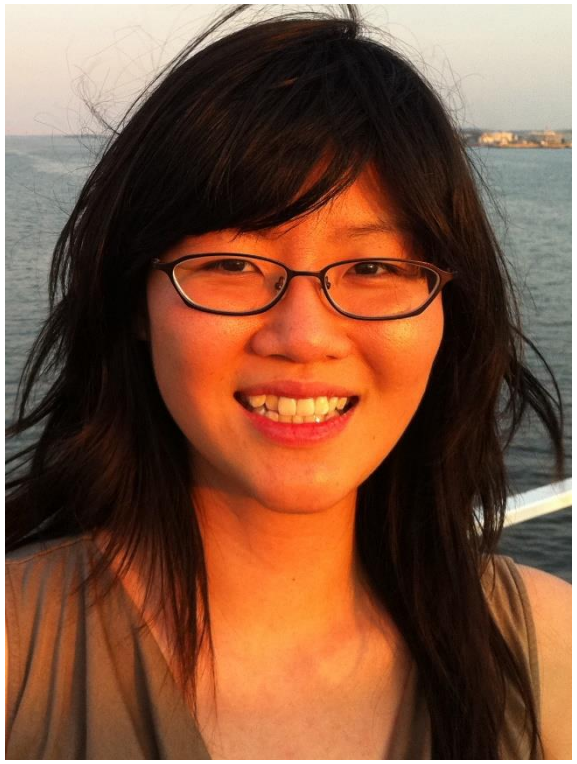
CompSci 101
Introduction to Computer Science

October 2, 2014

Prof. Rodger

Announcements

- Reading for next time on calendar page
  - RQ 9
- Nothing due today!
- APT 4 out today - due on Thursday, Oct 8



Tiffany Chen

- B.S. Duke (UTA, ACM president)
- Ph.D Stanford, 2012, in Biomedical Informatics
- Stem Cell biology
- Cancer drug screening
- Director of Informatics at Cytobank

Creating a list

- Given a list of numbers, create a second list of every number squared.

```
nums = [8, 3, 5, 4, 1]
sqnums = []
for v in nums:
    sqnums.append(v*v)
print sqnums
```

[64, 9, 25, 16, 1]

More on List operations

- See list operations on next page
- Mutator vs hybrid vs return
  - Mutator changes the list (no return value)
  - Hybrid changes list and returns value
  - Return – returns value, no change to list

List operations from book

Method	Parameters	Result	Description
append	item	mutator	Adds a new item to the end of a list
insert	position, item	mutator	Inserts a new item at the position given
pop	none	hybrid	Removes and returns the last item
pop	position	hybrid	Removes and returns the item at position
sort	none	mutator	Modifies a list to be sorted
reverse	none	mutator	Modifies a list to be in reverse order
index	item	return idx	Returns the position of first occurrence of item
count	item	return ct	Returns the number of occurrences of item
remove	item	mutator	Removes the first occurrence of item

Problem

- Remove all negative numbers from list
- Two ways

  1) return a new list with all negative numbers removed

  2) Modify a list to remove negative numbers

```
def removeNegatives(numberlist):
    # return a new list without negatives
    answer = []
    for num in numberlist:
        if num >= 0:
            answer.append(num)
    return answer
```

somenums = [3, -1, 8, -5, -2, 6, 7]

nonegs = removeNegatives(somenums)

www.bit.ly/101fall14-1002-01

```
def removeNegatives2(numberlist):
    # remove the negative numbers
    # from the list
    for x in range(len(numberlist)):
        value = numberlist[x]
        if value < 0:
            numberlist.pop(x)
```

somenums = [3, -1, 8, -5, -2, 6, 7]

removeNegatives2(somenums)

www.bit.ly/101fall14-1002-02

```
def removeNegatives3(numberlist):
    # remove the negative numbers
    # from the list
    pos = 0;
    while (pos < len(numberlist)):
        value = numberlist[pos]
        if value < 0:
            numberlist.pop(pos)
        pos = pos + 1
```

somenums = [3, -1, 8, -5, -2, 6, 7]

removeNegatives3(somenums)

Richard Stallman

- MacArthur Fellowship (Genious grant)
- ACM Grace Murray Hopper award
- Started GNU – Free Software Foundation (1983)
  - GNU Compiler Collection
  - GNU Emacs

List Comprehension

- Take advantage of patterns, make a new list based on per element calculations of another list

- Format:

[<expression with variable> for <variable> in <old list>]

- Example:

```
nums = [8, 3, 5, 4, 1]
sqnums =  [v*v  for v in nums]
```

Examples of List Comprehensions

```
[v for v in nums]
[2 for v in nums]
[v*2 for v in nums]
```

Creating a list with just the even numbers

```
nums = [8, 3, 5, 4, 1]
evennums = []
for v in nums:
    if v % 2 == 0:
        evennums.append(v)
print evennums
```

[8, 4]

List Comprehension with Filtering

- Create list and use “if” to filter out elements to the list
- Format:
- [<expression with variable> for <variable> in <old list> if <filter with variable>]

- Example: `nums = [8, 3, 5, 4, 1]`

```
evennums =
    [v for v in nums if v%2==0]
```

More on List Comprehensions www.bit.ly/101fall14-1002-03

- What is the list for the following:

1) [j+1 for j in range(20) if (j%3) == 0]

2) [i*2 for i in [j+1 for j in range(20)
if (j%3 == 0] if i*i > 19]

- Problem: Given a list of strings, return the longest string. If there are more than one of that length, return the first such one.

  [‘kiwi’, ‘plum’,‘orange’, ‘lemon’, ‘banana’]

  Write a list comprehension for this problem