Leveraging Distance Learning Of Engineering Skills Through Video Exercises

Germán Moltó, Jose F. Monserrat
Universitat Politècnica de València
gmolto@dsic.upv.es, jomondel@dcom.upv.es
Outline of the Talk

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Introduction

- **Problem:**
  - Many technical degrees require students to solve problems to develop the appropriate skills (mimicking the professor).

- **Opportunity:**
  - Massive adoption of electronic devices, widespread broadband access to the Internet

- **Proposal:**
  - Create video exercises that depict the statement and the resolution process of a problem solved and narrated by the teacher in a digital whiteboard.
    - Accessible online on a 24/7-basis.
Problem-Solving Video Exercises

- **Video-exercise:**
  - A combination of audio and video in which a white background serves as the canvas for the teacher to propose and solve a problem, just like writing on a paper.
  - Accompanied by an audio narration of the teacher in which the resolution process is explained.

- **Requirements:**
  - **Hardware**
    - Computer, graphics tablet
  - **Software**
    - Screencasting, video codification, online video provider.
Tools & Technologies

- Video distribution services: YouTube, Blip.tv, poli[Tube].
This trial and error iterative procedure enables the teacher to gain confidence with the video exercise generation methodology.

Do not forget to include a mark in the video to clearly identify its authorship.

Use different layers:
- The lowest layer: Authorship identification details.
- Middle layer: State the problem.
- Upper layer: Drawing the solution of the problem.
Workflow of video exercise distribution

- Teachers receive immediate feedback about the number of views of their videos.
Post-order traversal in a Binary Search Tree (in Spanish)

Video-Exercise Example (2/2)

- Integration with the Learning Management System.
## Discussion

### Pros for the Student

- **24/7 access from multiple devices**
- Seamless and repeated access to the video
- Reduced dependence on the professor’s schedule

### Pros for the Teacher

- Record once, show many.
- Survival of the fittest approach to improve the videos
- Reuse the videos (office hours, distance learning, etc.)
Conclusion and Future Work

- This paper has described the early experiences of using video exercises that can be accessed online in which the teacher solves a certain problem using a digital tablet together with a narration of the procedure.
  - These techniques have been employed in the degrees of computer science and telecommunications engineering at the Universitat Politècnica de València.

**Future work:**
- Continue with the development of videos, incorporating the feedback gained in the early experiences.
- Include closed captioning in order to reduce the limiting barriers for students with special requirements.
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