Module: C++

Aim : To learn to solve 10-20 problems on Hackerrank.

C++ Basics With Practice on Hackerrank

- C++ Helloworld
- C++ Data Types
- Practice on Hackerrank
- C++ Variable
- C++ Variable Scope
- C++ Operators
- C++ Loop Types
- C++ Functions
- C++ Arrays
- C++ Strings
- Searching and Sorting
- C++ Recursion

Module : Coding Mafia

Aim : To learn solve first 150-300+ problems on Codechef, Leetcode, InterviewBit and Spoj in 7

weeks.

Basics, Input, Output, Loops, Addition, Subtraction

- Introduction to Coding Platform Codechef
- Hello world program in C/C++
- While loop & For loop
- Operators like addition/substraction
- Solving reversing a number
- Getting started with Codechef
- How to solve more and increase speed
- Resolving wrong answers
- Solving problems on Codechef
- How to speed up problem solving ?
- Daily practice exercise

Time Complexity, Array, Binary Search, Kadane's Algorithm.

- Using for loop to input array
- Sum of all elements in array
- What is Time Complexity
- Best, worst and Avg Complexity
- Binary Search
- Kadane's Algorithm
- Count Sorting
- Solving problems on Codechef
- Daily practice exercise

Linear Search, Binary Search & Adhoc problems

- What is brute force ?
- How to optimise ?

- Linear Search & Binary Search
- Solving for loop based problems
- Submissions on Codechef
- Solving binary search based problems
- Solving problems on Codechef
- Daily practice exercise

Prime Numbers, Vector and STL algorithms:

- What is Vector ?
- Vector operations and Sort
- Starting number theory
- Finding Prime Numbers
- How to find prime faster ?
- Sieve of Ethranos
- Solving problems on Codechef
- Daily practice exercise

Recursion & Memoization

- Factiorial using for loop
- Factiorial using Recursion
- What is Memoziation ?
- What is Hashmap ?
- Solving problems on Codechef
- Daily practice exercise

Game Theory, Companion Matrix & solving problems asked in interviews

- Solving more 2D matrix problems
- Intro to Game Theory
- Power function in logn
- Faster way to compute large factorial
- Companion Matrix
- Tips : for solving problems
- Daily practice exercise

Working on LinkedList, Queue & Stack

- Introduction to Leetcode
- What is segmentation fault and pointers ?
- Into to Linked List
- Intro to Queue
- Intro to Stack
- Push, Pop and Size operations
- Strategy : How to solve think and solve faster ?
- Daily practice exercise
- More Problems Practicing on LinkedList Stack & Queue
- Daily practice exercise

Working on LinkedList, Queue & Stack

- Introduction to Leetcode
- What is segmentation fault and pointers ?
- Into to Linked List
- Intro to Queue
- Intro to Stack
- Push, Pop and Size operations
- Strategy : How to solve, think and solve faster ?
- Daily practice exercise

More Problems Practicing on LinkedList Stack & Queue

- Linked list based problem solving
- Stack based problem solving
- Queue based problem solving
- Solving problems on Leetcode
- **Daily practice exercise**

String, Maps & Heap

- Intro to strings library
- Solving problems on strings
- Solving problems on map
- Min heap and Max heap
- Using Priority Queue STL
- Solving problems on Leetcode
- Daily practice exercise
-

Bitwise operators

- And operator
- OR operator
- XOR operator
- More Hashmap
- Solving problems on Leetcode
- Solving problems asked in interviews
- Daily practice exercise

Set and Tree

- Using set library
- Operations like insert,size, begin, end, iterators
- Learning two pointer technique
- Intro to Binary Tree and Complete Tree
- Solving problems on Leetcode
- Solving problems asked in interviews
- Daily practice exercise

More Practice

- Revisiting pointer, linkedlist and Adhoc problems
- Solving more problems asked in interviews
- Solving problems on Leetcode
- Daily practice exercise

Tree and Tree Traversal

- Important tips to solve hard problems
- Introduction to Interview bit
- Intro to Tree
- Pre order traversal
- In order traversal
- Post order traversal
- Implementation using recursion
- Solving problem based on Tree
- Strategy to solve on Interviewbit
- Daily practice exercise

Hard Level : Tips and practice

- How to solve approach hard level problems
- Solving problems based on strings and arrays
- Soling problems asked in Google, Facebook, Directi
- Daily practice exercise

Hard Level : Number Theory, Strings & Interview problems

- Solving hard Number Theory based problems
- Solving hard string based problems
- Solving more problems asked in product based companies
- Daily practice exercise

Hard Level : Arrays, Strings & Maths

- Solving more problems asked in product based companies based on arrays, strings and maths
- Daily practice exercise

Hard Level : TRIE and Extras

- Intro to TRIE
- Implementation of trie.
- Solving problems asked in Amazon
- Solving problems based on TREE
- Daily practice exercise

Audio Podcast : Strategies and Time management

- Strategy to solve problems in Online Coding Contest
- Which projects benefits in resume ?
- How to resolve Time Management issues ?
- Daily practice exercise

Memoization

- Recursion Detailed
- What is Memoization
- Solving problem using memoization
- Daily practice exercise

Backtracking Algorithm

- What is BackTracking ?
- Solving NQueen Problem

- Daily practice exercise

Hard Problems: Tree and Arrays

- Level Order Traversal of Tree
- Zig Zag Order Traversal of Tree
- Tri Sum Zero Problem
- Daily practice exercise

Dynamic Programming

- What is Dynamic Programming ?
- Top Down & Bottom Up approach
- Fibbonacci Series
- 1D Prefix Sum Array
- 2D Prefix Sum Array
- Daily practice exercise

Hard Problems on DP

- Solving hard problems on DP
- Rod cutting pronblem
- Longest Increasing SubSequence
- Best notes for Dynamic Programming
- Daily practice exercise

Graph, BFS & DFS

- What is Graph ?
- Directed, Undirected ?
- What are the use cases ?
- Depth First Search
- Breadth First Search
- Implementation of code for DFS & BFS

- Daily practice exercise

Greedy Algorithm

- Huffman Coding Algorithm
- Daily practice exercise

Career Guidance

- Resume Tips
- GSOC
- Applying Off Campus
- Closure of Coding Mafia

Module : Advanced Coding Mafia

Aim : To learn to solve 300-500+ problems on Codechef, Leetcode, InterviewBit and Spoj in 3-4 months.

- Targeting 300+ hard problems
- Hard problems from SPOJ platform
- Hard variations of Recursion
- Hard variations of Trees
- Hard variations of Dynamic Programming

- Hard variations of Backtracking
- Hard variations of Graphs
- Hard problems asked in interviews

Module : AI Mafia: Python + Machine Learning A to Z

Aim: Learn Python from basics and develop projects like Face Recognition System, Handwritten Digit Recognition, Air Quality Prediction, Amazon Recommendation System, Diabetes Classification, Word Analogies and Dominant Color Extraction.

Building Foundation : Python Core

- Introduction to Python
- Variables
- Data Types
- Python Objects, Numbers & Booleans, Containers
- Operators - Arithmetic,Bitwise,Comparison,Assignment
- Conditions - if-else, if-elif-else
- Loops - for, while

- Break and Continue Statements
- Functions
- Practicing problems on Hackerrank
- Daily practice exercise

Project 1 : Send Email using Python

- Mini project Using SMTP library, send emails using python to anyone
- Daily practice exercise

Python Data Structures

- Lists - Object, Methods, List Comprehension
- Tuples - Object, Methods, Immutability
- Strings - Object, Methods, Splitting, Joining, Format Function
- Sets, Dictionary, View Objects
- OOPS Concepts and Working with Files
- Practicing problems, Become 4 Star Coder on Hackerrank
- Daily practice exercise

Project 2 : Automate Tinder using Python

- Mini project Using PyAutoGUI, automating tinder requests
- Daily practice exercise

Version Control System : Git

- What is Git?
- Git vs Github
- Git Bash vs GUI
- Setting up Git on machine
- Hands on Git Commands
- Setting up account and repository
- Pushing codes over Github

- Practicing - Getting comfortable with Git
- Daily practice exercise

Python Libraries in Depth : 1

- Numpy - Ndarray Object
- Numpy - Data Types
- Numpy - Indexing and Slicing
- Numpy - Broadcasting
- Numpy - Stacking and Splitting
- Numpy - Operators
- Numpy - Linear Algebra Methods
- Numpy - Statistics
- Daily practice exercise

Python Libraries in Depth : 2

- Pandas - Series
- Pandas - Dataframes
- Pandas - Indexing and Selection
- Pandas - Reading CSV, Excel and JSON
- Matplotlib - Visualization Scatter Plot
- Matplotlib - Visualization Bar Graph, Histogram and Curves
- Solving Assignment - Numpy and Pandas
- Daily practice exercise

Project 3 : Web Crawler using BeautifulSoup

- Learning and build cool stuff using web scraping in python
- Daily practice exercise

Getting Started with Machine learning

- What is Machine Learning
- Why Machine Learning
- Different ML Algo Classifications
- Challenges in Machine Learning
- Math Intelligence
- Applications in Various Verticals
- Set up and Installation - Anaconda and Libraries
- Daily practice exercise

Regression Techniques

- Linear Regression - Mathematical Intuition
- Gradient Descent in Depth
- UnderFitting and Overfitting
- Performance Evaluation
- Implementation of LR from Scratch without using Scikit Learn
- Implementation of LR from using Scikit Learn
- Multivariate Regression
- Solving Assignment - Linear Regression
- Daily practice exercise

Project 4 : Air Quality Prediction

- Predicting Air Quality using Multivariate Linear Regression
- Daily practice exercise

Logistic Regression

- Classification Problems vs Regression Problems
- Likelihood Estimation and Loss
- Gradient Ascent in Depth
- Independent Events
- Log Estimation
- Implementation of LR from Scratch without using Scikit Learn

- Solving Assignment - Logistic Regression
- Daily practice exercise

Project 5 : Diabetes Classification

- Use Logistic Regression to classify diabetic patients
- Daily practice exercise

K-Nearest Neighbors

- Lazy Learners
- KNN Issues
- Curse Of Dimensionality
- Non Paremetricity
- Implementing Nearest Neighbours Algorithm
- Learning OpenCV
- Solving Assignment - K-Nearest Neighbors
- Daily practice exercise

Project 6 : HandWritten Digit Recognition

- Using MNIST Dataset to perform Digit Recognition using KNN
- Daily practice exercise

Project 7 : Face Recognition

- Working with Images and Live Video Streaming
- Detect faces using OpenCV and Machine Learning.
- Daily practice exercise

Project 8 : Build Snapchat Filter using OpenCV

- Learn to process Live Webcam stream
- Apply Moustache and goggles to faces using OpenCV

- Daily practice exercise

KMeans Clustering

- Getting Started with Unsupervised Learning
- Pizza Parlour Case Study
- Implementing Clustering Algorithm from Scratch
- Implementing Clustering Algorithm using Scikit-Learn
- Problems with K-Means
- Solving issues using DBSCAN
- Daily practice exercise

Project 9: Dominant Color Extraction

- Repaint an image using K-Means Clustering.
- Daily practice exercise

Natural Language Processing (NLP)

- Natural Language Feature Engineering - converting text to features
- Text Analytics, Tokenization, Chunking
- Document Term Matrix
- Stop word removal
- Stemming
- Lemmatization
- Regular Expression
- Bag of Words, CountVectorizer
- TF-IDF
- Daily practice exercise

Project 10: Recommendation System

- Fetching women apprael's data from Amazon Product Advertising API
- Text Based Recommendation System on Amazon Real Data

- Exploratory Data Analysis
- Building Vocabulary
- Pickling
- Euclidean Distance, Cosing Similarity
- Daily practice exercise

Word Embeddings & Neural Networks

- Word2Vec Model
- Word Analogies
- Learn to implement Word2Vec and learn interesting analogies in an unsupervised manner.
- Neural Nets & Multi Layer Perceptron Classifier Introduction
- **Daily practice exercise**

Project 11: Odd One Out

- Selecting Odd one out from multiple words using word vector representation.
- **Daily practice exercise**

Career Guidance

- Resume Building
- Discussion on Project Explanation in Interviews
- How to prepare and apply for off-campus Interviews?
- Further Steps and Resources
- Closure of AI Mafia
- **Daily practice exercise**

Module : Course : Java A to Z + Full Stack Development

Aim: This course will help you to learn Core Java, Advanced Java, Database, Spring MVC Frambwork, RESTful APIs, Micro-services & related technologies to build Java-based web applications. Creating awesome projects like Twitter Clone.

Core Java : Installations

- Installing the JDK
- Running a Java Program
- Downloading IntelIJ
- **Daily practice exercise**

Core Java : Introduction to Java - Variable & Arrays

- Data Types
- Variables
- Arrays
- Multidimensional Arrays
- Getting User Input
- Daily practice exercise

Core Java : Practicing on Hackerrank

- Java 1D Array
- Java 2D Array
- Java Subarray
- Daily practice exercise

Core Java : Operators, Control Statements, Loops

- Math Operators
- Increment Operators
- Logical Operators
- Conditional Operators
- If Statement
- Switch Statement
- For Loops
- While Loop
- Do while Loops
- Daily practice exercise

Core Java : Practicing on Hackerrank

- Java Stdin and Stdout I
- Java If-Else
- Java Stdin and Stdout II
- Java Loops I
- Java Loops II
- Java End-of-file
- Daily practice exercise

Core Java : Maths, Strings & Date

- Random Number Generator
- String
- String methods
- toString, length, substring, indexOf, charAt, toUpperCase, toLowerCase, compareTo

- Date and Epoch Time
- Daily practice exercise

Core Java : Practicing on Hackerrank

- Java Int to String
- Java Strings Introduction
- Java Substring
- Java Substring Comparisons
- Java String Reverse
- Java Anagrams
- Daily practice exercise

Advanced Java : Data Structures

- Arraylist
- List
- Map
- Daily practice exercise

Advanced Java : Practicing on Hackerrank

- Java Arraylist
- Java 1D Array (Part 2)
- Java List
- Java Map
- Daily practice exercise

Advanced Java : Data Structures

- Stack
- Set
- Priority Queue
- Sort

- Daily practice exercise

Advanced Java : Practicing on Hackerrank

- Java Stack
- Java Sort
- Java Priority Queue
- Daily practice exercise

Advanced Java : OOPs and Exception Handling

- Class and Objects
- Public, Private and this
- Inheritance
- Daily practice exercise

Advanced Java : OOPs and Exception Handling

- Abstract Class
- Interface
- Method Overriding
- Exception Handling (Try-catch)
- Exception Handling
- Singleton Pattern
- Daily practice exercise

Advanced Java : Practicing on Hackerrank

- Java Inheritance I
- Java Inheritance II
- Java Abstract Class
- Java Interface
- Java Method Overriding

- Java Method Overriding 2 (Super Keyword)
- Java Exception Handling (Try-catch)
- Java Exception Handling
- Java Singleton Pattern
- Daily practice exercise

Advanced Java : Creating Project - Knowing about IDE

- How to debug
- How to setup environment
- Creating Project
- **Daily practice exercise**

Advanced Java : File, Thread & Networking

- File Handling
- Threads
- Multithreading
- Get, Post request
- Daily practice exercise

Advanced Java : Mini Project- Word Top Frequency Analyser

- Reading files
- Using data structures
- Finding top keywords
- Daily practice exercise

Advanced Java : Dependencies using Gson & Json

- How to add dependencies
- What is Json and Gson ?
- Converting objects to Gson
- Converting Gson to objects

- Daily practice exercise

Advanced Java : Parsing Html

- Learning about Jsoup
- Running selecting queries
- Daily practice exercise

Mini Project - Wikipedia Fetcher using Advanced Java

- Search Word
- Get information from wikipedia
- Display to user
- Daily practice exercise

Database : Setting up database

- Setting up Postgres
- Setting up Pg Admin
- Daily practice exercise

Database : Using JOOQ - Connecting Database

- Why JOOQ ?
- How to setup ?
- Connect with database
- Create, Update, Delete
- Running queries
- Daily practice exercise

Mini Project - Multithreaded Crawling using Advanced Java

- Picking links from file
- Making multi-threaded network requests

- Dumping data
- Daily practice exercise

REST APIS

- What is REST APIS ?
- HTTP Methods- GET, POST
- HTTP Headers##
- Daily practice exercise

Backend using Spring MVC - Getting Started

- The DispatcherServlet
- POM.XML
- Web.xml
- What is Model
- What is View
- What is Controller
- Daily practice exercise

Backend : Explaining Configurations

- Application Properties
- Profiles in IDE
- Knowing about static resources
- Daily practice exercise

Backend : Building first REST API

- Creating Controller
- Creating Entity/Model classes
- Creating Views using jsp
- Daily practice exercise

Backend : Running first REST API

- Setting up Jetty server
- Making GET/POST request to server
- Requesting for HTML
- Requesting for JSON
- Daily practice exercise

Backend : Building Twitter - Sign Up Page

- Creating sign up page
- Learning javascript concepts
- Adding Member details to Database
- Learning about interceptors
- Learning about cookies
- Daily practice exercise

Backend : Building Twitter - Login Page

- Learning javascript concepts
- Authenticating user
- Handling login failure
- Redirecting to welcome page
- Daily practice exercise

Backend : Building Twitter - Profile Page

- Update details
- Uploading photo
- Daily practice exercise

Backend : Building Twitter - Create First Tweet

- Setting up UI interaction
- Using more javascript
- Updating user profile

- Daily practice exercise

Backend : Building Twitter - Home Feed

- Fetching users feed from database
- Adding LOAD MORE option
- Adding like option to tweet
- Handling unlike
- Daily practice exercise

Backend : Building Twitter - Adding Follower

- Adding follow option on other's profile
- Adding follow option on HOME FEED
- Daily practice exercise

Backend : Building Twitter - Using CDN & Redis

- Making APIs faster ? How ?
- What is CDN ?
- What is Redis ?
- Daily practice exercise

Interview Tips & Closure of Course

- How to explore more
- More tips on projects
- Final words from team
- Daily practice exercise

Module : Core Concepts Fundamentals

Aim: Learning theory concepts because some companies do ask these topics in interviews.

Object Oriented Programming

- Classes and Objects
- Polymorphism, Overriding, Overloading
- Encapsulation
- Abstraction
- Access Modifiers
- Inheritance
- Friend and Virtual functions in C++
- STL (Standard Template Library) in Depth
- Practicing problems on Hackerrank

Operating System

- Operating System and its Types
- Multiprogramming, Multiprocessing and Multithreading
- Process Management and Scheduling
- Process Synchronization
- Deadlock
- Memory Management and Virtual Memory
- File systems
- I/O systems
- Protection and Security

Database Management System

- Introduction to DBMS
- Architectures
- ER Model
- Relational Model
- Keys in Relational Model
- Database Normalization and Normal Forms
- Concurrency Control
- Indexing in Database
- B and B+ Trees
- ACID and BASE Properties
- SQL Queries in Depth : Hands On

Computer Networks

- Introduction to Computer Networks
- TCP/IP vs OSI Model
- Circuit Switching vs Packet Switching
- Flow Control Protocols
- IP and Classful Addressing
- Classless Addressing
- Routing Protocols
- ARP & DHCP

- Transport Layer
- TCP & UDP
- Application Layer
- HTTP & GRPC Protocol

Module : Aptitude

Aim: To increase your aptitude score so that you don’t face issues while online APTI rounds.

Preparation for companies which takes Aptitude round as first round 🔥

- Quantitative Aptitude
- Logical and Verbal Aptitude
- Analytical Reasoning
- Practicing Interview Puzzles

Mock Interview Practice

Aim: To increase your confidence and to uplift your communications skills. Regular 1-1 Mock Interviews.

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