U!REKA CONNECTS

Custom Feedback Components for More Complex Kinds of Exercises

Education, E-Learning System, Automated Assessment, Dynamic and Detailed Feedback

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Project Website
jensliebehenschel.github.io/ADLT

GOOD FEEDBACK

The primary purpose of an e-learning system is for students to learn. But to achieve this, the students must be able to understand what mistakes they make. This is where detailed feedback comes in. With detailed feedback students should hopefully be able to comprehend which mistakes they made and then reflect on them.

And depending on the kind of exercise, creating such a system can be very hard to achieve.

An easy example would be solving math equations.

Equation	Feedback
$x = 5 + 3 \cdot 2$	Answer is **11** → **Correct** Answer is **16** → **Operator precedence?** Otherwise → **Unknown mistake**

FIG. : Rule-based feedback system for arithmetic expressions

While $x = 11$ is the correct answer, if the student were to arrive at $x = 16$, then one probable reason would be that they did not consider operator precedence and performed the addition before the multiplication instead. In that case, it could be worth a try to remind them about operator precedence. If that really was the source of their mistake, then that feedback could help the student effectively.

For other answers there is no likely explanation available, so one cannot provide any specific feedback, though with the exercise being this simple, there is no real need for it.

On the other hand, for more complex exercises, this problem becomes significantly more difficult.

BINARY TREES

Binary trees are an important concept in computer science. They consist of nodes, shown as circles. What matters is each node's value and its position within the tree.

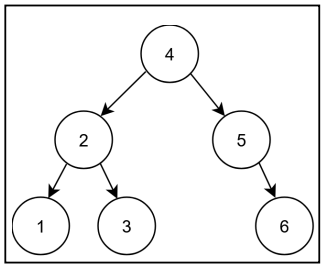

FIG. : Example of a binary tree

One can already guess that a feedback system for binary trees could be complex.

For the arithmetic equation there was just one number field, but now there is more room for mistakes. One can have too many nodes, too few nodes, nodes with the wrong value, and nodes at the wrong position. And of course, any combination of those.

A simple system like before is insufficient, so now there is a need for a more sophisticated system tasked with evaluating such tasks.

STUDENT PROJECTS

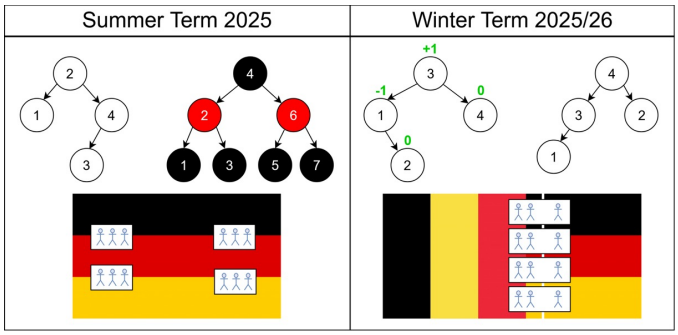

FIG. : Student projects creating feedback system for binary trees

And this is precisely, the topic of the two bachelor's courses, which we conducted in the previous two semesters. The first one at the Frankfurt University of Applied Sciences and the second one as a collaboration with our U!REKA partner HOGENT with mixed teams from both universities.