What Have You Learned in CS1?

MAY 9TH, 2014

Problem Solving and Programming

- Being able to model and solve computational problems via programming is one of the most important skills a young person can have.

- Instead of just being a consumer of digital stuff, you can now be a *creator*.

- Imagine yourself working for Google or Apple or Pixar or for NASA or for Pfizer or at a startup developing Mobile apps.

- Programming combines mathematical precision with lots of creativity.

Core Computer Science Ideas we have Touched…

- ## Algorithms and their efficiency
  - The efficiency of `quickSort` relative to `selectionSort`
  - The role of randomization in algorithms
  - The *Divide-and-Conquer* paradigm
- ## The importance of using appropriate data structures
  - Lists versus dictionaries
- ## Programming paradigms
  - Procedural programming, Functional programming, object-oriented programming
- ## Applications
  - Text analysis, network analysis, geographic facility location (Project 1), recommender systems (Project 2), discrete-event simulation, encryption and decryption

Programming concepts

- Constants, variables, expressions, data types, type conversion
- Functions, modules, parameter passing
- Control-flow statements: if-statements, while-loops, for-loops
- Strings, lists, tuples, dictionaries
- List comprehensions
- Recursion
- Object-oriented programming

We have used Python as the vehicle for exploring these concepts. These concepts are similar in any high-level programming language – C, C++, Java, Scala, R, etc.