Introduction to Processing

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Introduction

- Processing is programming language, development environment that is high visual and intuitive.
- See http://www.processing.org/ for a formal definition.
- In my experience it is pedagogical blockbuster.
- It is an instrument for attracting novices to programming and engaging them.
- This workshop comes of my experience of teaching Processing to non-CS entry level students.

Motivating Processing

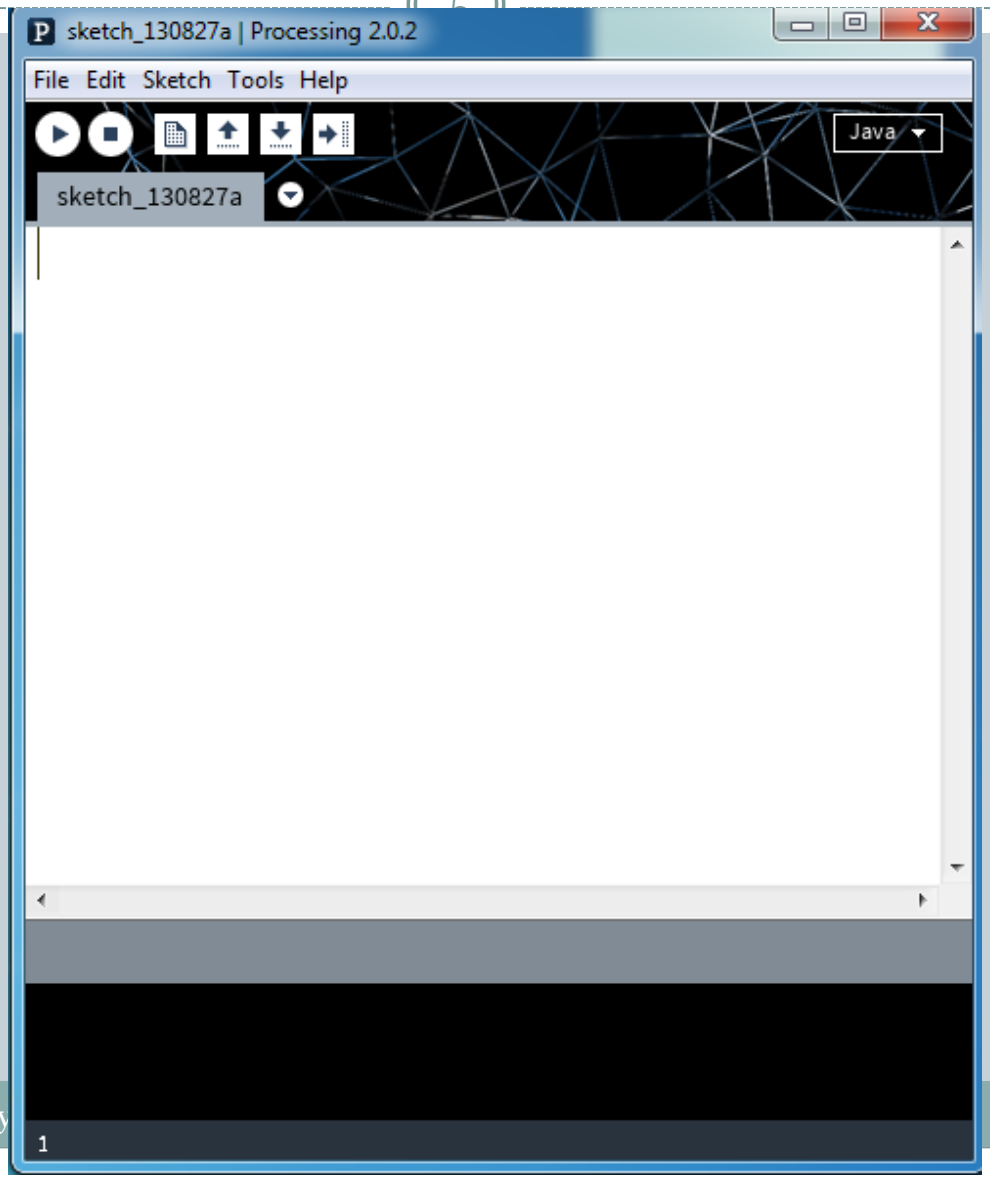
- Focus is on multi-media and graphics
- Simple to translate from ideas to “Visualization”, “interactive graphics”, “Animations”
- Easy to use “zero-entry approach to coding”
- Open source, abundant community contribution
- Built-on top of Java
- Can be exported to mobile application environment using Android mode
- Can be exported to Web environment using Javascript mode
- … many more

Sample Program: lets analyze this


```
void setup() {  // initialization : executed once
  size(400,400);
  stroke(0);
  background(192,64,0);
}

void draw() { // loops
  line(150,25,mouseX, mouseY);
}
```

Lets look at Processing Environment



Exercises

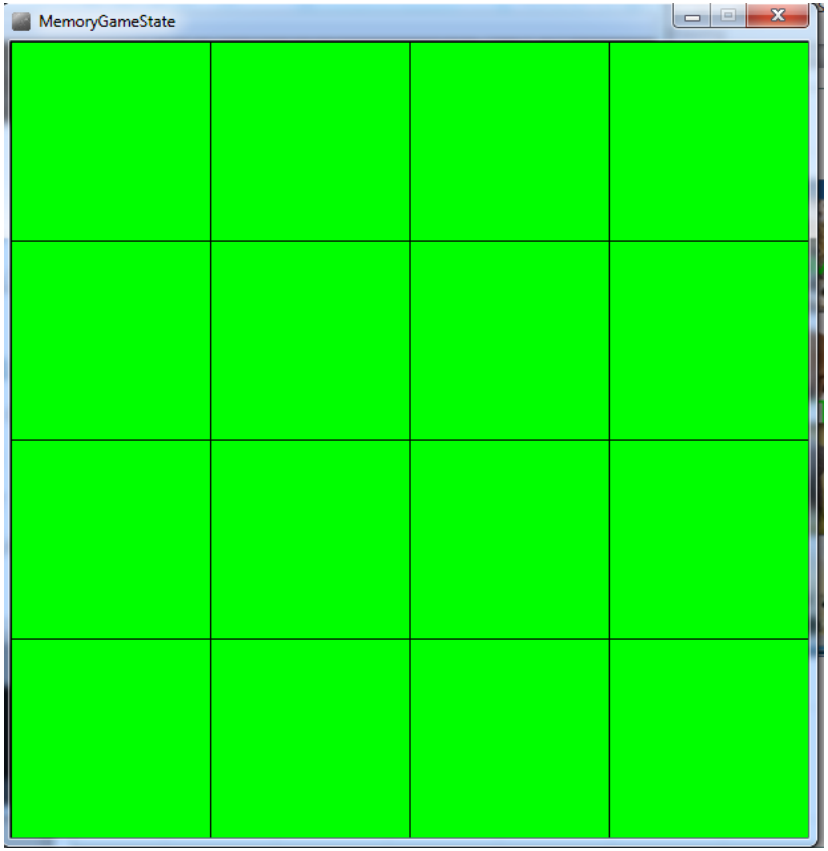
- See the handout enclosed:

Exercise 1: Simple example to draw a shape (rectangle, ellipse)

Exercise 2: Static image background and some basic motion simulation.

Exercise 3: Full game: memory game; lets quickly look at the working of this game, design approach, and then we will develop the code.

We will use function decomposition since we are doing "programming in the small".



Memory Game: A closed board and an open board
size n =4, number of tiles = n X n = 16
Theme: baby animals… can be anything
Question: how many pairs of pictures?

Analysis and Design

- Lets analyze the problem
- Need to display blank board
- Initialize board to some representation of the pictures: lets use number pairs

(0,0), (1,1), (2,2)…(7,7) in the case where n = 4, number of tiles = 16, there are 8 pairs of pictures

Let the pictures be pic0, pic1, pci2,..pic7

- Lets identify the **data structures** and design the **algorithm** before development of the code.

Initialize

-1	-1	-1	-1
-1	-1	-1	-1
-1	-1	-1	-1
-1	-1	-1	-1

Abstraction of the board
Random placement

0	2	0	1
7	1	7	5
6	4	3	4
5	6	2	3

Algorithm

- Initialize board
  - Display blank board
  - Setup random number for the tiles for the pictures
- User selects tile 1: openTile1 ➔ row1, col1, tileNum1
- User selects tile 2: openTile2➔row2, col2, tileNum2
- Match the pair of tiles opened: matchPair()
- If match,
  - Increment number of correct,
  - If all tiles done, display number of tries
- Else

  no match, close tiles.

Functional Decomposition

- Processing functions: setup, draw, mousePressed

void initializeBoard(int n)

    void findRandomPair(int j)

void openTile1()

void openTile2()

void matchPair()

Void closeTiles()

Summary

- We has a gentle introduction to Processing Development Environment
- We completed some representative exercises in Processing
- Re: Object-orientation: every sketch is class; OO is available for complex applications: you can define classes and methods and interaction among them.
- There is a wealth of resources available online for sophisticated simulations.
- It is easy to self-teach using the Processing environment.
- Most of all it is a very engaging environment for engaging K-12 students.