Media Computation in Python

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Motivation

- **What** is media computation?

- **Who** are we trying to reach?

- **Why** do this instead of a "traditional" introductory CS approach?

Paradigm

- Focus is **procedural** rather than object-oriented

  - Usually `getRed(pixel)` instead of `pixel.getRed()`

- However, object-oriented style is still available

- So whether you're **objects-early** or **objects-late**, media computation can work for you

Main Topics

- Arithmetic expressions

- Variables

- Conditional statements

- Basic lists

- Functional decomposition

- Loops

  - Collection-based
    `for value in list`

  - Count-based
    `for i in range(...)`

  - Simple and nested

What's Missing?

- Some Python concepts have weaker coverage or "don't fit"

- Dictionaries

- Condition-based loops

- String manipulation

- File input/output

Environments

The Dilemma

- There is **no** native Python distribution that

  - Can manipulate modern **image/sound** formats out of the box...

  - ...and is **cross-platform**...

  - ...and has an IDE suitable for **absolute beginners**...

  - ...and is **easy to install** and configure

- So, what are our options?

JES (Jython Environment for Students)

- Developed by Mark Guzdial and Barbara Ericson at Georgia Tech

- Runs on **Jython** (Python using the Java JVM)

  - We get Java's image/sound processing for free

  - Java is cross-platform

  - Custom student-oriented IDE written in Java

  - Most people have Java installed already

Pythy: Online IDE for Python

- Developed by Tony Allevato and Stephen Edwards at Virginia Tech

- **Web-based** IDE, runs entirely in the browser

- No installation — just log in, find your course, and get started

- Previewing an early version for you today — keep an eye out at **SIGCSE** and **ITiSCE** for more

Pythy Features

- **Translates Python code to Javascript** to run entirely client-side (Skulpt)

- Automatically saves all code in **Git repositories** on the server — no risk of data loss

- Students can **manage their own media** files to use on assignments

- "Examples" support live-push to student browsers for **in-class coding**

- **Automated grading** using Python unit tests

Examples

Getting Started

- Go to **https://pythy.cs.vt.edu**

- Create an account

- Choose **JMU CS Academy** as your organization

- Choose **Summer I 2013** as your term

- Click **Enroll** for the June 25 section of Media Comp

Untested in IE. Chrome, Safari, Firefox preferred.

Examples

- **Image Processing**

  - Basic image filters

  - Steganography

  - Creating charts from drawing primitives

- **Sound processing**

  - Guitar string synthesis