Augmenting OpenDSA eTextbook with Programmed Instruction Frames to Enhance Students Interaction and Engagement

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Problem Statement

- Static presentation of material can be easily skipped by students even if they did not understand the content.

- The main reason for this is that there is not enough student engagement for learning the materials.

- Some courses, like CS 4114 Formal Languages, require students to learn hard abstract content. This means we need to find a better way to engage students with the content of the slides.

- Programmed Instruction (PI) principles require students to be more engaged.

- We implemented a frame-based system to support PI pedagogy, making the slideshows far more interactive.

Programmed Instruction

- The idea of frames was initially inspired from B. F. Skinner's Programmed Instruction (PI) machine.

- The Programmed Instruction machine can be used to teach students the required materials by presenting a small piece of information (frame) to the student. Then the student must to answer a question.

- If the student successfully finishes a frame by solving the related question, the PI system will allow him/her to access the next frame. Otherwise, the student must try the question again.

- Students will have the motivation to solve each frame question correctly to move forward to further frames. This means more interaction and engagement if the frames are well designed.

Future Challenges

- Defining a new mechanism for how the system will identify if the student can access a specific frame or not. We need to limit the student's ability to skip any frame by enforcing them to satisfy a particular framed-satisfaction criterion. So, students may work on a frameset over several days, and we need to identify for every frameset if the student can access specific frames inside the set or not. Many students will use the proposed book at the same time.

- Recognizing each student's progress inside the frameset, and on all modules, e.g., which module each student can access.

- Providing students different questions each time they practice the same frameset.

- Help other researchers to build Programmed Instruction materials. We believe that creating the frames framework will encourage the researchers to build Programmed Instruction materials for their courses.

OpenDSA Slides V.S. Frames
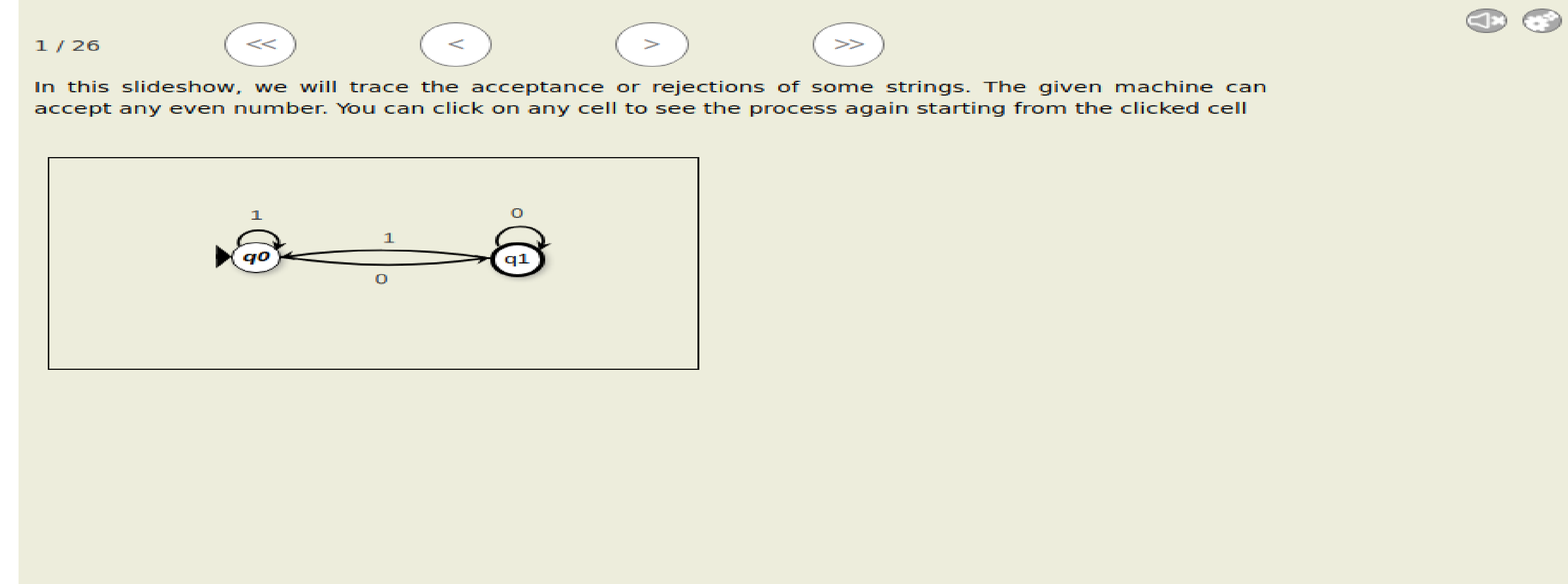
- Our primary goal is to follow the PI principles. We need to add a constraint that prohibits students from skipping the current slide. To achieve this goal, we built a new framework, called Frames.

- The frame is similar to the slide in that it has the same buttons and space to give the information to students. However, there are differences between frames and regular OpenDSA slides, which are:

  - Each frame will have satisfaction criterion. For each frame, the student has to do something to be able to move forward.

  - Students can not use the forward button until they satisfy the satisfaction criterion. However, students can use this button freely if they previously completed this frame. This allows students to review the frame.

  - Students can not use the "last slide" button unless they fulfill the satisfaction criterion for all frames in the module.

  - The frame layout has space dedicated to content and space dedicated to question or actions.
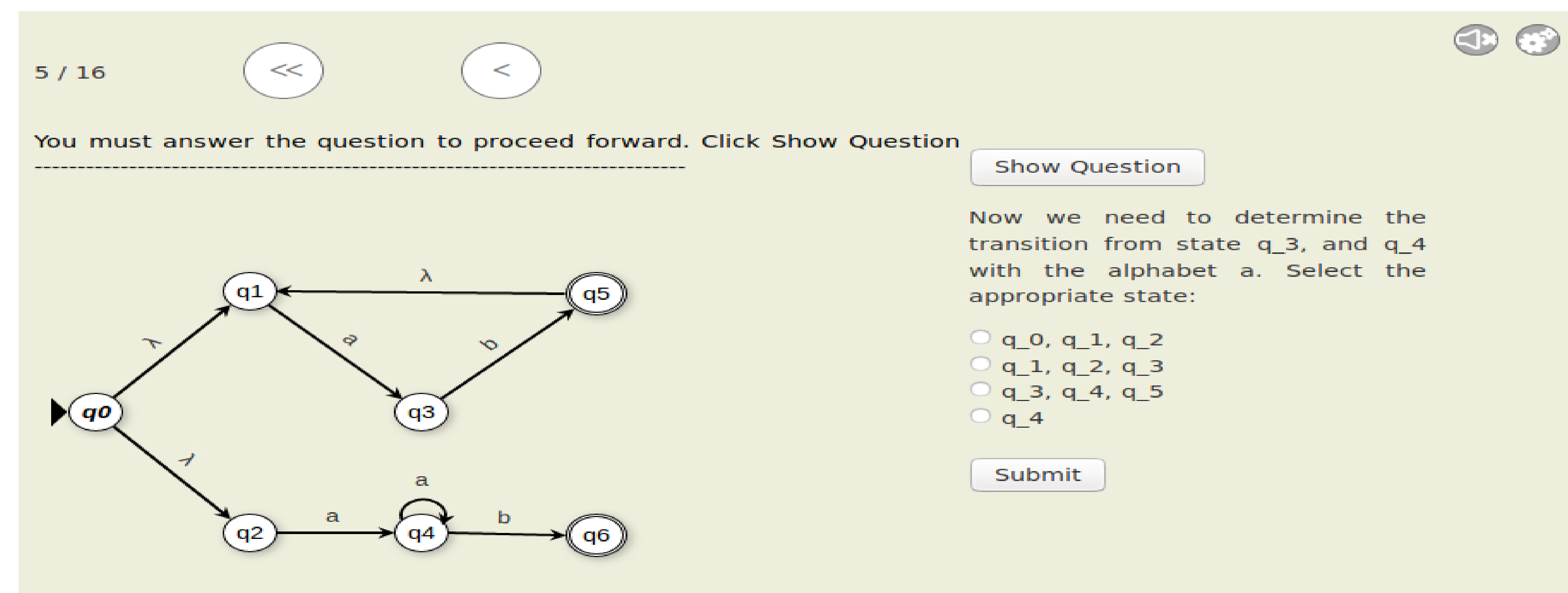
Examples

References

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