
In the name of God
The beneficent the merciful

CP - Connect

A Problem Recommender System

By AmirReza PoorAkhavan

About me

- I love solving problems!
- Started CP at 12.
- Started Problem Setting at 15.
- Started Contest Coordination at Quera.
- Teacher at high schools.
- Currently, Contest Coordinator at HackerEarth.



Why?

- There are many people interested in CP but don't have teacher.
- Even for red coders, it can help to become better.



Brief

Here is the brief of what I want to talk about.

- **Problem Classification**
Determine the exact tags about problems.
- **Show The Path**
Determine a good path to learn CP.
- **Collecting Data**
Put problems in their categories.
- **Recommend**
Now, analyze the user and recommend him good problems to grow.



Intro

Problems are different in many aspect, you know!

- **Tags**
- **Level**
- **Good for Start?!**
- **Amazing?**

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Just a minute! I have
something to show you ;)

(You'll enjoy, I promise)



Let's see

Soala

- Means “Problems” in persian.
- Contains ~1500 problems from ~15 Online Judges.
- Contains 160 tags.
- Some problems are marked as amazing.
- Some problems are marked as good for start.



Examples

→ **ADITREE creative**
heavy_light_decomposition
special_segment_tree hard * {
counting zeroes and ones in
segment tree }

A problem from CodeChef.

→ **C6085 (next_max_finding | dsu |**
rmq) sorting medium *

A problem from Quera.

To be more exact

- Each problem has several solutions.
 - ◆ Each solution has several tags and it has a difficulty level.
 - It's possible to clarify that some tag is more important in some solution.
 - ◆ It should be clarified that how much the problem is amazing.
 - ◆ It should be clarified that how much the problem is good for start.
- The classification should be as exact as possible such that if someone gives you the classification before the contest, you could solve it straight forward. e.g. In “soala”, I have 13 tags under “segment tree” category.

The Route

→ Maybe at first Dynamic Programming, then Segment Tree, hmm?

Most Important Part

Put problems in accurate
positions.

Simple?!

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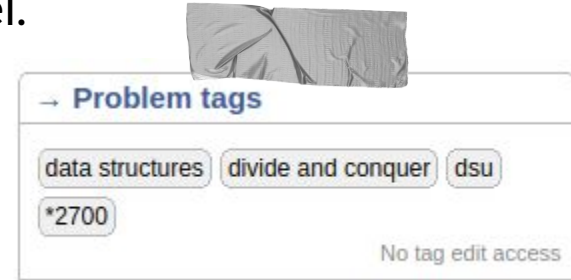
**How much problems
are available in
Online Judges?**

~77000

Problems available on Vjudge!

Where we can find some data?

- Base data: “Soala”!
- Some OJs have tags, e.g. Codeforces, it also have level.
- Scoreboards, blogs, editorials.
- And... a code!
 - ◆ A code that can detect tags from source codes.



More exact about our bot

- DP solutions usually have an array “DP”.
- Maximum-Flow solutions usually have Max-flow function.
- Segment tree solutions...



Now...

We have prepared everything.

We have a lot of problems, we know their exact category, we know what's the best path for learning, so, it's the time to recommend problems to users.

We are talking about who?!

- Maybe the user is a red coder, or maybe a beginner, so at first, we need to know him.
- Let's scan problems that he have solved before, we can more or less know his abilities.
- This part has a lot of open projects to work on.

Next step

- Now, find some tag that user doesn't know or is weak in that, sort problems of that tag with difficulty.
 - ◆ Maybe the user knows what he wants himself, so, there is an option that user ask system to come with problems with special tags.
- At first, try not to combine this tag with tags that he know before, but after 2, 3 problems, combine it with known tags.
- Choose “good for start” problems at first.
- Choose “amazing” problems.

Use community

- Community helps community in CP-connect, that's why I choose this name for this project.
- You can register as a volunteer to help CP-connect become better, e.g. complete problem tags, mark problems good for start, ...
- When you use help of CP-connect, after each problem it asks you to put a comment that if this problem was in correct order or not, if you want, you can suggest that this problem must come sooner or later.

Many thanks!

- To you!
- Bill Booth for this opportunity.
- Dr. Amin Gheibi, my favourite and #1 lovely teacher. Who helped our team and specially me a lot.

Respect costs nothing...

But buys everything...

— Imam Ali (PBUH) (Born 601 AD)
