Data Structures & Algorithms

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The WHY: Learning Objectives

- Algorithms and Data Structures helps understand and develop basic algorithms to solve some popular and well celebrated algorithmic problems.

- Throughout the course, as a problem is posed, we discuss a straightforward approach to solve it, its drawbacks and further improvements.

- The course is tailored to suit students of diverse background. Learning theories ranging from sorting algorithms to NP-completeness, we explore routine and tricky questions, aimed primarily towards technical interviews.

The WHO and WHEN:

Instructors

Somak Laha

Completed B.Stat from ISI Kolkata. Currently pursuing M.Stat at ISI Kolkata and will be joining Capital One as an Analyst next year.

Ranojoy Dutta

Completed B.Stat from ISI Kolkata. Currently pursuing M.Stat at ISI Kolkata and will be joining Morgan Stanley as an Associate next year.
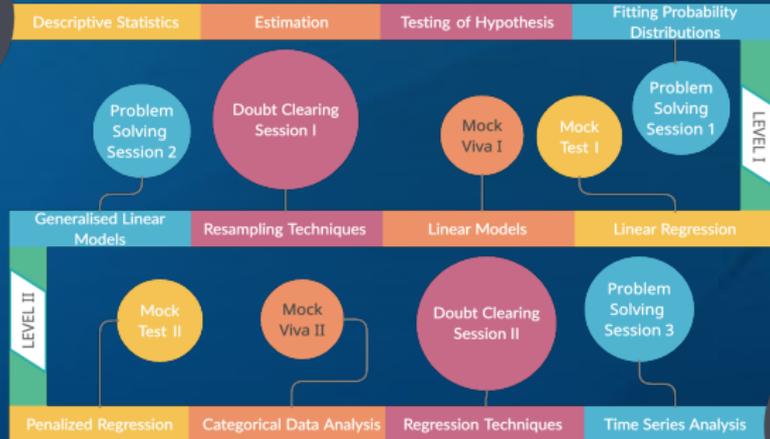
Class schedule

| Monday: 9pm-11pm | Tuesday: 9pm-11pm |

The WHAT: Syllabus Schematics

STATISTICS FOR DATA SCIENCE : Course Plan & Description

Statistics

| Descriptive Statistics | Estimation | Testing of Hypothesis | Fitting Probability Distributions |

Problem Solving Session 2 · Doubt Clearing Session I · Mock Viva I · Mock Test I · Problem Solving Session 1

LEVEL I

| Generalised Linear Models | Resampling Techniques | Linear Models | Linear Regression |

LEVEL II

Mock Test II · Mock Viva II · Doubt Clearing Session II · Problem Solving Session 3

| Penalized Regression | Categorical Data Analysis | Regression Techniques | Time Series Analysis |

Miscellaneous Problems

Lecture-Wise Syllabus

Lectures (1-5)

- Union–Find & Analysis of Algorithms.
- Stacks and Queues.
- Elementary Sorts, Mergesort, Quicksort.
- Search Trees & Hashing
- Algorithms involving sequences & sets.

Lectures (6-10)

- Graph Algorithms.
- Minimum Spanning Tree.
- Single Source Shortest Path.
- Maximum Flow Algorithms.
- Geometric Algorithms.

Brain Teasers and FAQ's

- You are given n matrices $A_1, A_2, \ldots, A_n$ of such dimensions such that the product $A_1 A_2 \ldots A_n$ is defined. The computer can multiply only two matrices at a time and in whatever order the product $A_1 A_2 \ldots A_n$ is computed, the answer is always the same. Find an optimal way to parenthesize the matrices so that minimum number of operations have to be perfomed to compute the product.

- You are given two sorted arrays of length n. Device an algorithm of complexity $O(\log n)$ to find the median of the array obtained by merging the two given arrays.

- A person have two eggs and he have to determine the minimum floor of a 100 storey building from which if an egg is dropped, breaks. An unbroken egg can be, of course, repeatedly used. What is the most efficient algorithm for the person to determine the minimum required floor?

  Note: Efficient means minimum number of trials.