CS 134
Intro to Computer Science

Apr 8, 2016

Lecture 21:
Arrays and Images, Part 2

Announcements

- TA/Tutor Applications due next Friday
- Next week’s lab: Write your own implementation plan!

Come join Jaclyn Porfilio ('15) and Ryan Barry ('15) for an introduction to consulting (and McKinsey) specifically for DIII majors! Deadlines come quickly senior fall, so we wanted to give sophomores and juniors a chance to jumpstart thinking about consulting. This is for any DIII majors who don’t know what they want to do after graduation or have ever wondered what consulting really is. We will provide pizza. Friday April 8th 12-1pm in Wege.

Last Time

- Learned about arrays
- Learned about for loops

For Loops

- for (int x = 0; x < array.length; x = x+1) { ... }
- **First parameter:** assign start value of loop variable
- **Second parameter:** loop condition (just like while)
- **Third parameter:** how the loop variable changes
- Can easily convert while loops to for loops
- array.length tells you the size of the array
- **Note** array.length is not a method call! (It is not array.length())
Today’s Plan

- 1-D Array Example: LetterHistogram
- 2-D Arrays
- Lab 7: SImages, Files, ...
- Image Manipulation

Examples

- Sorting and swapping
- Histogram

2-Dimensional Arrays

What kind of object is int[][] pixels?

- int[] grades; // an array of ints
- String[] months; // an array of Strings
- JButton[] choices; // an array of JButtons
- AnyJavaClass[] xyz; // an array of AnyJavaClass
- int[][] pixels; // an array of int[]s!

Representing Intensities

- Black & white image: collection of gray-scale values (e.g., 0–255) in a rectangular array
- int [][] pixels = myImage.getPixelArray();
- pixel[x][y] is value in x\textsuperscript{th} column (from left), y\textsuperscript{th} row from top
- pixel[0][0] is top left value
Array of arrays

- Not all of the 1-D arrays need same length
- String[][] wordTable can have
  wordTable[i].length ≠ wordTable[j].length
- wordTable.length is number of 1-D arrays in
  the 2-D array!
- Can have more than 2 dimensions:
  - int [][][] colorPixels;
  - colorPixels[0] : 2-D array of RED values

SImages, Files, and Layouts

- ImageIcon Class
- JFileChooser
- BorderLayout
- Sample Code: SimpleImage
Look at Edges in action

We need to find edges in pixel array, but how?
Edges

- Look at Edges in action
- We need to find edges in pixel array, but how?
  - Look at neighboring pixels
  - If difference in brightness is significant, mark current pixel as black (it's an edge!)
  - Otherwise, mark it white

Shift

What other things can we do with arrays?

Copy them to “shift” the values
Another example: Scaling

8x10
8*140/100 = 11.2 = 11

5x7
8*70/100 = 5.6 = 5

11x14
scaled[0][0] = orig[0*100/70][0*100/70] = orig[0][0]
scaled[0][4] = orig[0*100/140][4*100/140] = orig[0][2]

scaled[0][7] = orig[0*100/140][7*100/140] = orig[0][5]