University of Illinois at Chicago
Department of Computer Science

CS 0.5 with Media Computation

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Two different parts

• Splitting incoming majors into different tracks: CS 0.5

• What is taught in one track: mild variation on Guzdial’s Media Computation in Python
Problems in Computer Science

- High Attrition Rate at Freshman and Sophomore level
  - 19% National Average
  - As high as 66%
  - 30%-40% at UIC
  - Worse for Female Students

- Not attracting students into the Program
Reasons for High Attrition

• "The traditional approach to CS1 has been found to discourage many prospective computing majors"

• Introductory CS often fail to engage students

• Class are described as
  – too boring
  – overly technical
  – lack creativity
Reasons for High Attrition

• Students have wide variations in background and experiences
  – Slower pace bores those with Greater Experience. Students lose interest!
  – Faster pace loses those with Lesser Experience. Students feel incompetent!
Our Solution

• Divide and Instruct

• Divide Incoming students into two groups
  – Those with greater experience
  – Those with lesser experience

• Use placement exam to determine experience level
Placement Exam

- Focus on Semantics not Syntax
  - Language Independent
- Write code showing some minimal knowledge of:
  - Variables
  - Arrays
  - If Statements
  - Loops
  - Basic Function Calls
Division of Students

- Students not taking or not passing the placement exam follow normal route of CS 0.5 course followed by an aggressive CS 1 course
  - CS 0.5 is not “remedial” but “normal”

- Students passing placement exam are
  - advanced into the aggressive CS 1 course
  - receive credit for our CS 0.5 course
  - “Free” credit motivates the students
Jargon: CS 1, CS 0, etc.

- **CS 1**: First course for CS majors, programming in Java in >50% of U.S. schools today.
- **CS 0**: Survey of computer science topics, may or may not include a drop of programming (Javascript, VB); typically for non-majors.
- **CS 0.5**: My term for home for 1/2 of incoming CS majors
Curriculum of CS 0.5 at UIC

• Based on Mark Guzdial’s Media Computation course from GA Tech

• Engage them with Pictures, Sound and Movie manipulation

• Programming in Python with special IDE and add-ons for novice media programmers; programming important but not entire course
def turnRed():
    brown = makeColor(48,20,17)
    file = "~/Users/sloan/MediaSources/emma.jpg"
    picture = makePicture(file)
    for px in getPixels(picture):
        color = getColor(px)
        if distance(color,brown) < 25.0:
            redness = getRed(px)*1.5
            setRed(px,redness)
    show(picture)
    return(picture)
Posterizing: Reducing range of colors
How do we compare algorithms?

• There’s more than one way to sample.
  – How do we compare algorithms to say that one is faster than another?

• Computer scientists use something called Big-O notation
  – It’s the order of magnitude of the algorithm
  – The goal is to describe what happens to the running time of the algorithm as the size of the input grows

• Big-O notation tries to ignore differences between languages, even between compiled vs. interpreted, and focus on the number of steps to be executed.
Advantages of Python

• Fun, relatively easy language
• Not terribly Java-like, so not overlapping with Java students will learn later
• Easy to do Internet things, like downloading web pages, and string things, like writing web pages
## Preliminary Results

<table>
<thead>
<tr>
<th></th>
<th>Enrollment</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Old: Fall 02</strong></td>
<td>61</td>
<td>74.8%</td>
</tr>
<tr>
<td><strong>Old: Spring 03</strong></td>
<td>38</td>
<td>76.7%</td>
</tr>
<tr>
<td><strong>Old: Fall 03</strong></td>
<td>51</td>
<td>68.6%</td>
</tr>
<tr>
<td><strong>Old: Spring 04</strong></td>
<td>22</td>
<td>82.9%</td>
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<tr>
<td><strong>Old: Fall 04</strong></td>
<td>15</td>
<td>93.3%</td>
</tr>
<tr>
<td><strong>Average “Old”</strong></td>
<td>37</td>
<td>75.9%</td>
</tr>
<tr>
<td><strong>New: Spring 05</strong></td>
<td>18</td>
<td>94.4%</td>
</tr>
</tbody>
</table>
## Absolute latest results

| OLD Average Success Rate (ABC) | 76% |
| NEW Average Success Rate (ABC); 2 semesters of data | 91% |
A bit about the course

• Tweaked version of Guzdial Media Comp course for Georgia Tech non-majors
• Mildly slower pace
• A bit more drill on easiest programming fundamentals
• Our tweaked version is available on our website, of course: http://wiki.cs.uic.edu:8080/CS101