GAMIFYING THE STUDY OF ALGORITHMS

Player: Iulia Avram
Round: EuroPython 2019
Level 1
History
Does this run in linear time?

A case for algorithmics

Iulia Avram
Great for

- Mental exercise
- Breaker of routine
- Logic and design improvement
- Knowing about algorithms as a social duty

Loads to be gained
FIND YOUR SOURCES

INTRODUCING UPSOLVING

KEEP TRACK OF PROGRESS

GAMIFY EVERYTHING

DON'T FORGET TO COMPETE
What is this gamification shenanigans anyway?
So why does it work?
Mmmmmmm
...Dopamineeeeee...
Level 2

Foundations
● “Gamification” is a buzzword
● Widely implemented in various situations
● Subject of research, conference talks and blog articles
● Gaming is fun ^.^
A conceptual model of how algorithm visualization, gamification, and learning instructions interact to improve learning outcomes
This isn’t new
Badges

- Problem Solving
- Python
- 10 Days of JS
- 10 Days of Statistics

Contest

- Finished Contests: 4
- Rating: 1172
- Global Ranking: 83599 / 102091

Contest History

October, 2018
HourRank 30
141/1069 participants

August, 2018
HourRank 29
177/1906 participants

Learning about...
Binary Search
8 Chapters
30 Items
53%
Congrats! You’ve reached level 2.
Levels allow you to keep track of your progression while sharpening your skills.

Source: Coding Game

Your program must destroy the enemy ships by shooting the closest enemy on each turn.
Level 3

New frontiers
Before we can imagine where to go next, let’s read the instructions manual first
Bloom’s Taxonomy

- **Remember**
  - Recall facts and basic concepts
    - define, duplicate, list, memorize, repeat, state

- **Understand**
  - Explain ideas or concepts
    - classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

- **Apply**
  - Use information in new situations
    - execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

- **Analyze**
  - Draw connections among ideas
    - differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

- **Evaluate**
  - Justify a stand or decision
    - appraise, argue, defend, judge, select, support, value, critique, weigh

- **Create**
  - Produce new or original work
    - Design, assemble, construct, conjecture, develop, formulate, author, investigate

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Vanderbilt University Center for Teaching
The legs of gamification

- Constraints drive creativity
- Easy failures
- Perseverance and grit
- Speed and pressure
Let’s make a game of it
Bonus

The mage’s question
```python
def funky_max(a, start, end):
    if end - start <= 1:
        return max(a[start], a[end])
    mid = (start + end) // 2
    first_side = sum(a[start:mid])
    second_side = sum(a[mid:end])
    if first_side > second_side:
        return funky_max(a, start, mid)
    else:
        return funky_max(a, mid, end)
```

https://pastebin.com/cRJ8uTKn

1) What's the time complexity? # HELPER QUESTION
2) This code doesn't always provide the max, provide a counter example.
What is your favourite game?
What is your favourite game?

And why?
• Story

• Achievements

• Community

• Challenges

• Level up
• Story
  Do we like problem statements with a story? Or do we like a story to a collection of problems?

• Achievements

• Community

• Challenges

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• Achievements
  Badges? Progress bar?

• Community

• Challenges

• Level up
Do we like problem statements with a story? Or do we like a story to a collection of problems?

Badges? Progress bar?

Compete with friends or against them? Do we need help in solving problems?

Level up
• Story
  Do we like problem statements with a story? Or do we like a story to a collection of problems?

• Achievements
  Badges? Progress bar?

• Community
  Compete with friends or against them? Do we need help in solving problems?

• Challenges
  30 day challenge? A very hard problem? Solving a known problem in a different way?

• Level up
● Story
Do we like problem statements with a story? Or do we like a story to a collection of problems?

● Achievements
Badges? Progress bar?

● Community
Compete with friends or against them? Do we need help in solving problems?

● Challenges
30 day challenge? A very hard problem? Solving a known problem in a different way?

● Level up
Through a number of problems solved or rating system?
Analysis is a powerful tool
Boss level

What is the point?
Fig. 4. The average scores between book-first group and game-first group after the first test and the second test.
Boss level

What is the point?