COL1000: Introduction to Programming

Command Line Arguments

Subodh Sharma | Lec 31 | Oct 29

Announcement

- **(Usually) Monday's — 5 pm to 7 pm; Doubt learning sessions in Bharti 419**
  - **Only one student visited me!**

FileIO — Command Line Arguments

- What are command line arguments?
  - `python3 myfile.py input1 input2`
- Python provides two ways to read command-line arguments, through:
  - `sys.argv:` list of strings;
  - `argparse:` includes parser, …

FileIO — Command Line Arguments

- What are command line arguments?
  - `python3 myfile.py input1 input2`
  - `Sys.argv[0]` is the script name: **myfile.py**
  - `sys.argv[1], sys.argv[2]` are all arguments: **input1, input2**
- Need to **import sys module** to work with sys.argv

Algorithmic Development

Algorithmic Thinking & Development

- **Start with the specification**
  - Preconditions, Postconditions, edge behaviours,
    - Objective: minimize/maximize/counted?/decision?
  - Supply input-output pairs
- **Choose the right data structures**
  - Dictionaries, Lists, Tuples, …
- **Choose the model for computation based on performance goals(?)**
  - Greedy, Divide and Conquer, Randomisation, Dynamic Programming …

Case Study: Coin Change Problem

- **Input**: Set of coin denominations C1, …, Cm of positive integers; **reach a target amount** T >=0; unlimited copies of each coin denomination
- **Output:** Minimum number of coins whose values sum to T; if impossible then report no solution
- **Specs:**
  - **Preconditions:** Ci is positive; T is non-negative
  - **Postconditions:** return $min \Sigma x_i$ **s.t.** $\Sigma(x_i \,.\, c_i) = T$
  - **Performance goal: ..**

Case Study: Coin Change Problem

- **Example:** C = {1, 3, 4}; T = 6
  - Min coins — 3 +3 —> 2 coins
  - C = {2}, T = 3 —> no solution
- **Simple Solution strategy:**
  - Sort C in descending order
  - Repeatedly take as many copies as possible of the largest coin until remaining amount > largest coin value
  - Subtract the total from the remaining amount & continue to the next smaller coin
  - If you reach amount 0 — done; if the next coins all the way cannot sum up to the target or least coin is exhausted and amount > 0 —> no solution
    - Quicker way?
  - Suboptimal — C= {1,3, 4} T = 6 —> 4, 1,1, —> 3 coins