Engaging Students Through Video: Integrating Assessment and Instrumentation

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This is CS50

• 700 students, majors and non-majors alike
• weekly problem sets
• lectures, sections, walkthroughs
• mostly C, some PHP, SQL
Background
you all the steps involved just so you get a sense that this is a real code that I'm going to write here. So I will go ahead and comment out the earlier line. And now I'm going to change the color.

**So, for example, I could make this all white. So let's make it all white.**

And if I do this I should get a completely white floor. The final one is already white, so let me save this file.

And you may have a number of different compilation environments, but I'm running this on a Mac.
A cycle that uses each edge of a graph exactly once is called _____________.

- a simple cycle
- an Euler tour
- a Hamilton tour
- a path
**local sensitivity:** if (in addition) $p^*(u, v)$ is differentiable at $(0, 0)$, then

$$
\lambda_i^* = -\frac{\partial p^*(0, 0)}{\partial u_i}, \quad \nu_i^* = -\frac{\partial p^*(0, 0)}{\partial v_i}
$$

proof (for $\lambda_i^*$): from global sensitivity result,

$$
\frac{\partial p^*(0, 0)}{\partial u_i} = \lim_{t \to 0} \frac{p^*(tc_i, 0) - p^*(0, 0)}{t} \geq -\lambda_i^*
$$

$$
\frac{\partial p^*(0, 0)}{\partial u_i} = \lim_{t \to 0} \frac{p^*(tc_i, 0) - p^*(0, 0)}{t} \leq -\lambda_i^*
$$

hence, equality

$p^*(u)$ for a problem with one (inequality) constraint:

![Graph](image)
Goals

• extend existing player functionality
• add seamless in-video exercises
• make videos more engaging for students
CS50 Video
Features

• searchable transcripts
• variable playback speed
• captions
• translations
• analytics
• in-video exercises
var player = new CS50.Video({
    download: {
        '720p': 'http://example.com/720p.mp4',
        'MP3': 'http://example.com/audio.mp3',
        'Notes': 'http://example.com/notes.pdf'
    },
    playerContainer: '#video',
    srt: {
        en: 'http://example.com/en.srt',
        pt: 'http://example.com/pt.srt'
    },
    title: 'Lecture 1: Wednesday',
    ...
});
Question Types

- multiple choice
- true/false
- numeric
- short answer (via regex)
Mobile: Goals

- Emulate the in-class experience
- Different viewing options
- Increase flexibility
- Control over playback and content
with for a company or with some partner working on some project
Results
CS50x

- 150,000 students
- 100,000 have watched at least one video
- 900,000 in-video questions answered
CS50x

- 28% have answered at least one question
- 62% of all answers are correct
- 80% of correct answers are reached in at most two attempts
Incorrect Attempts

Responses

Number of Incorrect Attempts

- 0: 300,000
- 1: 100,000
- 2: 30,000
- 3: 10,000
- 4: 3,000
- 5: 0
Students who answered a question
Engagement
Engagement
Improvements

- low engagement with video questions
- varying question quality across videos
- incentives to engage
http://github.com/cs50