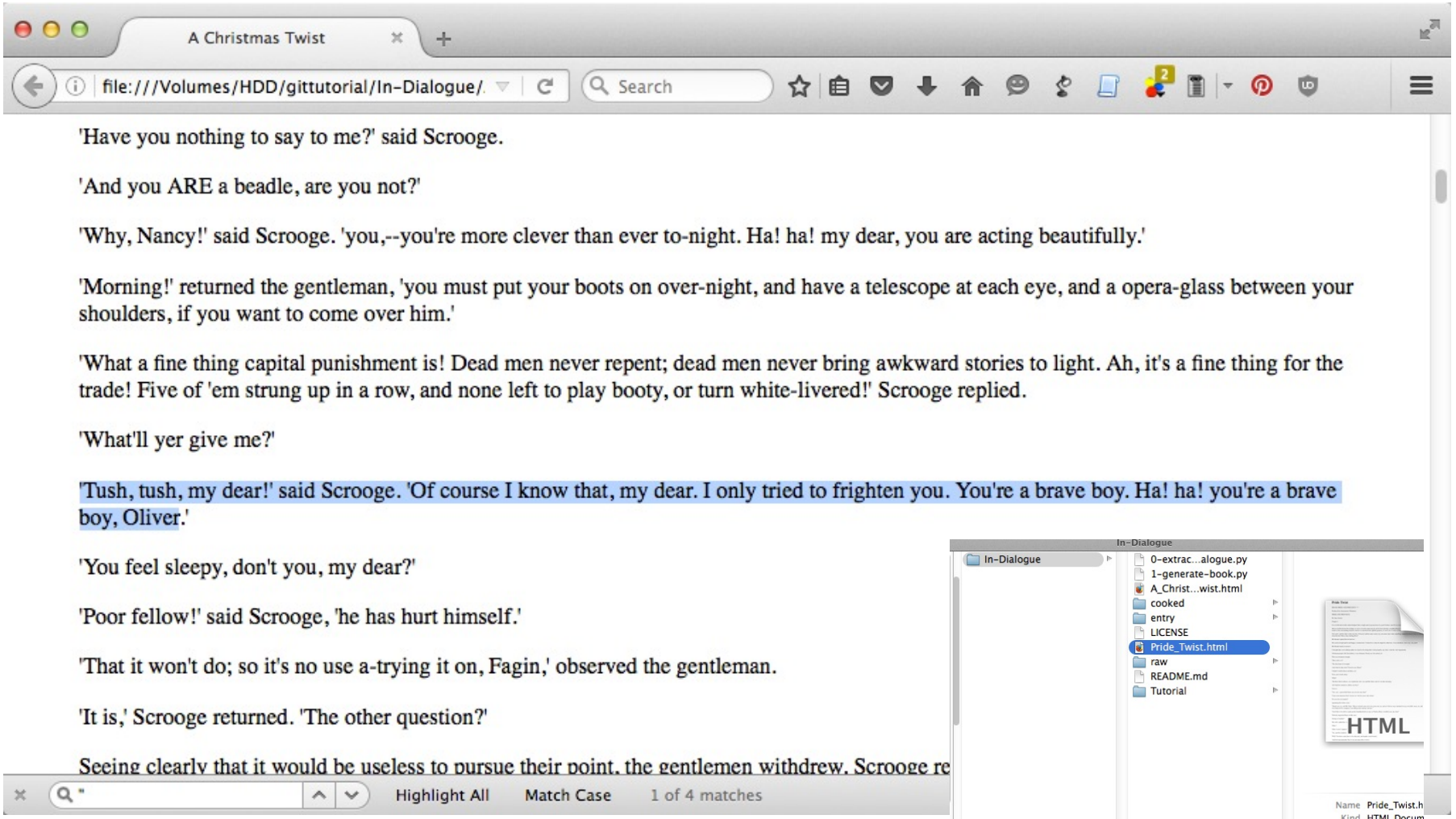
You decide the name

Number of the text source

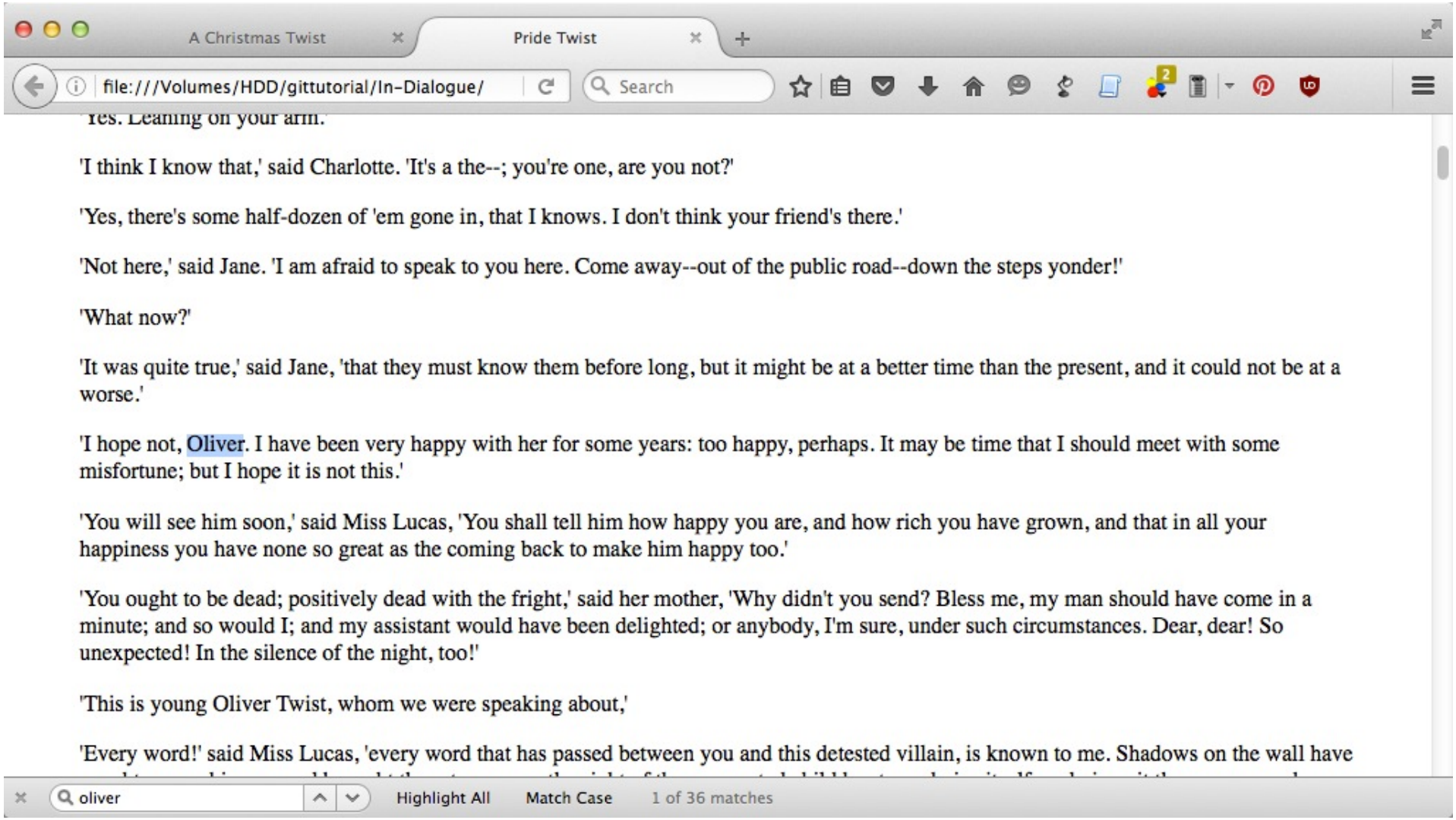
Number of the dialogue source

Name the output of the html file

Check the output:



Check the output:



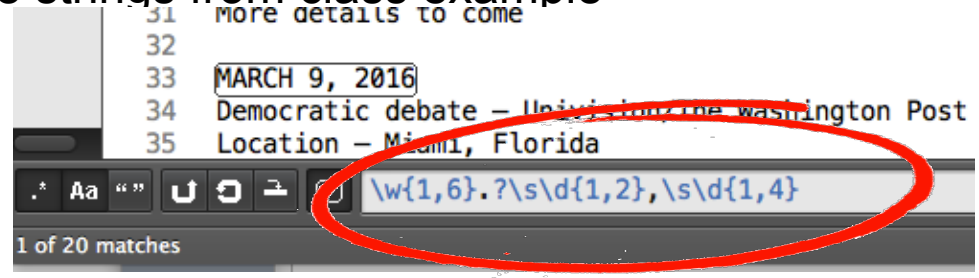
Regex Group Exercises

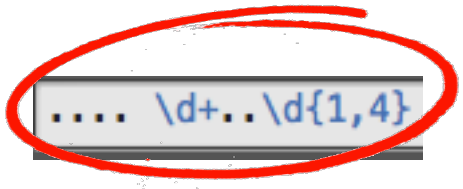
10 minutes, if we have time…

Grab a generated book mash-up from a friend. Write a regular expression that will find some the occurrences of different parts: numbers and/or dates (days of the week or months or years) but not other parts of the text. Try out your regular expression first in a text editor to ensure that it works. The right answer will depend on the date format used in your particular data.

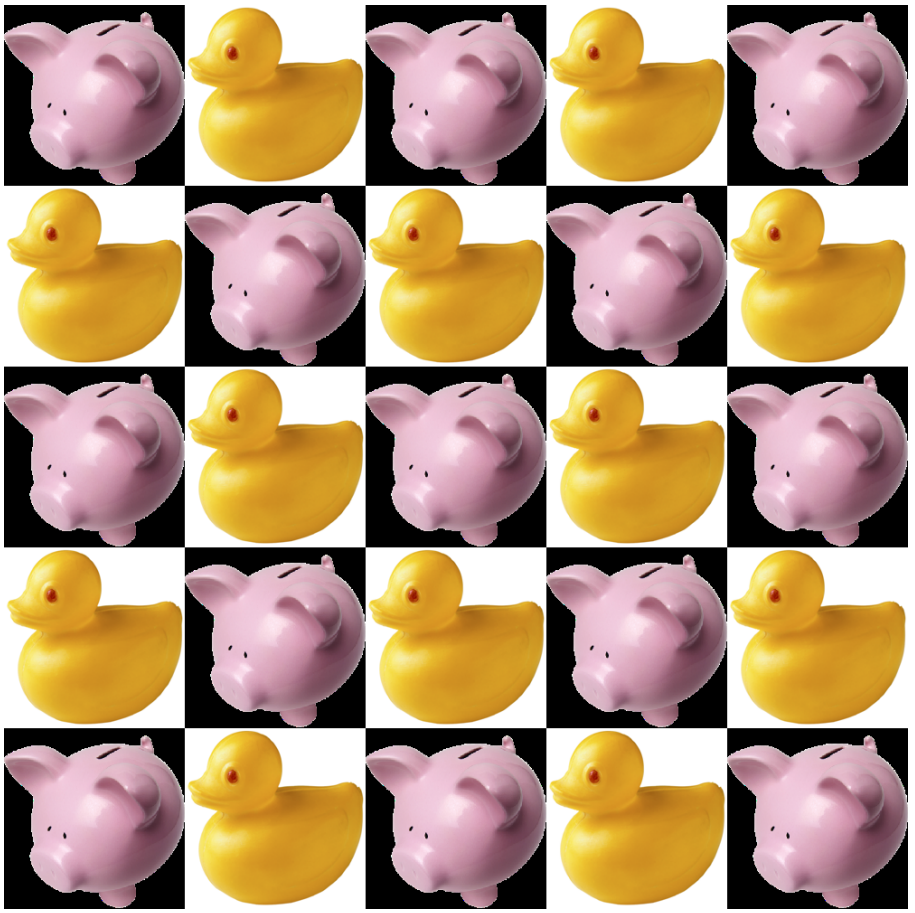
Share with the class what expression you used.

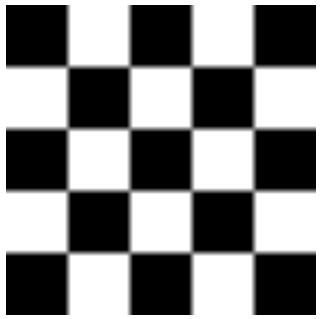
Date strings from class example





Ps Zip and upload your class files for credit,
and name your collaborators on the documentation.





IMAGES IN PYTHON

Learning about libraries and docstrings

To get a library, you use import statement with library:name

```
import re
```

To list its the functions:

```
dir(re)
```

```
dir([])
```

Doc strings = “documentation strings”, messages about functions

To read a docstring

Object.__doc__

note the double underscores

```
print [].count.__doc__
```

```
print len.__doc__
```

To create a docstring when you write a function, just it on a newline after def

```
#write a docstring
def tax(subtotal):
    'returns the tax on a meal in Massachusetts'
    return subtotal * 0.0625
```

Python librarires

- Using libraries gives us special functions.

PIL

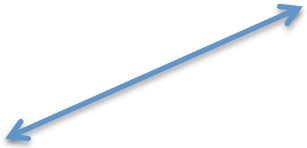
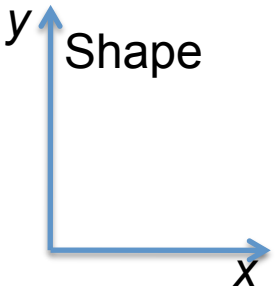
python imaging library

other libraries we have seen

webbrowser re random math

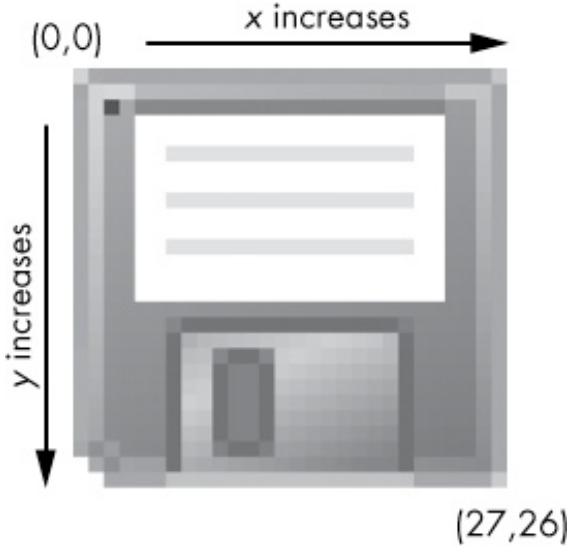
From 1D to 2D

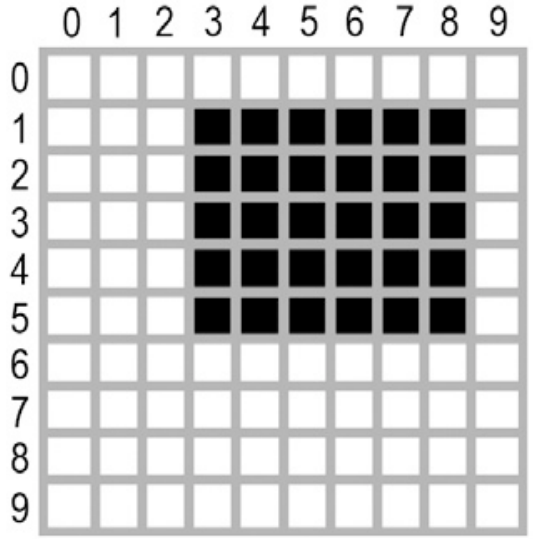
Extending from our work with numbers and lists…

dimension			
0	Number single entity 20 3.14159 -13	Point	"No length, no width"
1	Numbers … -3,-2,-1,0,1,2,3… Lists, sequences	Line 	"length or width"
2	Points on a plane (0,0),(0,1),(1,0),(1,1)	Shape 	"length and width"

Representations in different domains along increasing dimensions

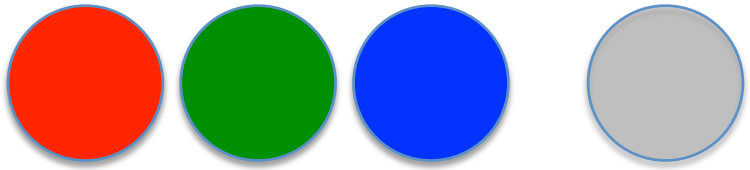
Images



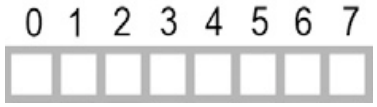


Area is represented by the box tuple (3,1,9,6)

Each pixel consists three (or four channels):



Each channel has a value:



(2^3) or 8 bits = 1 byte

0-255 (0-FF hex)

Hex #FFFFFF is white
-Full red, green, and blue

Tuples

pairs, triples, quadruples, and so on.

Specified by rounded parenthesis: (tuple)

Puts things together, but is immutable (once created it does not change).

Create some tuples in iPython notebook:

```
twod = (42,17) #note parenthesis for tuples
```

```
threed = (7,6,14)
```

```
twod
```

```
threed
```

Like lists, but you can't change them.

Tuples vs Lists

```
twod[-1]
```

```
threed[-1]
```

```
threed[0] = 9
```

Guess what's going to happen before you press enter!

```
alist = [1,2,3]
```

```
alist[0]=15
```

```
alist
```

Does change happen?

```
for i in range(5):  #can make a lot of tuples by iterating
    print (i,2,3)
```

Tuples are more computationally efficient.
Useful for very large numbers of numbers….
like in an image.

A new type also helps us prevent errors.

```
def to_f(c):
    return (9/5)*c + 32
```

```
to_f("hello") #helpful error
```

But, can we iterate over it?

Double

```
#double double from earlier
def double(sequence):
    result = [];
    for element in sequence:
        result = result + [element*2]
    return result
```

```
double(alist)
```

```
[2, 4, 6]
```

```
double((2,3,4))
```

iterating over a tuple here!

```
[4, 6, 8]
```

So we can use it to iterate computations---
we can work on bitmap images this way,
just need 2 iterators to go in each x and y direction.

Get a PIL and create an image

Python Imaging Library

```
#import the PIL Library
from PIL import Image
```

```
ourimage = Image.new('RGB',(100,100), 'white')
#mode = 'RGB'
#size = (100,100)
#color = 'white'
```

Did you get an error?

NO

```
#save the images
ourimage.save("allwhite.png")
```

Switch to your directory and admire your handiwork. Try changing values.

YES

```
NameError: name 'Image' is not defined
```

If you see 'Image' not defined – that means python doesn't have the Image library. Import it again using

```
from PIL import Image
```

Then try again.

Image link

Image creation

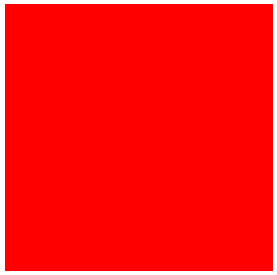
```
ourimage = Image.new('RGB',(100,100), 'white')
```

```
mode = 'RGB'  #the format could also take
size = (100,100)
color = 'red'
```

```
ourimage2 = Image.new(mode,size,color)
```

```
ourimage2.save('allred.png')
```

Make some images.
Admire your handiwork.



Which number is width, which is height in size?
Try using tuples for the color.

```
ourimage = Image.new('RGB',(150,100),'blue')
```

```
ourimage.save('allblue_notsquare.png')
```

```
ourimage = Image.new('RGB',(100,100),(127,127,127))
```

```
ourimage.save('allgray.png')
```

```
ourimage = Image.new('RGB',(100,100),(200,127,127))
```

```
ourimage.save('allrose.png')
```

Changing images

```
allblack = Image.new('RGB',(100,100),(0,0,0))
```

```
allblack.save("allblack.png")
```

```
allblack.putpixel((50,50),(255,255,255))
```

```
allblack.save("almostall.png")
```

```
#try drawing a line
```

```
for i in range(100):
    allblack.putpixel((i,25),(255,255,255))
```

```
allblack.save('oneline.png')
```

Can you draw a line in the other direction?

Iterating through all the pixels

```
#iterate through the entire image
rectangle = Image.new('RGB',(150,100),(0,0,0))
```

```
for x in range(150):
    for y in range(100):
        rectangle.putpixel((x,y),(127,127,127))
```

```
rectangle.save('rectangle.png')
```

```
#now change the color of each pixel
```

```
for x in range(150):
    for y in range(100):
        rectangle.putpixel((x,y),(x,x,x))
```

```
rectangle.save('gradient.png')
```

Now try a vertical gradient or even a diagonal gradient.

Generalizing image operations

Need to get image properties.

```
#generalize to images of any size
rectangle.size
```

```
rectangle.size[0]
```

```
rectangle.size[1]
```

```
bigger = Image.new('RGB',(500,600),(0,0,0))
```

```
bigger.size
```

```
bigger.size[0]
```

```
bigger.size[1]
```

```
# bundle grayout function generalized for images of different sizes
def grayout(pngimage):
    for x in range(pngimage.size[0]):
        for y in range(pngimage.size[1]):
            pngimage.putpixel((x,y),(127,127,127))
```

```
test = Image.new('RGB',(150,100), (0,0,0))
```

```
grayout(test)
```

```
test.save('test1.png')
```

Load and save images

```
#loading an existing image
ourimage = Image.open('heart.png')
```

```
ourimage.save('ours.png')
```

```
#check that these are the same image
#now tryout our grayout function
grayout(ourimage)
```

```
ourimage.save('ournew.png')
```

```
#check that this new image is all grayed out
#otherwise check your function or restart ipython
```

Now we can write functions that operate on images.

Lighten or darken an image

Need to look at pixels.

```
ourimage.getpixel((0,0))   #get a pixel from the image
```

```
transparent = Image.open('heart_trans.png')
```

```
transparent.getpixel((0,0))
```

```
#fill in the blanks to generalize the size
def modify(pngimage):
    for x in ____:
        for y in ____:
            (r,g,b) = pngimage.getpixel((x,y))
            pngimage.putpixel((x,y),(r,g,b))
```

Not quite modify:

```
def modify(pngimage):
    for x in range(pngimage.size[0]):
        for y in range(pngimage.size[1]):
            (r,g,b) = pngimage.getpixel((x,y))
            pngimage.putpixel((x,y),(r,g,b))
```

```
ourimage = Image.open('heart.png')
```

```
modify(ourimage)
```

```
#verify it gets saved out
ourimage.save('modheart.png')
#now actually modify the function to change the intensity
#by lightening the image\ procesing\ 1.ipynb
```

Class 6 stopped here! Please try the following things at home!

Lighten the image

```
def modify(pngimage):
    for x in range(pngimage.size[0]):
        for y in range(pngimage.size[1]):
            (r,g,b) = pngimage.getpixel((x,y))
            pngimage.putpixel((x,y),(r+64,g+64,b+64))
```

```
modify(ourimage)
ourimage.save('modheart.png')
```

```
#note no errors if r,g,b > 255
#putpixel uses saturation arithmetic
```

```
#generalize so modify works with transparent images too
def modify(pngimage):
    for x in range(pngimage.size[0]):
        for y in range(pngimage.size[1]):
            (r,g,b) = pngimage.getpixel((x,y))[:3] #get colors only
            new_color = ( r+64, g+64, b+64)
            new_color = new_color + pngimage.getpixel((x,y))[3:]#add transparency
            pngimage.putpixel((x,y),new_color)
```

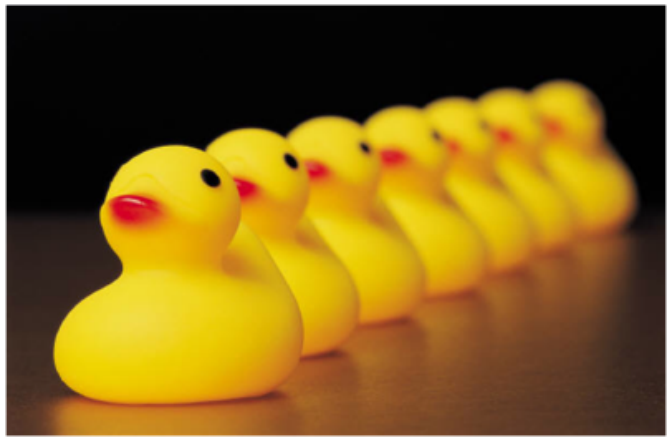
Try it out…

```
modify(ourimage)
```

```
ourimage.save('modheart2.png')
```

```
modify(transparent)
```

```
transparent.save('modtransparent.png')
```



Now try darkening the image….

```
def darken(pngimage):
    for x in range(pngimage.size[0]):
        for y in range(pngimage.size[1]):
            (r,g,b) = pngimage.getpixel((x,y))[:3] #get colors only
            new_color = ( r-64, g-64, b-64)
            new_color = new_color + pngimage.getpixel((x,y))[3:]#add transparency
            pngimage.putpixel((x,y),new_color)
```

Summary of today

- Quiz – hope you feel good about it
- Textual analysis of large files using regex
  - Grabbing source code off the web
  - Running another person's code
  - Using regex expressions
- Introduction to working with PIL library
- Class Participation – Upload a zip file with your Jupyter notebook from today, along with generated text and images
- Homework - Readings on technology and questions