Language of Algorithms

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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.

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] ≤ 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.