Master's Thesis

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Working title: A Comparative Analysis of Interactive Coding Platforms and a Prototype of a new Environment based on Recording and Replaying User Interactions

Interactive coding platforms like Jupyter Notebooks, Pluto, Observable and others are systems which can aid learning programming. By providing an intuitive interface where code can be written, executed, and visualized alongside explanatory text and multimedia elements, these systems facilitate hands-on learning experiences. Learners can experiment with coding concepts, immediately see the results of their code, and iteratively refine their understanding through exploration and experimentation.

Features like collaboration support and real-time updates foster community engagement and knowledge sharing, making these platforms ideal for collaborative learning environments. They empower learners to develop practical programming skills and gain a deeper understanding of programming concepts in a dynamic and engaging manner.

Despite of their power, the support of interactivity and collaboration is still limited. An idea of a new type of interaction would be to record all user interactions of a teacher, including keyboard and mouse input, audio input, possibly video, as well as program execution results, and allow replaying these by students. Further, students are able to provide their own inputs.

The goal of this thesis therefore is to do an analysis of existing platforms and design, implement, and evaluate a prototype of a new platform based on those ideas.

The thesis should include the following parts:

- Evaluation of interactive coding platforms like Jupyter, Pluto, Observable and others
- Analysis how they can support in teaching programming
- Design of a new platform based on the idea of recording and replaying user interactions including at least one programming language
- Implementation of the new platform
- Demonstration of application examples of the new platform
- Comparison to existing platforms with pros and cons

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