

Language of Algorithms

Debswapna Bhattacharya, PhD
Assistant Professor
Computer Science and Software Engineering
Auburn University

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

- $A[p \dots p]$ is an array with one cell with index p
- $A[q \dots p]$ where $q > p$ is an empty array
- $A[p \dots q]$ where $q \geq p$ 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.

Reading Algorithms in Pseudocode

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 $A[j] \leq x$

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
 1. 3 parts
3. Strategy
 1. Correct?
 2. Efficient?
4. Algorithm

Reading Assignment

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