How to win coding competitions

Haris Muneer

nuces-acm
STUDENT CHAPTER

About me.

- Graduated among the top 3 in batch with 4 consecutive Gold Medals
- Fully-funded NTS Scholar at FAST
- Worked as a researcher at LUMS on various projects in ML, NLP, Security and Operating Systems
- Currently working with an Austin, USA based startup named Quantified Communications
- Established Pakistan's first Open Source Software community to help students make their projects portfolio on Github

Outline

1. Benefits of participating in programming competitions and how to get started
2. The algorithms and approaches you need to master the world of competitions.
3. Effective tips and tricks to gain an edge in a coding competition.

1- Intro and Benefits of Competitive Programming

What is a coding competition?

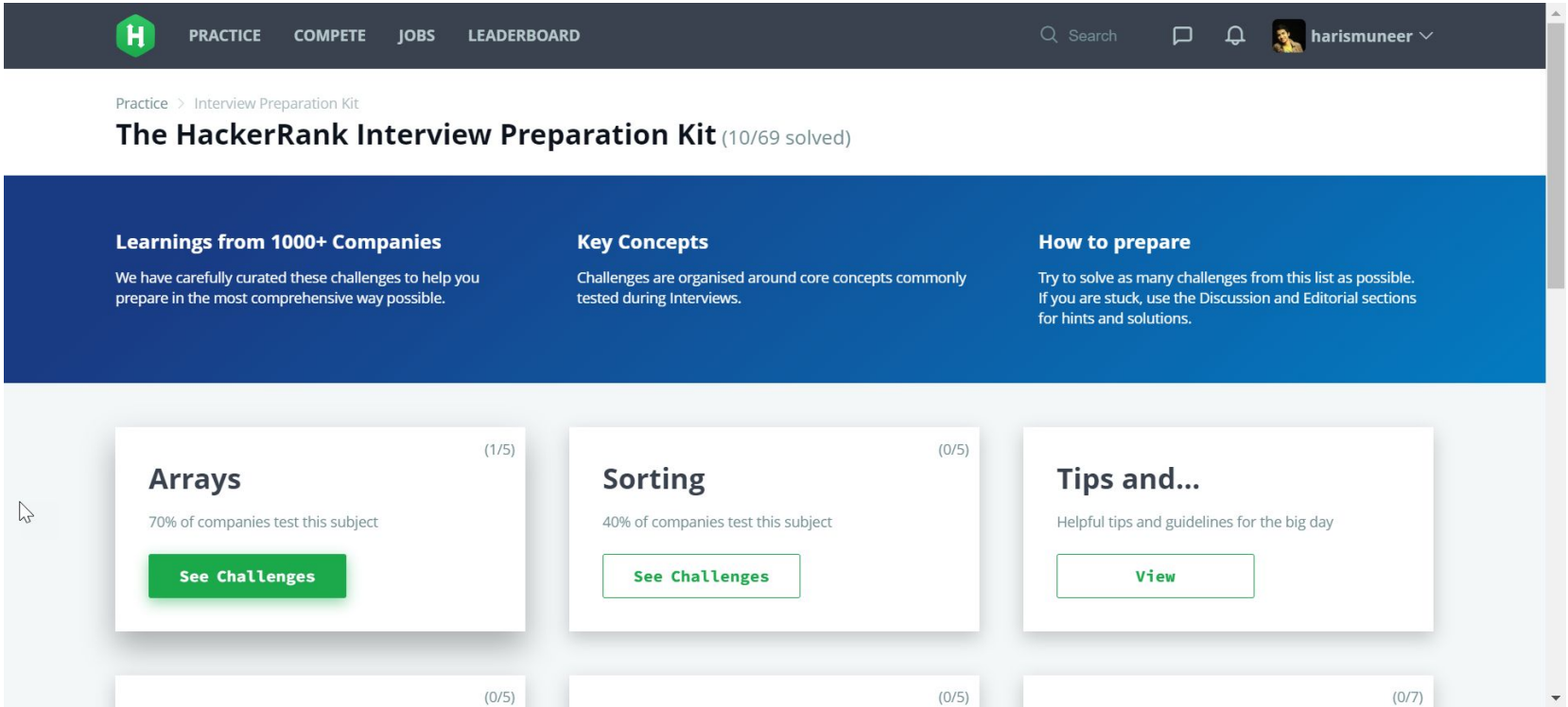
- Solving some programming problems in a limited amount of time.
- Team which solves the maximum problems in minimum time wins.
- Code written should be efficient in terms of time complexity.
- Format of a coding problem:
  - Problem Statement
  - Inputs
  - Outputs
  - Time/Memory Constraints

Benefits of Competitive Programming

- Prepares you for interviews of silicon valley companies like Google, Facebook, Microsoft etc.
- You will surely be in a position to clear coding rounds of every tech company in Pakistan.
- Securing good ranks in coding competitions really boosts your CV's strength
- Gain better grasp on data structures and algorithms which in turn helps you in securing good grades
- Solving problems on HackerRank is really fun! You also earn cool badges along the way which attract job recruiters

How to get started?

HackerRank


PRACTICE
COMPETE
JOBS
LEADERBOARD
Search
harismuneer
Practice
Interview Preparation Kit
The HackerRank Interview Preparation Kit (10/69 solved)
Learnings from 1000+ Companies
We have carefully curated these challenges to help you prepare in the most comprehensive way possible.
Key Concepts
Challenges are organised around core concepts commonly tested during Interviews.
How to prepare
Try to solve as many challenges from this list as possible. If you are stuck, use the Discussion and Editorial sections for hints and solutions.
(1/5)
Arrays
70% of companies test this subject
See Challenges
(0/5)
Sorting
40% of companies test this subject
See Challenges
Tips and...
Helpful tips and guidelines for the big day
View
(0/5)
(0/5)
(0/7)

List of Coding Competitions

- NUCES-ACM IntraFast
- Softec
- IEEE Week, FAST Lhr
- Procom, FAST Karachi
- Nascon, FAST Islamabad
- LUMS CodinGuru
- PUCIT Soft Expo
- UCP Mindmation
- UMT, UET, NUST, GIKI, COMSATS etc.
- Almost every CS Uni in Pak organizes an annual coding competition.

ACM ICPC

The World Cup of Programming Competitions

2- Types of Problems and Algorithms to Solve Them

Common Categories of Problems

Practice 1-2 problems of each category below:

- Arithmetic/Mathematical
- String Manipulation
- Data structures like Stack, Hash Map, Set (Union, Intersection, Difference)
- Pattern Matching in 2D Arrays (Bit Manipulation)
- Graph Search (mostly DFS and BFS)
- Greedy Algorithms
- Dynamic Programming

3- Practical Tips & Tricks

Strategies

- Divide the problem set equally among team and make sure every member reads the problem with full concentration.
- Don’t get scared by the length of the problem. Usually there’s a lot of unnecesarydetail in the problem. Therefore while reading, underline the major lines/points only to remove clutter.
- During reading, identify the underlying algorithm used in the problem and make a visual solution in your mind in terms of code.
- After reading all the problems once, choose the easiest one to implement first and proceed similarly.

Strategies Contd.

- Among a team of 3: the guy who understood the solution should code, one member should monitor his code to identify and fix issues real-time, and one member should continue developing solutions to other problems.
- Before competition starts make an organized code structure of problems like A.cpp and A.input. Also, write the test cases in .input files for each question and just copy/paste them while debugging to save time.
- The competition is of 5 hours normally so don't lose hope in the middle and be prepared to fight till the end. Don't get distracted by other teams.

Technical Tips

- Use while (cin >> input_variable) when the requirement is to read from console and the number of test cases isn't mentioned.
- For very large inputs, use ***long long int*** in C++
- For C++, remember to read the functions available in ***algorithms*** library like next_permutation, search, sort etc and also make yourself familiar with STL vectors especially.
- Make sure your output is according to the output format for the question i.e. no extra spaces etc
- Only submit your solution when you are maximum sure of it, because every wrong submission results in penalty points.

Helpful Resources

This link contains EVERYTHING related to competitive programming including tutorials, videos, practice platforms and much much more:

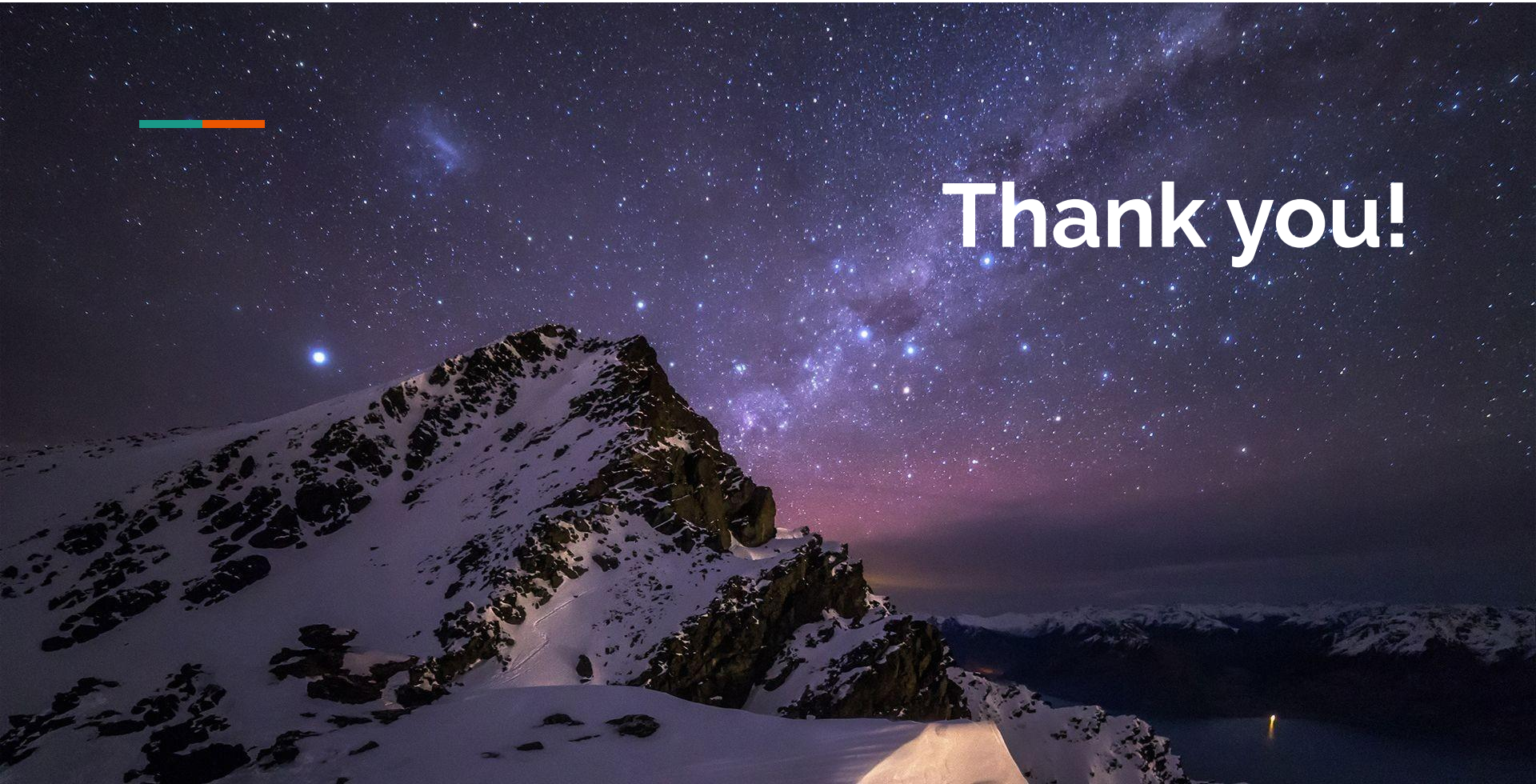
- https://github.com/lnishan/awesome-competitive-programming

Feel free to reach out to me.

LinkedIn:
https://www.linkedin.com/in/harismuneer/

GitHub:
https://github.com/harismuneer
https://github.com/OSSpk

Email: haris.muneer5@gmail.com


Thank you!