ESc101 : Fundamental of Computing

I Semester 2008-09

Lecture 39

Last Lecture

Instructor : Surender Baswana

Which of the two algorithms would you call faster than the other?

- **Algorithm A** worst case number of instructions : 10n + 200
- **Algorithm B** worst case number of instructions : n^2

Answer : ????

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Incorrect

Realize the following important fact

The number of instructions executed or the time taken by an algorithm becomes an important issue only when the input is very large.

So we should compare the number of instructions of two algorithms for **asymptotically** large values of input.

Which of the two algorithms would you call faster than the other?

- **Algorithm A** worst case number of instructions : 10n + 200
- **Algorithm B** worst case number of instructions : n^2

Answer :

Asmptotically **A** is faster than **B**

Time complexity of an algorithm

Definition :

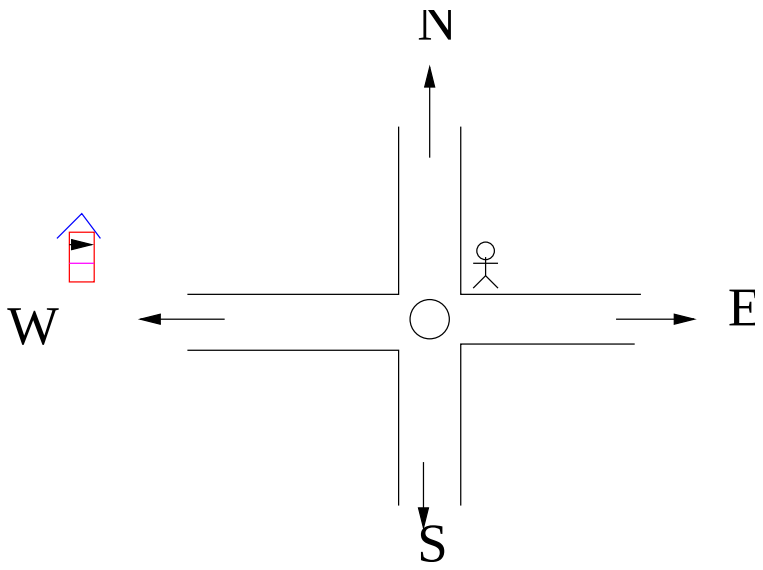
it is a measure of how many steps are executed by an algorithm on a given input **asymptotically**, i.e., for *large* input size.

Worst case time complexity of an algorithm

Definition : Over all inputs of size n, what is the worst case number of steps taken by the algorithm ?

An interesting algorithmic problem asked in first lecture

"searching for the shop"



- Unknown : the road on which the shop is located ?
- Unknown : the distance of the shop from the crossing ?

How will you reach the shop by traveling at most a constant multiple of the distance of the shop from the crossing ?

Another problem mentioned during the first lecture

1. Given a set of points, find the circle which encloses all the points and is of smallest radius.

A trivial algorithm : which performs cn^4 instructions. Can you imagine there is an algorithm which solves this problem by performing cn instructions only ? Such an algorithm indeed exists, and is very simple and beautiful. If you feel excited, do the course **ESO211**.

Aim of the course

How to solve problems by computer ?

Prerequisites :

- elementary knowledge of mathematics (high school).
- **No** background on computers or programming languages - C,C++, JAVA is expected.
- Zeal to learn problem solving.

Were all basics covered in the course itself ?.... Answer yourself

Things we learnt from the course ?

- Developing algorithmic skills
- Learning basic programming skills (loops, conditional statements, arrays)
- Basic understanding of Object Oriented programming (OOP)

  : **Assignment 8**

- Recursion

Things we did not learn during the course ?

- **OOP :**

  Inheritance, Polymorphism, Interface, Exceptions,..

- Linked lists

Optional extra class

Saturday : 10:00 AM, tomorrow

Please check your emails regularly (once a day at least)

Tutors details :

Section	Tutor Name	Tutor Code
B1	Prof. Mainak Chaudhuri	1
B2	Nikhil Jain	2
B3	Prof. Sanjeev Saxena	3
B4	Kshitiz Garg	4
B5	Abhinav Jain	5
B6	Nitin Agarwal	6
B7	Prof. Amitabha Mukherjee	7
B8	Vikas Marda	8
B9	Paras Tikamani	9
B10	Prof. Somenath Biswas	10

Best Wishes for your exam

It was an honour for me to teach you