elevatebox

Proven way to learn Competitive Programming and excel in Online Coding Assessments.

Start:

- hackerrank.com
- A2oj ladders: https://a2oj.com/
- codeforces.com
- Guide to increase Rating : https://drive.google.com/file/d/1J2x8pIYQ3MXANgvzOgBciWd3d79j_Exa/view
- cses.fi (beautiful problemset)
- cp-algorithms.com
- Hackerearth Codemonk
- Youtube : Errichto, Galen Colin, Kartik Arora, Algorithms Live, Striver, Priyansh Agarwal

Contests for beginner :

- Codechef Long Challenge
- Atcoder Beginner Contests
- Div - 3 & 4 Codeforces
- Codechef Lunchtime and Cook off

Famous :

- ICPC
- Facebook Hackercup

CP Platforms :

- Codeforces
- Codechef
- Atcoder
- CSES (Contains very good problem set)
- SPOJ

Compare yourself with your peers :

- cf-viz

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DSA & Competitive Programming for ACM ICPC by elevatebox.

These are some resources related **DSA- Competitive programming in general**, do explore them :)

This document is made up of multiple hyperlinks – to access them – **right click > open hyperlink.**

As human it is common for all of us to make mistakes, even I've made some while writing this doc – If there are any such mistakes in the document – please kindly , send us a email.

Happy Coding!!

These two Competitive Programming Lists are for the Training Purposes – If you're a beginner or a newbie to it please go through the beginner level before solving these lists.

- **Junior Training - Problem Solving Sheet – 1 (vvimp)**
- **Training for Online contests ICPC or IOI – Advanced.**

- Use the guided Procductivity hacks mentioned in the last Page.
- Updated versions of the document will be available in the git- repository mentioned in the last page.

BEGINNER LEVEL :

Create a developer profile in **Hackerrank, Hackerearth**.

- **C - Cpp Track :**

Not so comfortable with basic programming concepts? (syntax , loops, conditional statements..)

This playlist (till 69 videos) will help you with the things needed to start programming.

Already sure with them - Then, **jumpp!!**

C Basic Exercise from hackerank

- Start solving these 20 patterns programming in C. (Easy)

Video editorials :

  - Playlist 1
  - Patterns in C

Blogs for the Same.

  - Programiz's Blog on patterns
  - Blog from GFG (GeeksForGeeks) on Patterns

- **Java Track :**

Comfortable with basic programming concepts? (syntax , loops, conditional statements..)

Start with this Playlist (2.1 to 3.5 videos)

Java Basic exercise from Hackerrank.

Language : This video will give you clear fundamentals of java in general.

Now, Jumpppppp!!!!

Start solving these 20 pattern programs on your own..

Stuck?? –

Use these tutorials for intuitions behind the statements given..

Video Editorials :

- In detail explanation for pattern problems and followed by solutions from videos (35 - 74) .
- Need more? , **Complete videos 5-9 from the playlist**!

Blogs :

- **Pep coding Blog**
- **Solve any Pattern Problem with this trick – Kunal.**

Python Track :

- Clear with basic syntax in python?

Try solving 20 problems from the basic python exercise - Hacker rank.

Want to revise python?? – Roger that!!

Reference playlists :

- Apna College (Hindi)
- Complete 11 vedios from the playlist then, you are good to go!!

Try solving these patterns on your own in python!

Patterns problem list

Stuck, in between for logic? Refer these tutorials and try to implement the code in python.

Patterns editorial link - java. -Implemented??

Video Editorials :

- Playlist 1
- Learn 100+ Python Pattern Programs

Blogs in General – Beginner Level :

- **https://www.geeksforgeeks.org/programs-printing-pyramid-patterns-c/**
- **https://www.geeksforgeeks.org/c-programs-print-interesting-patterns/**

INTERMEDIATE LEVEL :

Firstly, Create coding profiles in all these platforms. **Codechef** , **Codeforces** **,** **Leetcode** **(Completely for DSA).**

Cpp Track :

o Do you know Basic Data Structures ,

If (yes, I know basic DSA concepts) goto step2.

Else Do revise them with this playlist on basic **Algorithms and Data Structures (From videos 1.1 to 5.12).**

o Good with C,Cpp fundamentals? - Try solving these basic (1000-1200 rating problems from Codechef)

o Now, you've done things with c,cpp start learning cpp stl to implement code in the best possible way. – Not so clear with pointers?

Pointers playlist! (Videos 70 -108)

o Learn Cpp – STL with this playlist and starting solving problems on the concept learnt on daily basis!

Now, you are equipped with all tools needed for **competitive programming and DSA.**

TRY TO SOLVE , LEARN , IMPLEMENT!! – Pratice >>>

These are some playlists on Different Programming paradigms , Advanced Concepts too!

– Would be helpful if you give regular contests on **codechef, codeforces and up solving them after the contest**!

Refer them on daily basis after try problems or solve the problems on particular concepts after learning (watching a video on particular concept!) :

I suggest you to go with the second approach! – But, don't keep looping on videos instead understand the concept – read a blog and jumppp in the ground to solve as many problems as possible!

- First Complete Competitive Programming course (This includes Recursion & Backtracking , Optimized Binary Search , Number Theory , Graph Theory and MVP!! – Dynamic Programming)

But, I'll share different resources for individuals topics here!

  - Ø Firstly, **The Complete Competitive Programming Course!**
  - Ø **Start Solving these Intermediary DSA Problems using these playlist as the guided path for all these topics.**

- For Arrays DSA Preparation Playlist.
- **DSA -Level 2 Playlist (it includes Arrays, Strings , Heap data structure -Imp)**
- **Solve all these leetcode problems explained in these playlist from videos (9 – 30)**

o **Refer this playlist by Kunal (videos 13-21)** – Java implementation.

Ø Heap Playlists : Priority Queue.

§ Heap DS by Aditya Verma.

§ Heap Problems implemented in Python.

Ø By this time one has to solve any leetcode medium problems from Arrays – Strings – Heap.

Ø Advanced Binary Search Problems :

§ Advanced binary search by Karthik Arora

§ Aggressive cows by Utkarsh Gupta – SPOJ question

§ Various in Binary Search Implementations by Erchitto

§ Binary Search DSA Questions.

DATA STRUCTURES – STACK , QUEUE , LINKED LIST.

- Solve as many leetcode medium to hard problems as possible.
- Some playlists which help along the way!

§ Comprehesive Approach by Aditya verma.

        - By Striver.
        - Love Babbar on Stacks & Queues.
        - This video by kunal – implemented in java.

    - Linked list
        - By Fraz
        - By Love Babbar
        - MVP by Striver.
        - By kunal kuwashah

    - Binary Trees , BST **(I suggest completing Graph theory before linked lists and Binary trees)**

- Problem Set by Unstop. (Filter trees here.)

Solve all problems from leetcode Medium.

Playlists on trees :

- By striver.
- By Love babbar

Ø Recursion Playlists :

- § Recursion Playlist by Striver. (Basic to Advanced)
- § Ultimate course on Recursion & Back-Tracking by Fraz.
- § Comprehensive Approach by Aditya Verma – Recursion. (Try this first if both above are not understanding)
- § **Solve these leetcode problems discussed in the playlist from videos (31-41)**

NUMBER THEORY :

§ **Firstly, refer the complete cp course – number theory.**

§ **Number Theory Course - codencode**

§ **Number theory – Spoj**

§ **Number Theory - Codeforces**

GRAPH THEORY :

§ **By Luv – CP Course**

§ **Graph Theory Course part 1.**

§ **Graph Theory Course part 2.**

Ø Hey, Pretty Comfortable in Recursion and Backtracking – right? – Yeahhh, It's time to start the most important Concept! – **Dynamic Programming** -Dp.

Understand what is Dp – With these playlists – but, try to solve all these problems before watching these videos. – so, that one will get the intuition for why dp is needed to solve them..

Some Important problem lists of Dynamic Programming (By the end of completing all these playlists one has to go through each and every problem in these lists and try to follow the order mentioned below for better understanding) :

- CSES Problem Set.
- AtCoder Educational Dp Contest.
- Coding Ninjas Dp
- Leetcode Dp Blog – Guided Path
- Dp problems list by Codeforces.
- Dp Optimizations – Cp Algorithms.

Ø **Dynamic Programming Playlists:**

(**It's not a Sprint – it's Marathon!!**)

Ø Solve, Solve, Solve!!

Basic Level Understanding – Try to watch as speed as possible – Get a glance!! – Note the important points from these **lectures by Aditya Verma**.

§ Basic - In depth of Understanding of Dp by Aditya Verma

§ Dp BootCamp of IIT Gandhinagar students by Priyansh Agarwal.

§ Still, not unable solve problems – try

Dp workshop by Vivek Gupta (a 7* coder in cc).

Tried Everything, unable to solve Dp problems in Contests.. Then how??

Striver's Playlist will help you to understand complete dp from very basic recursive to iterative (bottom up) and necessary space optimizations in dp.

But, I suggest you to go through all these above approaches (playlists) of dp before starting this course – btw , have you solved atleast 40 problems using the above playlists? – If no, don't start this below playlist – **Go, solve as many as problems possible after referring those above problems – before starting this**..

STRIVER'S DYNAMIC PROGRAMMING PLAYLIST

Extra Reference: Playlist by Pep Coding.

Java Track :

As the above mentioned playlists are having their implementation in cpp stl, I am including some resources which are implemented in java.

If you are using java , create your own templates of your choices or find templates from the web (other coders who are using java in competitive programming)

What does this actually a template meant : Simply, It helps in shortening your code – observe the submissions in the below mentioned profiles**.**

Here are some coders using java : - you can find many profiles like these in codechef or codeforces!

Profiles :

§ https://codeforces.com/submissions/SecondThread **(Clean code without any templates used in java)**

§ **Go through this Blog. (If you didn't get that – leave it it's not at all important in this level)**

Please refer order from the CPP TRACK.

Some Playlists which are implemented in Java :

o DSA LEVEL -1 (includes Arrays, Linked lists , Stacks, Queues)

o Kunal Kuwashah's Community class (Includes containers, recursion & Back Tracking , Arrays, Strings, Linked lists , Oops Concepts)

Cyclic sort , Recursion, Bactracking are Imp.

o **Complete Functions & Arrays**

o **Course on 2D Arrays.**

o **Strings and String Builders**

o **MVP BY** Sumeet Malik

Best Course on Recursion & BackTracking – Part 1

Part 2 Recursion & Back Tracking.

Refer Complete Cpp track for Dynamic programming.

o **Advanced Dp problems by Rachit Jain.**

o **Graph Series**

MVP for JAVA TRACK : Playlist of 189 Leetcode Solved problems. Please don't directly jump on solution. – Try, Try, Try till you solve to an extent – then refer this videos so that it'll help to get intuitions during coding interviews.

Playlist by Nick White on 189 LeetCode Problems.

PYTHON TRACK :

There are very few resources on web implemented using python for competitive programming.

But, most of leetcode problems are solved using python.. So, stick with it if you are already pretty familiar with all the concepts in it.

So, okay with implementation? – Refer cpp track (playlists given after cpp stl) and then solve problems mentioned in below playlists where you can find the implementation in python itself.

Books for competitive programming (MVP) : - **Enough to learn!**

Competitive Programming Python – 128 Algorithms to Develop your coding skills. (click download in left side > download templates)

o **Will be uploaded in git -hub repository (Python track)**

Playlist – Video Editorials for leetcode problems in python. :

o **A playlist with BLIND - 75 (most important Problems) in leetcode -MVP.**

o **Leetcode easy using python.**

o **Medium**

o **Hard**

o **Sliding Window Problems**

o **Binary Search**

o **Recursion & BackTracking**

o **Linked lists**

o **Stack Problems.**

ADVANCED LEVEL : (CF >= 2000 Rating)

For these topics there are very few resources available on web – I'll be sharing the blogs, a yt channel where you can find such advanced content.

Below are the concepts involved.

o **Segment Tree and Lazy propagation**, Binary Index Tree, Sparse Table, Sqrt Decomposition, Dynamic Connectivity, Persistent Data Structures, Euler Tour + Segment Tree, HLD, Centroid Decomposition, Disjoint Set Union and DSU on Trees, Trie applications.

- **Number Theory, Combinatorics, String Algorithms** (KMP, Hashing,Z Algorithm, Manacher, Suffix Array, Aho Corasick) Gaussian Elimination, Game Theory, FFT, Computational Geometry.

- **MST, Shortest Paths, Topological Sorting**, SCC , BCC (Articulation Point, Bridge Tree),,Binary Lifting, Euler Tour / Cycle, Building Graphs with Non-Trivial State Space, Max Flow, Minimum Cost Maximum Flow, Dilworth's Theorem, **2-SAT.**

- **Dynamic Programming** (Common states, Bitmask DP, Digit DP, Tree DP, SOS DP, DP + Probability, Linearity of Expectation, DP Optimizations) :

  Problems list :

    - https://usaco.guide/gold/dp-bitmasks?lang=cpp

Playlists :

- **Advanced Dp :**
    - **Dp on trees by Karthik Arora**
    - **Dp with Bit Masking K A**
    - **Digit Dp**
- **Segment trees :**

- § Range minimum queries – Sparse Tables, Segments , Lazy propogation by Tushar Roy.
- § **Segment Trees Course by codencode.**
- § **Range Query DS by Karthik Arora**
- § Fenwick Trees, Binary lifting, Segment trees, Lazy Propogation, CF Education round.

Youtube Channels on coding as a whole :

{ CF Profile – YC }

Errichto	**Youtube Channel**
Second Thread	**Youtube Channel**
William Lin	**Youtube Channel**
Colin Galen	**Yotube Channel**
Vivek Gupta	**Yotube Channel**
Utkarsh Gupta	**Youtube Channel**
Priyansh Agarwal	**Youtube Channel**
Luv	**Youtube Channel**

- **Rachit Jain**
- **Gourav Sen**
- **Back 2 Back SWE**
- **Neetcode**
- **Karthik Arora**
- **Nick White** **(Java)**
- **LeadCoding – Fraz**
- **Striver – Take u forward.**
- **Codencode**
- **Apna college**
- **Pepcoding**

Some good resources to Prepare Cp :

- **You can download these resources from GitHub repository too.. (Books) .**
- **Links :**
  - Guide to Competitive Programming: Learning and Improving Algorithms Through Contests
  - Competitive Programming 3

- Advanced Level : Programming Challenges: The Programming Contest Training Manual
- CRACKING the · CODING INTERVIEW
- Competitive Programming 1
- Competitive Programming Hand Book
- Elements of Programming Interviews
- Cp with python 128 Techniques
- Learning algorithms with programming and puzzles
- Looking for a challenge
- Some Advanced problems book.

Blogs :

- **CP Algorithms.**
- **An awesome list for competitive programming!**
- **The Ultimate Topic List(with Tutorials, Problems, and Templates) – Personally my favourite.**
- **Dp Optimizations. (Advanced level)**

Problem Archives :

- **Google code jam – Archives.**
- **Project Euler Archives.**

- SPOJ

Problem sets :

- Hackerearth Practice.
- Coding Ninja's – Guided paths
- USACO Guide (Important)
- CSES Problem sets
- Atcoder Beginner – Educational.
- Work@Tech Practice DSA

If any links among are not working or any doubts related to the concepts – students can send you query as mail to this Gmail.

If there are any mistakes in the doc, **please** let us know through the Gmail so, that the updated version of docx will be uploaded in GitHub repository.

- Please give any suggestions (on necessary changes) so that I can update them in next version of this docx – which will be uploaded in github repository.

Gmail : mailto:lsaicharan01@gmail.com

Github – Profile : https://github.com/elevatebox/intuit

Productivity Hacks :

- In YouTube the maximum video speed is 2X – to increase more than 2X (if needed) add **Video Speed Controller extension** to the chrome browser.

- As there **lot of advertisements** while using YouTube
  - This chrome extension **Ublock-Origin** will block the advertisements.
  - In many YouTube videos – there are sponsorships in between , so to avoid them use **SponsorBlock Youtube** chrome extension and disable all self-promotions, in dated sponsors.