

# CMSC110

## Introduction to Computing

Deepak Kumar

### Administrivia

## CMSC110: Introduction to Computing

### Fall 2014

Course Website: <http://cs.brynmawr.edu/Courses/cs110/fall2014dk/>

Instructor:

Deepak Kumar, (dkumar@cs.brynmawr.edu)

#### Lectures

TuTh 2:15p to 3:45p in Park 338

#### TA-Support

>20 hrs/week in Park 231

#### Open Labs (Optional)

Wed 10:00a to 12:00noon in Park 231

#### Office Hours

Available by appointment. Walk-ins are welcome!

#### Grading

• 7 Assignments	56%
• In-class Quizzes	4%
• Exam 1	18%
• Exam 2	26%
Total	100%

## Administrivia

### Software

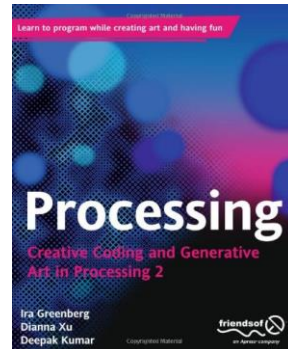
#### Processing 2.X

- Already installed in the CS Lab
- Also available for your own computer @ [www.processing.org](http://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.



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## 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.

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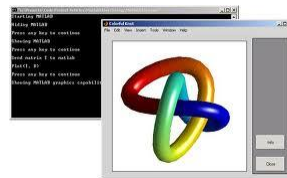
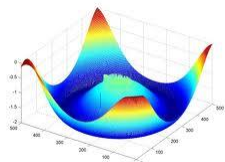
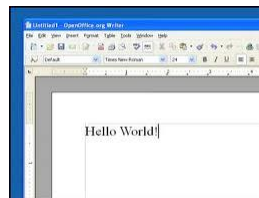
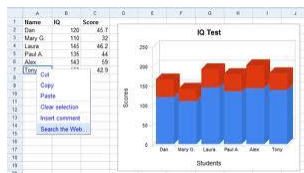
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# What is Computing?

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## Computing: Your Parent's View



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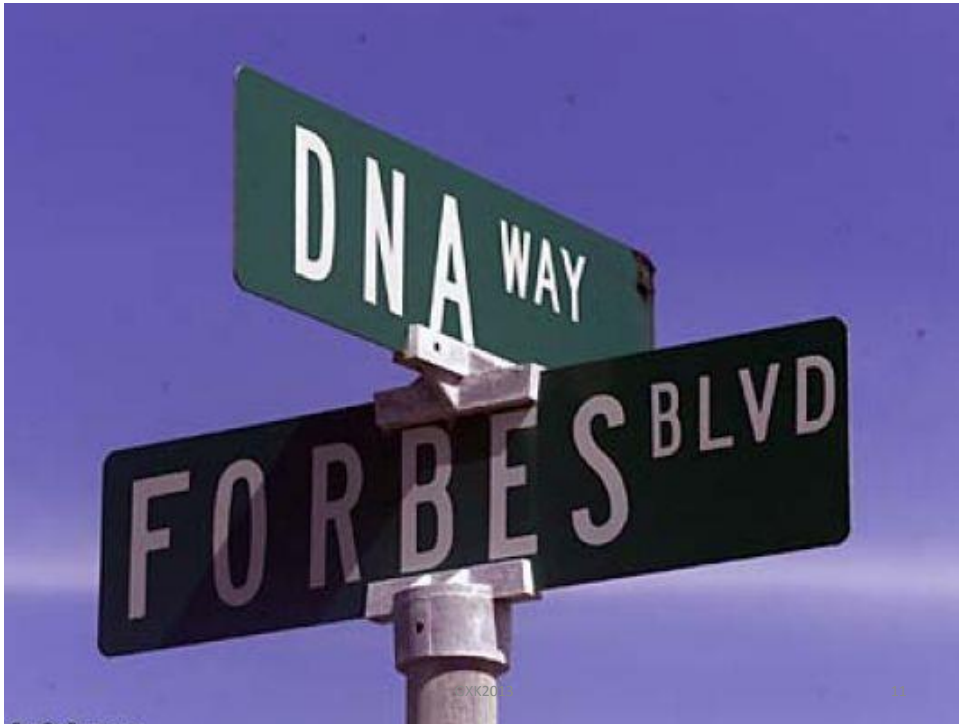
# Computing: Entertainment...



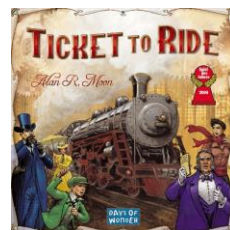
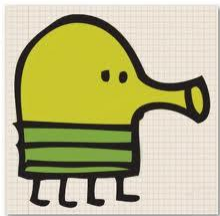
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## Computing: Entertainment...



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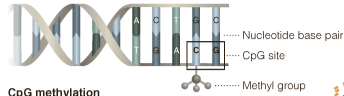




## Cutting Edge Computer Science

### Mapping the Epigenome

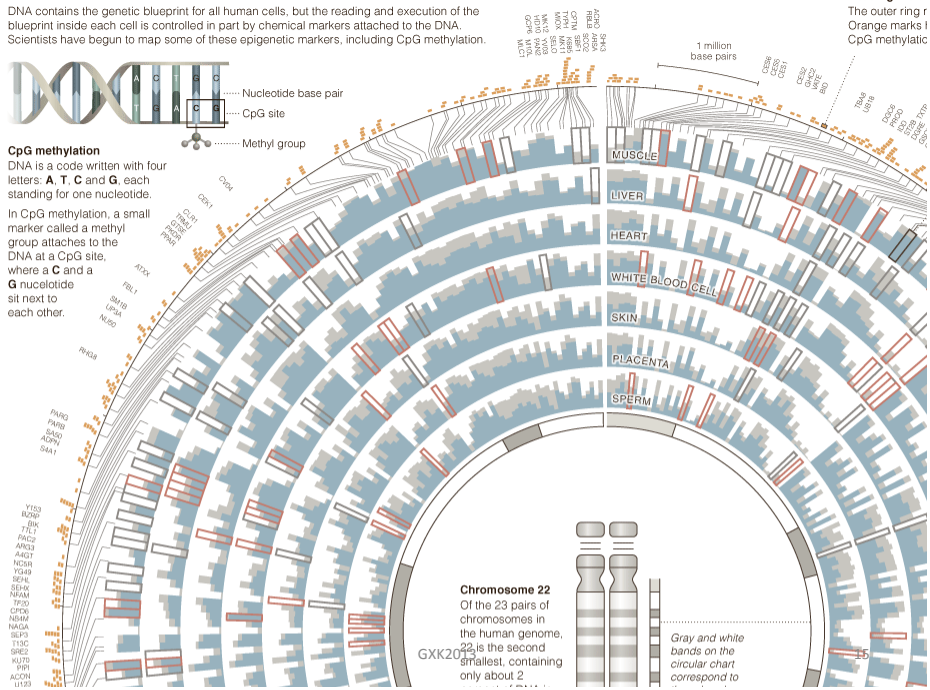
DNA contains the genetic blueprint for all human cells, but the reading and execution of the blueprint inside each cell is controlled in part by chemical markers attached to the DNA. Scientists have begun to map some of these epigenetic markers, including CpG methylation.



#### 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.

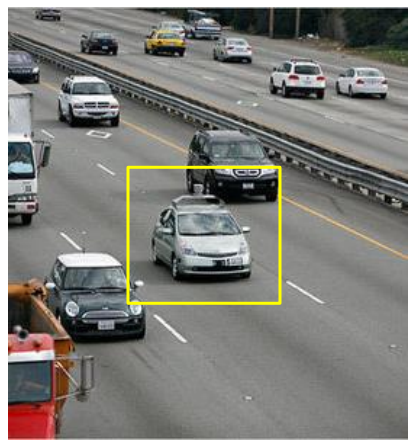


**Reading the chart**  
The outer ring  
Orange marks  
CpG methylation

**Chromosome 22**  
Of the 23 pairs of chromosomes in the human genome, 22 is the second smallest, containing only about 2

Gray and white bands on the circular chart correspond to

## Google's Autonomous Car



- Nevada made it legal for autonomous cars to drive on roads on March 1, 2012
- California, Florida, and Michigan as well by 12/2013



# Google Driverless Car May 2014



- If video doesn't play, click here:

<https://www.youtube.com/watch?v=CqSDWoAhvLU>

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## 2011 Jeopardy!



- 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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# ART



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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

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## 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:

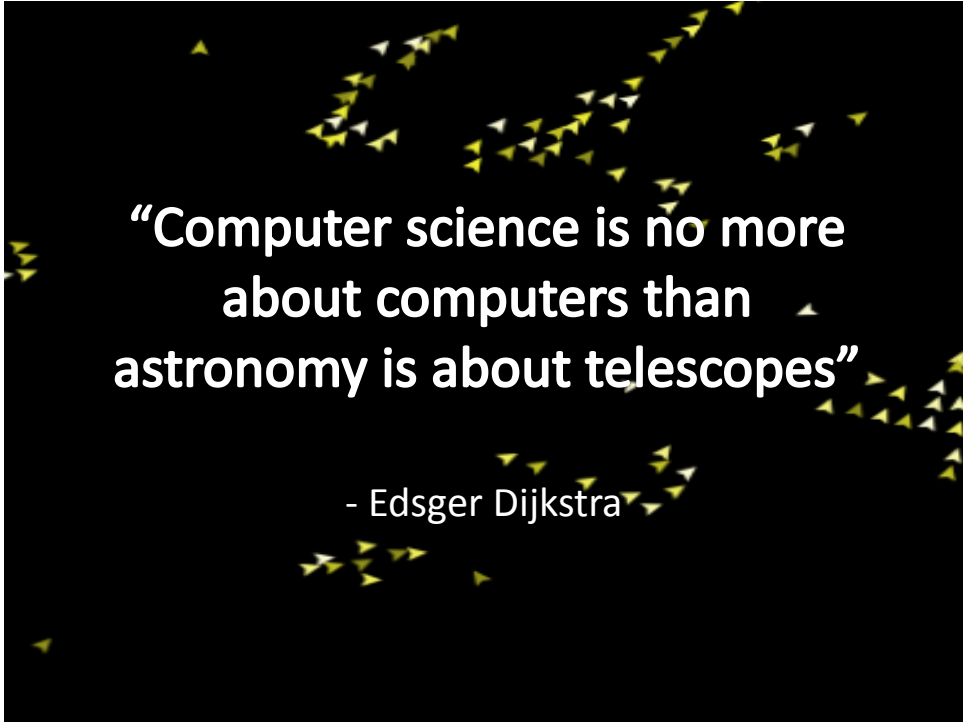
Mathematics  
Biology (bioinformatics)  
Chemistry  
Physics  
Geology

Geoscience  
Archeology  
Psychology  
Sociology  
Cognitive Science

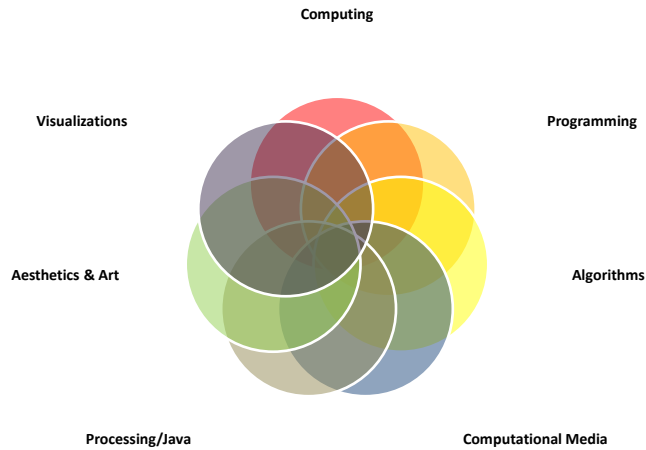
Medicine/Surgery  
Engineering  
Linguistics  
Art  
...

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# Introduction to <sup>Creative</sup> Computing



# 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



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# 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.

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## A program

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

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

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## Programming Languages

Processing	Python	Lisp
<pre>int areaOfCircle(int radius){     return PI*radius*radius; }  r = 10; area = areaOfCircle(r);</pre>	<pre>def areaOfCircle(radius):     return PI*radius*radius;  r = 10 area = areaOfCircle(r)</pre>	<pre>(defun areaOfCircle (radius)   (return (* PI radius radius)))  (setq r 10) (setq area (areaOfCircle r))</pre>

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## 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

```

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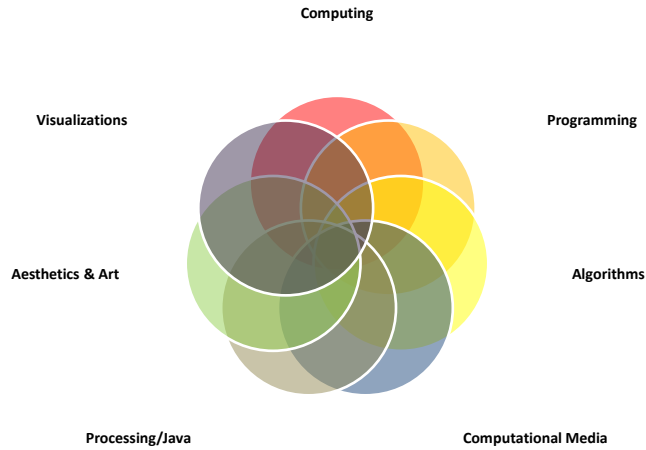
## Our Goal

- 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!

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# Introduction to <sup>Creative</sup> Computing



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# Examples

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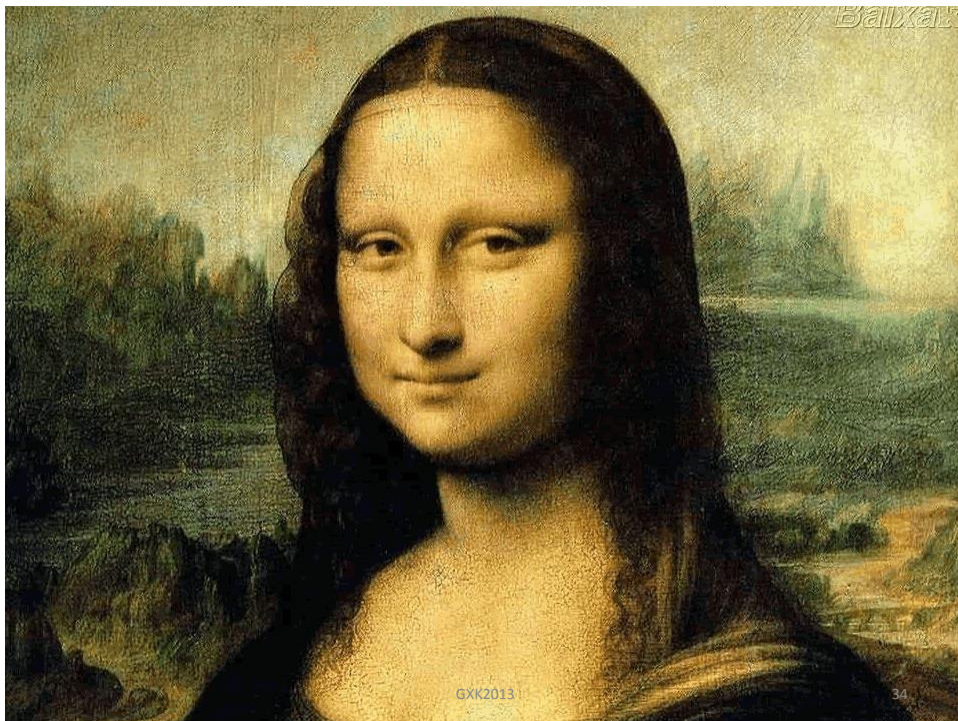
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# Shepard Fairey



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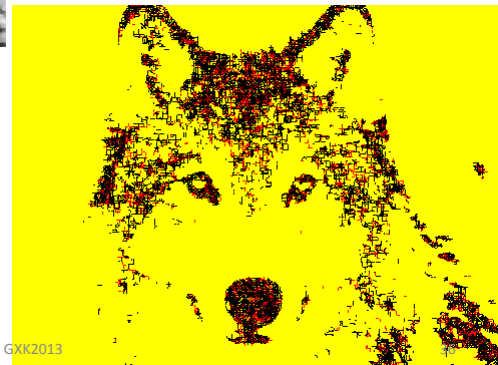


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# Abstract Art



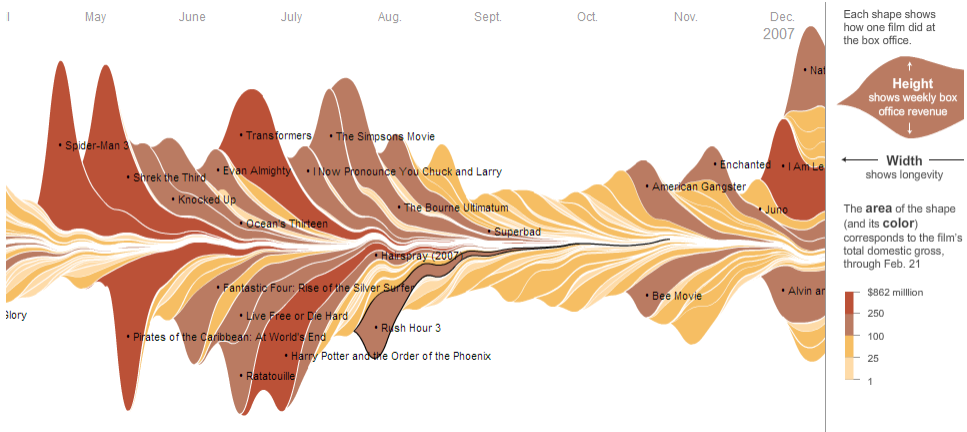








# Box Office Earnings



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

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**Let's get started...**

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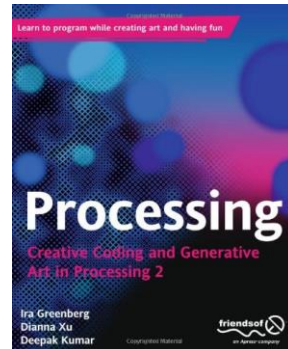
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## Homework

- Go the CS Computer Lab (Room 231 PSB)
- Log in
- Start the Processing application  
(Make sure it is Version 2.x)
- In a web browser, go to the Tutorials section of processing.org  
<http://www.processing.org/tutorials/gettingstarted/>
- Read the Getting Started tutorial (by Casey Reas & Ben Fry) and try out the two examples of simple Processing programs presented there
- If you'd like, install Processing 2.x on your own computer
- Read Chapter 1 (Read pages 1-12, skim 12-32)

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