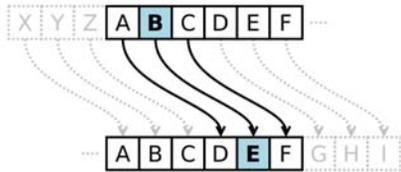


CompSci 101

Introduction to Computer Science



Sept 26, 2017

Prof. Rodger

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Announcements

- RQ for Thursday.
- Assignment 4 due next Tuesday
- APT 3 is due today, no new APT out
- APT Quiz 1 finish by Midnight Wednesday
- Exam 1 is Oct 5
- Lab 5 this week! Legos and coding
- Today: problem solving with files
 - largest word in file, where is largest word

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Looping over and accumulating...

initialize

for variable in something:

 ask question about variable?

 accumulate or build a structure

return answer

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

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Largest number in list

bit.ly/101f17-0926-1

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

x = biggest([8, 3, 9, 1, 5, 7])
Then x is 7? What is wrong?

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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”)`

Difference between

`alist = ‘cannot stop Duke’.split()`

`for word in alist:`

`print word`

`for index in range(len(alist)):`

`print index, alist[index]`

When to use index?

Back to APT TxMsg – with index! Step 5: Translate to Code

`# Letter before is “a” # start with a vowel`

`# answer is empty`

`# for each letter in word`

Step 5: Translate to Code (code)

`#If it is a consonant, and the letter before is a
#vowel, then add the letter to the answer`

`#This letter is now the letter before`

`# return answer`

Problem Solving

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

wordsInFile.py

bit.ly/101f17-0926-2

- Answer questions about computing the length of the longest word in a file
 - words is a list of strings

```
def lengthLongestWord(words):
```

```
    maxSoFar = 0
```

```
    for w in words:
```

```
        if len(w) > maxSoFar:
```

```
            maxSoFar = len(w)
```

```
    return maxSoFar
```

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?

Assignment 4 – Piglatin/Caesar 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 PiglatinTransform.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()
```

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writefile Code in PiglatinTransform.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()
```

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Questions: File writing and Transform

bit.ly/101f17-0926-3

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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



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What do we learn from assignment?

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

What does *Howto* say about PiglatinTransform.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 lineToPiglatin work

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

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

Making wordToPiglatin work

- Once you know what wordToPiglatin 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 wordToPiglatin is done ...

- Get to piglatinToLine and piglatinToWord
 - Which will be easy? Why?
 - Can you do one easy case in piglatinToWord?
- 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.

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In class Questions

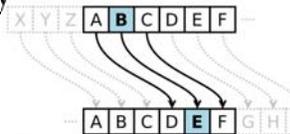
bit.ly/101f17-0926-4

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Cracking the Caesar Cipher

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



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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

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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?

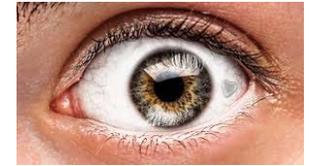
14 Pljbbqfjbp fq'p bxpq ql zlrkq colj 1-10, yrq klq xitxvp
15 Qmkerqkq gr'q cyqw rm amslr dpmk 1-10, zsr lmr yjuywq
16 Rnldshldr hs'r dzrx sn bntms eqnl 1-10, ats mns zkvzxr
17 Sometimes it's easy to count from 1-10, but not always
18 Tpnfujnft ju't fbtz up dpvou gspn 1-10, cvu opu bmxzbt
19 Uqogvkogu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

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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... 28

Automatically determine what the key is....

- Translate each line 1-26
- Which one has more English words?
 - Use a file of English words
 - Count how many are in each translation

14 Pljbbqfjbp fq'p bxpq ql zlrkq colj 1-10, yrq klq xitxvp
15 Qmkerqkq 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 bmxzbt
19 Uqogvkogu kv'u gcua vq eqwv htqo 1-10, dwv pqv cnycau

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What do you output for assignment 4?

- Demonstrate with clear output that all parts of your program work.