CS 0
Adventures in Media Computing

Introduction to Media Computing

Original Source: Christine Alvarado
Admin

☐ Check CIS accounts which allow you to get onto these machines.
☐ Go to F&M where your id cards can be coded to get into the lab.
☐ Twiki Page:
  https://www.cs.hmc.edu/twiki/bin/view/CS0Spring2009/WebHome
☐ Book:
  ■ “Intro to Computing and Programming in Python,” by Mark Guzdial
  ■ Bring your book to class
☐ Software
  ■ JES,
    http://coweb.cc.gatech.edu/mediaComp-teach/26
☐ Friday Afternoon Open Lab: 2:45 – 5:00
☐ Profs Elizabeth Sweedyk, ‘Z’ & Michael Erlinger, ‘Mike’
Philosophy

☐ More of a lab course then a lecture course
  ■ Some lecture
  ■ Some lab.

☐ Start labs in Class, finish for hwk

☐ Programs will NOT be the most efficient, rather try to make Clear and Understandable

☐ Do your own work!!

☐ Grades based on Labs, Projects, and Tests
What is “Media Computing”?

Media Computing = Media + Computing

def lighten(picture):
    for px in getPixels(picture):
        color = getColor(px)
        makeLighter(color)
        setColor(px, color)
Working With Media
Programming with Media

In this course you will write computer programs to manipulate media (images and sounds) automatically.

At the end of this course you will be able to write programs in Python that will:
- Automatically reduce red-eye or enhance color in images
- Automatically combine pictures into unique collages
- Manipulate sound
- Create web pages to showcase your creations
- And much more!

And, you will understand computer programming in general!
CS = Study of Information

- Computers store information
- Computer programs describe how to manipulate and modify information

"Information"

Computer Programs

- Remove Green

Modified Information

- Remove Background
Your Computer, Unveiled

Point out everything inside the computer (all data) is 1s and 0s
Multimedia = 1s and 0s?

- Pictures, Sounds, Videos are all stored inside the computer as 1’s and 0’s!
- It’s all about the encoding
Multimedia manipulation

Lab 1: Writing Programs to Manipulate Images

Learn the basics of writing computer programs (recipes)

Describe how an image is represented as “information”
# A Standard Recipe

## Ingredients:
- 2 1/4 c. flour
- 1 tsp baking soda
- 1 tsp salt
- 1 c. butter
- 3/4 c. sugar
- 3/4 c. brown sugar
- 1 tsp vanilla
- 2 eggs
- 2 c. choc. chips

## Steps:
1. Combine flour, baking soda and salt in small bowl.
2. Beat butter, granulated sugar, brown sugar and vanilla in large mixer bowl.
3. Add eggs one at a time, beating well after each addition;
4. Gradually beat in flour mixture.
5. Stir in morsels.
6. Drop by rounded tablespoon onto ungreased baking sheets.
7. Bake in preheated 375-degree [Fahrenheit] oven for 9 to 11 minutes or until golden brown.
8. Let stand for 2 minutes;
9. Remove to wire racks to cool completely.

More information and the original recipe can be found [here](http://www.well.com/user/vard/cookie.html).
Computers are not Smart

A “recipe” has to be very detailed

| Information | 2 | 5 | 1 | 6 | 1 |

Goal: Find the average of the numbers in the list

Recipe?:
1. add all the numbers together
2. divide by the length of the list

Problems:
1. How do we refer to this information?
2. How does the computer know how to “add up a list”?
3. How long is a list? Where is its end?
Storing Information

- Information is represented inside the computer in 1’s and 0’s (binary)
- How does the computer know what information we are talking about?

Variables: Named storage locations for data

We could point to the location where the information is...
But that’s a pain
So we give the location that holds the information names
These names are called “Variables”
Variables

- Variables are names for locations in the computer that store data

```python
myName = "Christine"
print myName
a = 5
print a
b = a + 6
print b
a = 2
print a
print b
```
Activity

☐ Average, precisely

| Information | 2 | 5 | 1 | 6 | 1 |

Goal: Find the average of the numbers in the list
Recipes (Functions) Have Names

# Create our own recipe named 'average'
def average( listOfNumbers, size ):
    total = 0
    index = 0
    while index < size:
        total = listOfNumbers[index] + total
        index = index + 1
    average = total / size
    return average

# Anywhere else in our program:
myList = [2, 3, 4]
myAverage = average( myList, 3 )
print myAverage
Pictures as “Information”

- We can store pictures in variables too!

```python
myFilename = "C:\butterfly.jpg"
myPicture = makePicture(myFilename)
```

variables

recipe that someone else wrote

data the recipe needs

- Next time we will talk about what pictures “look like” when represented in the computer
Getting Started

- We will be programming in a language called Python
  - Our version of Python is called Jython (Java-based Python... and don’t worry if this doesn’t make sense to you)

- Writing a program (in Python) involves:
  - Writing the algorithm (i.e. the recipe)
  - Translating the recipe into Python code (and typing it into the computer)
  - Running the recipe
  - Debugging—a.k.a. figuring out what’s wrong and fixing it
Designing the Algorithm

- Can (and should) be done AWAY from the computer

- Tools needed:
  - Pencil and paper

- But many of our algorithms will be very small so you will tend to ‘forget’ paper and pencil!!!
Writing the Python code

- Translate your recipe into a language the computer can understand (i.e., Python)
- Tools needed:
  - JES
Run Your Program

☐ Ask the computer to execute your code

☐ Tools needed:
  - JES
Debug Your Program

- Figure out what went wrong and fix it
- Tools needed:
  - JES
  - print statements
Summary

- Media Computing involves writing programs to manipulate media, represented as information.
- Information is stored in “named locations” inside the computer:
  - Variables
  - Filenames
- Computer programs are detailed “recipes” (a.k.a. algorithms) for manipulating information.

Don’t worry if you’re still unsure what’s going on... the labs will walk you through more details.
Summary

- Program – description in a programming language of a process that achieves some result that is useful to someone.
- Algorithm – description of a process apart from any programming language.
- Recipe – For this class, describes programs or portions of programs that achieve some useful media-related task.
- Digitization – Process of encoding media into bits.