Learning Computer Science by Watching Video Games

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Approach – Using video games as learning materials of CS

- Video games – good concrete examples for learning CS and Informatics
  - Easy to grasp the mechanism of computational behavior by visual and auditory effects
  - Closely linked with the history of evolution of computers
  - A lot of real sources – a variety of interesting examples can be found
    - ‘Classic’ or ‘bad’ games are preferable for observing computational behavior
- Enhance learners’ interests and learning motivation for CS
  - Easy to lead learners aware that every behavior of computers around them has some reason based on CS theory and technology

Binary expressions

<table>
<thead>
<tr>
<th>Level</th>
<th>Max HP</th>
<th>Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>255</td>
<td>65535</td>
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Overflow

‘1-up glitch’

\[ \frac{1}{2} \times 129 \]

GAME OVER

What is the possible cause?

Primary & secondary storage

‘Now loading’ process

- Now Loading...
- You got it!
- Waiting for over 10 sec...
- (a movie plays 2 seconds)
- Is that all??
- What is loaded from what to what?

Code Theory

- Data lost

We’re very sorry but the record of Number 1 has been lost...

How did they detect ‘data loss’?

Algorithm

- Inescapable homing enemy

How do you solve this bug?

Other Topics

- Game controls (User Interface)
- Game Engine (Software Engineering)
- Lags (Network)
- Framerate drop (Processing Unit)

Implementation

Introduction to computer science through video games (2010-, at Okayama University)
- An elective general course for every student who doesn’t have enough basic knowledge of CS
- A total of 15 lessons, each 90 min long
- Lectures of basic CS theory and applications with a variety of videos & screenshots of video games

Result
- High attendance rates
- Keeping and improving the students’ motivation for learning CS

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