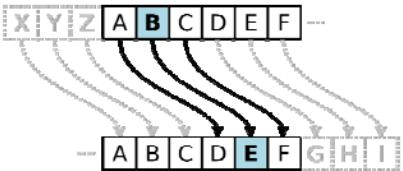


CompSci 101

Introduction to Computer Science



Sept. 27, 2016

Prof. Rodger

Example – Software to Cheat (2015)

<http://www.bbc.com/news/business-34324772>

```
If car.isDriving() or car.onRoad():
    gofaster()
    emit_more()
    get_performance()
elif car.connectedToMonitor():
    beclean()
    register_as_wonderful()
else:
    act_randomly()
    engine_light_on()
```



Announcements

- No Reading or RQ until Oct 6
- Assignment 4 due Thursday
- APT 3 is due Today, no new APT out
- APT Quiz 1
- Exam 1 is Oct 4
 - Do practice Exam 1's by Thursday
 - Will review next time
- Today: problem solving with files
 - largest word in file, where is largest word

Lab this week....

- Continue working with files, read file in once:

Sean:Davis:men:soccer:72
Lexie:Brown:women:basketball:69
Jessica:Ho:women:tennis:65

- To this format:

```
[ ['Sean', 'Davis', 'men', 'soccer', '72'],
  ['Lexie', 'Brown', 'women', 'basketball', '69'],
  ['Jessica', 'Ho', 'women', 'tennis', '65'],
```

- Now ask many questions about the data...

Looping over and accumulating...

```
initialize
for variable in something:
    ask question about variable?
    accumulate
return answer
```

Loop over characters in strings, items in lists, lines in a file

More on lists

```
range(5)  is  [0,1,2,3,4]
range(2,6) is  [2, 3, 4, 5]
alist = ["a", "b", "d", "c"]
for i in range(len(list)):

x = " ".join(alist)  # alist must be list of strings
y = list("peach")
```

Largest number in list
bit.ly/101f16-0927-1

```
def biggest(numbers):
    max = numbers[0]
    for num in numbers:
        if num > max:
            max = num
    return num
```

```
print biggest([8,3,9,1,5,7])
Returns 7?  What is wrong?
```

Problem Solving

- How do we count words in a file?
- How do we find the length of the longest word?

wordsInFile.py

bit.ly/101f16-0927-2

- Answer questions about computing the longest word in a file

More Problem Solving

- How do we find the longest word?
- How do we find where the longest word is?
- Do we read a file into a list of words? A list of lines of words?

Reading from Files, Writing to Files

- Programs generate data, store for access
 - Notes we take, notebooks we keep
 - Files we make our programs create and add to
- File concepts for reading and writing
 - Call open with a path to file, how to open?
 - Choice of reading, writing, appending
 - Read or Write (depending on "r", "a", "w")
 - Close the file when done

Reading from files: see Piglatin.py

- Open file for reading
 - Read lines: `for line in f:`
 - Read file: `st = f.read()`
 - Both get strings, convert as needed
- If fname not found?
- Type of f?
- Type of st?

```
def readfile(fname):  
    f = open(fname)  
    st = f.read()  
    f.close()  
    return st.split()
```

Code in Piglatin.py

```
def writeFile(words, fname):  
    LINE_SIZE = 80  
    f = open(fname, "w")  
    wcount = 0  
    for word in words:  
        f.write(word)  
        wcount += len(word)  
        if wcount + 1 > LINE_SIZE:  
            f.write('\n')  
            wcount = 0  
        else:  
            f.write(' ')  
    f.close()
```

Questions: File writing and Transform

bit.ly/101f16-0927-3

How to approach a 101 Assignment

- Programming compared to Cooking
 - Follow a recipe to create {food or masterpiece}?
 - Understand the whole project before coding
 - Know at least a few steps before coding



What do we learn from assignment?

- We will snarf to get started
 - We will modify Piglatin.py
 - We will create CaesarCipher.py
 - We might want to use parts of Piglatin.py for CaesarCipher.py

What does *Howto* say about Piglatin.py

- Lots of details on how to pigify a word
 - Ignore at first, make the structure of the program work
- We have to write four functions
 - Details on function headers/prototypes given
 - Details on function functionality given
- Types and values in main program
 - Work to understand the flow
 - Run the program, where do you start?

Making pigifyall work

- Make sure you understand this
 - What do you need to do so this works?
 - What is header, signature, prototype: `pigifyword`

```
def pigifyall(st):  
    all = []  
    for word in st.split():  
        all.append(pigifyword(word))  
    return ' '.join(all)
```

Making pigifyword work

- Once you know what pigifyword does, how do you implement it?
 - Review rules for piglatin
 - Review code for APT you hopefully did ☺
- Don't try to make every case work at once!
 - Start small and grow a working program.
 - How about first word is a vowel to begin ...
 - Then add another case, ...

If `pigifyword` is done ... else ...

- Get to unpigifyall and unpigifyword
 - Which will be easy? Why?
 - Can you do one easy case in unpigifyword?
- Why does it help to do one case at a time?
 - Builds confidence in reaching completion
 - Decreases time-to-completion: code works! Bugs easier to find.

In class Questions

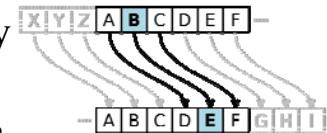
bit.ly/101f16-0927-4

Lots of details in making this work

- How do you loop over characters in word?
 - Is there anything familiar here?
- How do you know if a character is
 - Alphabetic?
 - Uppercase or lowercase?
 - A vowel or a consonant?
- Once again: start simple, make something work, add functionality incrementally

Cracking the Caesar Cipher

- First create CaesarCipher.py
 - Where do you start?
 - What's in the main program?
 - What's copied from Pigify.py
- What functions will you write first?
 - Where do you find this information?
 - What's not clear about it?



How do you know encryption works?

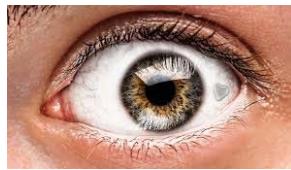
- Is this a chicken and egg question?
 - Could you write decrypt first?
 - Isn't decrypting by eyeball decryption just encrypting 26 times?

- 14 Pljbqfjbp fq'p bxpv ql zlrkq colj 1-10, yrq klq xitxvp
- 15 Qmkcrgkcq gr'q cyqw rm amslr dpmk 1-10, zsr lmr yjuywq
- 16 Rnldshldr hs'r dzrx sn bntms eqnl 1-10, ats mns zkvzxr
- 17 Sometimes it's easy to count from 1-10, but not always
- 18 Tpnfujnft ju't fbtz up dpvou gspn 1-10, cvu opu bmxbz
- 19 Uqogvkogu kv'u gcua vq eqwpv htqo 1-10, dwv pqv cnycau

Can you call a function 26 times?

- Encrypt using 26 shift keys and ... eyeball!

```
em = #encrypted message
for n in range(26):
    sem = encrypt(em,n)
    print n,sem
```



- Also write automatic decryption by determining which words are real words...

What do you output for assignment 4?

- Demonstrate with clear output that all parts of your program work.
- See new statement in red on the bottom of the howto page.