Language of Algorithms

AUBURN UNIVERSITY

Hugh Kwon

Slides adapted from Dr. Debswapna Bhattacharya's class

The language of algorithms: Pseudocode

Reading and writing algorithms

Pseudocode

- A mixture of English and some notation
- There is no specific syntax, but we will follow the textbook conventions

Pseudocode

- Keywords: for, while, repeat-until, if-then-else
- Variables, object.attributes, array cells, value assignments, comparisons, arithmetic operations, logical operations
- Parameter passing: variables by value, objects by reference
- Each line is numbered

Additional Notes about Pseudocode

- A[p…p] is an array with one cell with index p
- A[q…p] where q>p is an empty array
- A[p…q] where q≥p is an array with at least one element
- Two kinds of for loops: “for i=p to q” is an incrementing loop and “for i=q downto p” is a decrementing loop
  - for i=q to p where q>p and for i=p downto q where q>p will both fail immediately without executing.

- Understand the semantics (i.e., meaning) of each line Example:

```
Partition(A[p...r]: array of numbers)
1   x = A[r]
2   i  = p – 1
3   for j = p to r -1
4        if A[j] ≤ x
5                then i = i + 1
6                swap A[i] and A[j]
7   swap A[i +1] and A[r]
8   return   i +1
```

Reading Assignment

- **Before Next Class**: Read the pseudocode conventions from Chapter 2 Section 2.1 pages 20-23.
- Make sure that you understand these algorithm writing conventions. Ask me in next class if there is something you do not understand.
- We will follow those throughout the course.

The “string search” problem:

find a string (such as “cat”) in a piece of text

Thinking Assignment: Writing Algorithms in Pseudocode

1. Problem: string search

2. Well-defined specification
   - 3 parts

3. Strategy
   - Correct?
   - Efficient?

4. Algorithm

Reading Assignment

- Read Chapter 32 Section 1 (32.1: p. 988-999) and understand the algorithm there.

AUBURN UNIVERSITY