CMSC 110
Introduction to Computing

Administrivia
CMSC 110: Introduction to Computing
Spring 2014

Course Website: http://www.cs.brynmawr.edu

Instructor:
Jia Tao, Ph.D. (jtao@cs.brynmawr.edu)

Lectures
TuTh 2:25PM-3:45PM in Park 338

TA-Support
>20 hrs/week in Park 231

Open Labs (Optional)
TuTh 4:00pm - 6pm in Park 231

Grading
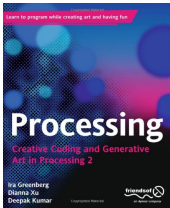|		
•	7 Assignments	56%
•	Exam 1	18%
•	Exam 2	26%
	Total	100%

Administrivia

Software
Processing 2.X
– Already installed in the CS Lab
– Also available for your own computer @ www.processing.org
– Processing == Java

Book
Creative Coding & Generative Art in Processing 2 by Ira Greenberg, Dianna Xu, Deepak Kumar, friendsofEd/APress, 2013. Available at the Campus Bookstore or amazon.com or other vendors.

Processing
Creative Coding and Generative Art in Processing 2

Ira Greenberg
Dianna Xu
Deepak Kumar

Class Lottery

• Make sure to sign-in your name.

• If you are not "in" the lottery, indicate that. We will contact you by e-mail as soon as we have confirmation from other students.

What is Computing?

Computing: Your Parent's View

Computing: internet, e-mail, network…

Computing: Digital Photography

http://www.alanzeyes.com/2009/02/hdr-photography.html

Computing: Entertainment…

You Tube

NETFLIX

hulu
Watch your favorite. Anytime. For free.
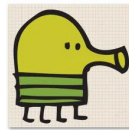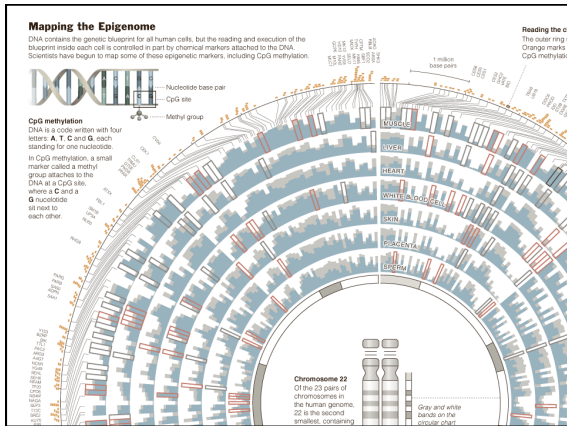
Computing: Entertainment…

"Computer science is no more about computers than astronomy is about telescopes"

- Edsger Dijkstra

Cutting Edge Computer Science

Mapping the Epigenome

DNA contains the genetic blueprint for all human cells, but the reading and execution of the blueprint inside each cell is controlled in part by chemical markers attached to the DNA. Scientists have begun to map some of these epigenetic markers, including CpG methylation.

Reading the c
The outer ring
Orange marks
CpG methylatio

— Nucleotide base pair
— CpG site
— Methyl group

CpG methylation
DNA is a code written with four letters: **A**, **T**, **C** and **G**, each standing for one nucleotide.

In CpG methylation, a small marker called a methyl group attaches to the DNA at a CpG site, where a **C** and a **G** nucleotide sit next to each other.

1 million base pairs

MUSCLE
LIVER
HEART
WHITE BLOOD CELLS
SKIN
PLACENTA
SPERM

Chromosome 22
Of the 23 pairs of chromosomes in the human genome, 22 is the second smallest, containing

Gray and white bands on the circular chart

Google's Autonomous Car

- Nevada made it legal for autonomous cars to drive on roads in June 2011
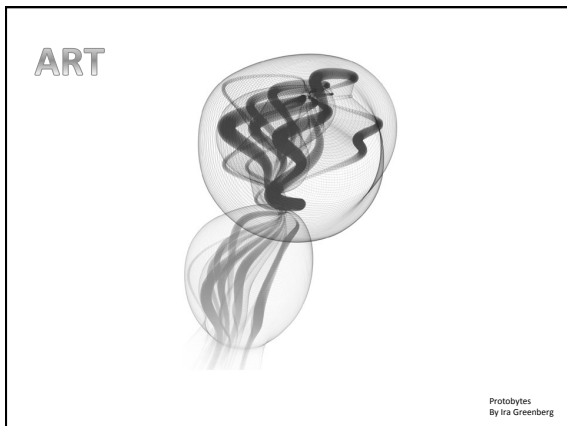- California introduced a similar bill in Aug 2012

2011 Jeopardy!

$200 $4,000 $600
Ken WATSON BRAD
Maxwell's silver hammer — 96%
FRANK SINATRA — 11%
Brown — 7%

- In February 2011, IBM Watson bested Brad Rutter (biggest all-time money winner) and Ken Jennings (longest winning streak)
- IBM is currently applying Watson's technology to medical diagnosis and legal research

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Robot Soccer

Humanoid League

Aibo League

RoboCup International Robotics Competition
http://www.robocup.org/

Bryn Mawr Robot Soccer Team (Mexico 2012)

ART

Protobytes
By Ira Greenberg

Areas in Computer Science

Artificial Intelligence

Robotics

Human-Computer Interaction

Computer Graphics

Computer Vision

Operating Systems

Computer Networking

Databases

Computer Security

Ubiquitous Computing

What is Computer Science?

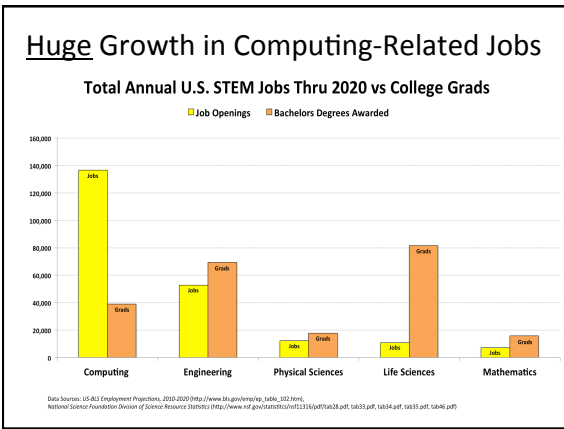Computer science is the study of solving problems using computation

– Computers are part of it, but the emphasis is on the problem solving aspect

Computer scientists work across disciplines:

Mathematics	Geoscience	Medicine/Surgery
Biology (bioinformatics)	Archeology	Engineering
Chemistry	Psychology	Linguistics
Physics	Sociology	Art
Geology	Cognitive Science	…

Computing is important

<u>Huge</u> Growth in Computing-Related Jobs

Total Annual U.S. STEM Jobs Thru 2020 vs College Grads

☐ Job Openings   ☐ Bachelors Degrees Awarded

Data Sources: US-BLS Employment Projections, 2010-2020 (http://www.bls.gov/emp/ep_table_102.htm),
National Science Foundation Division of Science Resource Statistics (http://www.nsf.gov/statistics/nsf11316/pdf/tab28.pdf, tab33.pdf, tab34.pdf, tab35.pdf, tab46.pdf)

Computing is Consistently Ranked Among the Best Occupations

CS-Related Jobs Highlighted in Red

CS Careers Rank Highly In:
- Job satisfaction
- Salary
- Work/life balance
- Growth potential
- Employment rate
- Work environment

Strong Earnings Potential

Salaries of Bryn Mawr Graduates
- Computer Science Dept
- All Science Depts
- College Average

$120,000 | $66,667 | $57,134

Average Individual Annual Income

Office of Institutional Research, Planning, and Assessment Bryn Mawr College

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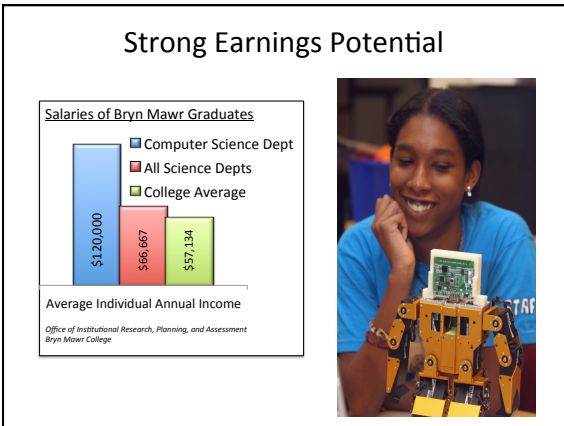
Computer science tops list of best major for jobs

BY RACHEL GOTTFRIED

…many different companies … need to hire computer scientists. They aren't tied to one particular industry.

Introduction to ^ Creative Computing

Computing

Visualizations

Programming

Aesthetics & Art

Algorithms

Processing/ Java

Computational Media
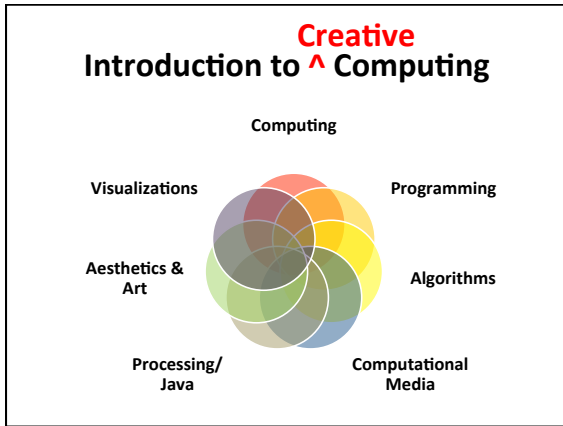
Algorithms

An **algorithm** is an effective method for solving a problem expressed as a finite sequence of instructions. For example,

Put on shoes
  left sock
  right sock
  left shoe
  right shoe

Programming = Writing Apps

Programming is the process of designing, writing, testing, debugging / troubleshooting, and maintaining the source code of computer programs. This source code is written in a programming language.

A program

```
int areaOfCircle(int radius){
   return PI*radius*radius;
}

r = 10;
area = areaOfCircle(r);
```

Programming Languages

Processing	Python	Lisp

`int areaOfCircle(int radius){`
`   return PI*radius*radius;`
`}`
 	
`r = 10;`
`area = areaOfCircle(r);`
	`def areaOfCircle(radius):`
	`   return PI*radius*radius;`
	
	`r = 10`
	`area = areaOfCircle(r)`
		`(defun areaOfCircle (radius)`
		`   (return (* PI radius radius)))`
		
		`(setq r 10)`
		`(setq area (areaOfCircle r))`

A more interesting program…

```
Eye e1, e2, e3, e4, e5;

void setup()
{
  size(200, 200);
  smooth();
  noStroke();
  e1 = new Eye( 50, 16, 80);
  e2 = new Eye( 64, 85, 40);
  e3 = new Eye( 90, 200, 120);
  e4 = new Eye(150, 44, 40);
  e5 = new Eye(175, 120, 80);
} // setup()

void draw()
{
  background(102);

  e1.update(mouseX, mouseY);
  e2.update(mouseX, mouseY);
  e3.update(mouseX, mouseY);
  e4.update(mouseX, mouseY);
  e5.update(mouseX, mouseY);

  e1.display();
  e2.display();
  e3.display();
  e4.display();
  e5.display();
} // draw()
```

```
class Eye
{
  int ex, ey;
  int size;
  float angle = 0.0;

  Eye(int x, int y, int s) {
    ex = x;
    ey = y;
    size = s;
  } // Eye()

  void update(int mx, int my) {
    angle = atan2(my-ey, mx-ex);
  } // update()

  void display() {
    pushMatrix();
    translate(ex, ey);
    fill(255);
    ellipse(0, 0, size, size);
    rotate(angle);
    fill(153);
    ellipse(size/4, 0, size/2, size/2);
    popMatrix();
  } // display()
} // class Eye
```
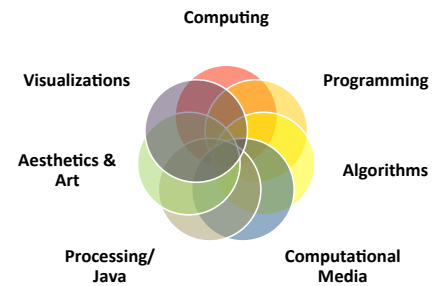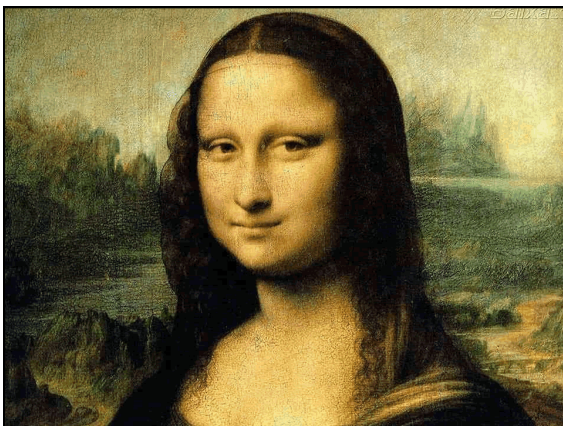
Our Goal

- Use computing to realize works of art

- Explore new metaphors from computing: images, animation, interactivity, visualizations

- Learn the basics of computing
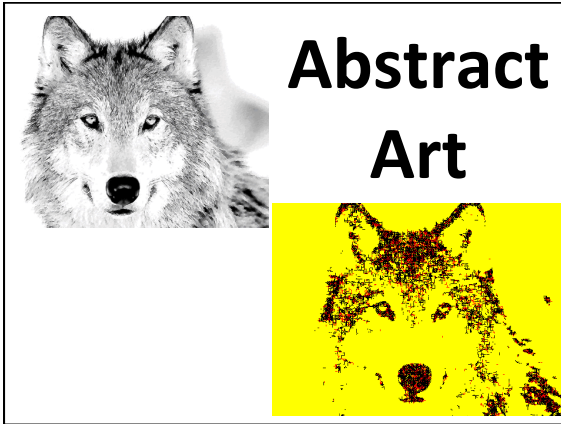
- Have fun doing all of the above!

Introduction to ^ Creative Computing

Computing

Visualizations

Programming

Aesthetics & Art

Algorithms

Processing/ Java

Computational Media

Examples

Shepard Fairey

Abstract Art

Summertime

Summertime,
And the livin' is easy
Fish are jumpin'
And the cotton is high

Your daddy's rich
And your mamma's good lookin'
So hush little baby
Don't you cry

One of these mornings
You're going to rise up singing
Then you'll spread your wings
And you'll take to the sky

But till that morning
There's a'nothing can harm you
With daddy and mamma standing by

Summertime,
And the livin' is easy
Fish are jumpin'
And the cotton is high

Your daddy's rich
And your mamma's good lookin'
So hush little baby
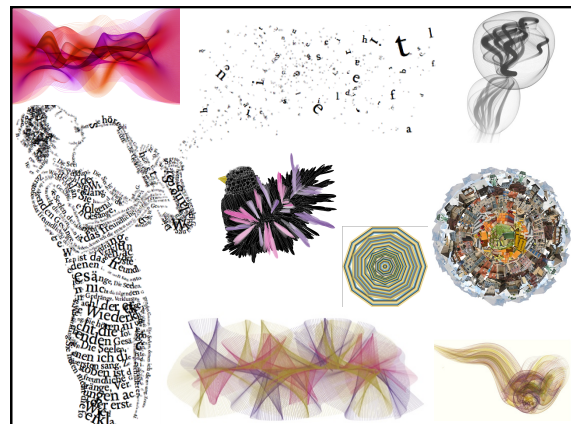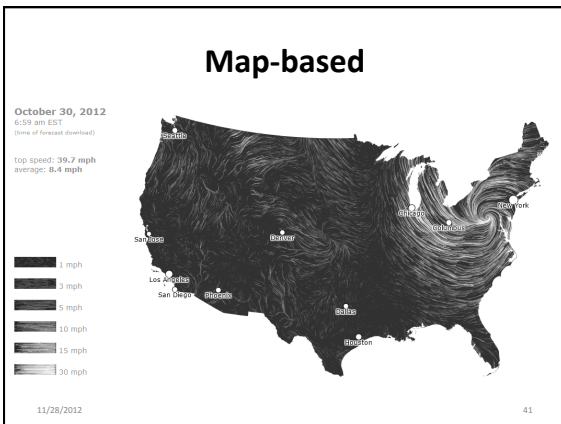Don't you cry

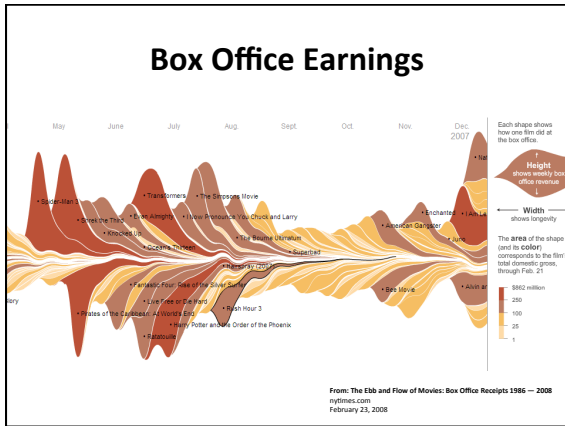Word Cloud

Created using: wordle.net

Lyrics by George Gershwin

World Cloud

President's Inaugural Addresses

Map-based

October 30, 2012
6:59 am EST
(time of forecast download)

top speed: **39.7 mph**
average: **8.4 mph**

1 mph
3 mph
5 mph
10 mph
15 mph
30 mph

11/28/2012

Box Office Earnings

From: The Ebb and Flow of Movies: Box Office Receipts 1986 — 2008
nytimes.com
February 23, 2008

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- Learn the basics of computing

- Have fun doing all of the above!