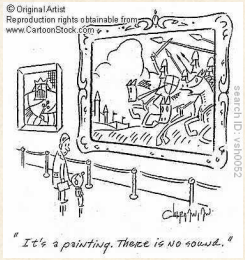
UNIVERSITY of WISCONSIN-MADISON
Computer Sciences Department

CS 202
Introduction to Computation

Professor Andrea Arpaci-Dusseau
Fall 2010

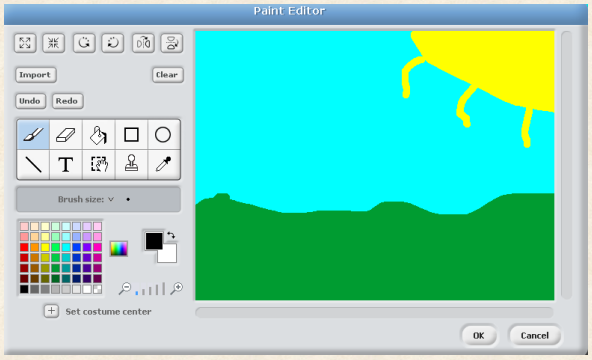
Lecture 4: How does computation … create art



What are different approaches of "Computer Art"?

1. Human uses computer as drawing/painting tool
2. Human designed algorithm computer follows to create exact picture (e.g. drawing in Scratch)
3. Human designed algorithm w/ randomness – human examines results, picks appealing
4. Human designed algorithm w/ randomness – computer evaluates and shows best
5. Human interacts with computer (e.g., algorithm translates sounds to shapes; volumes to sizes; movement to color)
   - Golan Levin makes art that looks back at you
   - http://www.ted.com/talks/golan_levin_ted2009.html

1) Computer as Paint Editor



2) Computer draws same picture by following algorithm

Program (Problem) Specification

- Describes problem to be solved
  - What should outputs be? (as function of inputs)
  - Does **not** say HOW to solve the problem **(not** the algorithm!)
- What is Output? Anything coming out off computer…
  - Anything sent to display (Scratch: Stage)
  - Anything sent to printer
  - Messages sent over network
  - Data stored permanently in files
- What is Input? Anything going into computer…
  - User typing on keyboard
  - Mouse actions
  - Messages arriving over network
  - Data read from files
  - Any other sensors (GPS location, motion)

What is the Specification?

Initial state:

- Starts with background

Draws:

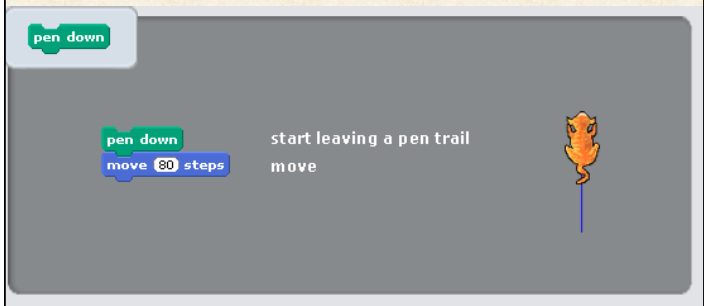
- 1 house
- 5 trees on grass
- 3 stars in sky

How?

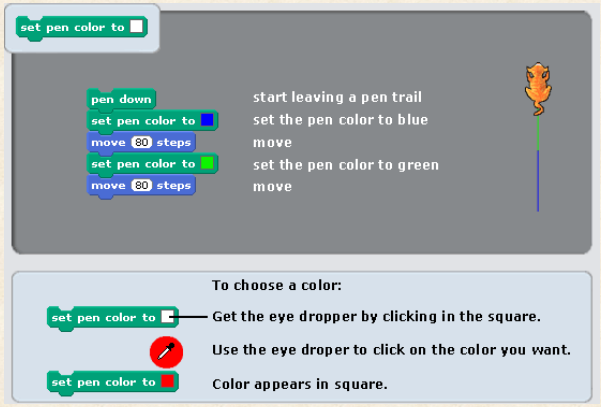
What steps? algorithm?

Watch screencast from course website for full details

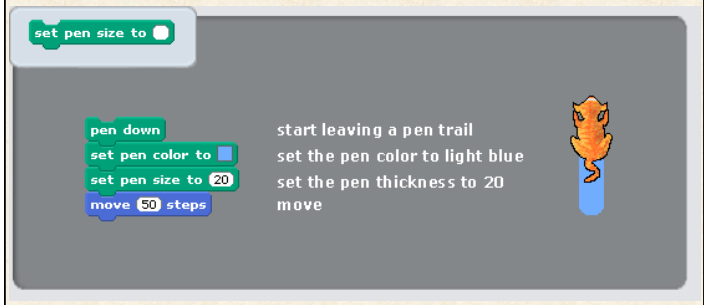
Art in Scratch: Pen



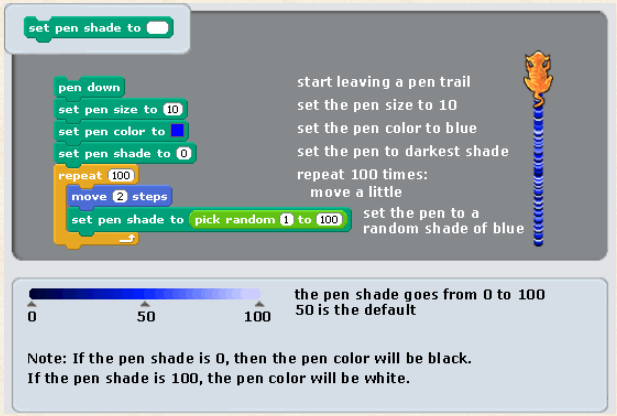
Art in Scratch: Pen



Art in Scratch: Pen

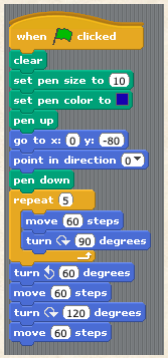


Art in Scratch: Pen



Art in Scratch: Stamp

How to Draw a House?



- Activate script by clicking flag
- Code runs sequentially
- Set pen characteristics
- Make sure "pen up"
- Move to starting point
- Put "pen down"
- Move Sprite along desired path, using move and turn blocks

3) Algorithm with Randomness

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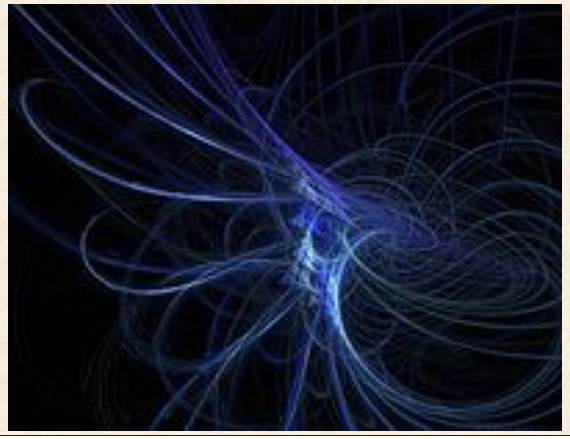
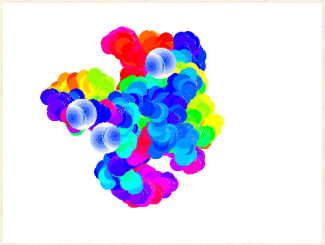


3) Algorithm with Randomness: Version A: Brownian Motion

Specification?

Initial state
- Stage is empty
- Pen begins in middle of stage

Repeat until reach edge
- Move randomly up/ down and left/right
- Change to random (nearby) color



Brownian Motion

Initial state
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- Pen begins in middle of stage

Repeat until reach edge
- Move randomly up/ down and left/right
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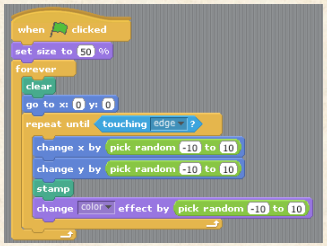
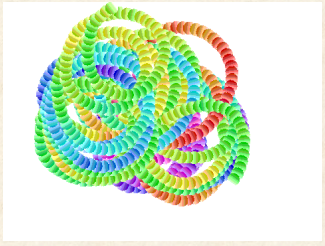


3) Algorithm with Randomness: Version B: Random Turns

Specification

Initial state
- Stage is empty
- Pen begins in middle

Repeat until reach edge
- Move in irregular arc of circle
- Change to random (nearby) color

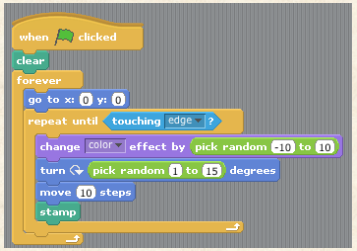


Random Turns

Stage is empty

Pen begins in middle

Repeat until reach edge
- Move in irregular arc of circle
- Change to random (nearby) color



Programming Concepts

General

- Initial state must be specified
- Incrementally test code as you go
- Scripts must be activated to run (when flag clicked)
- Execution within script proceeds sequentially
- Control : forever, repeat <times>, repeat until

Blocks in Scratch

- Movement: X-Y coordinate system for Stage
- Pen and stamps
- Random numbers

Today's Summary

Today's Topics

- Can create art with pen and stamp tools

Reading: TED Talk

- Golan Levin makes art that looks back at you
- http://www.ted.com/talks/golan_levin_ted2009.html

Announcements

- Homework 2 due before class Friday
  - See web page for hw details (www.cs.wisc.edu/~cs202-1)
  - Any questions Send mail to cs202-tas@cs.wisc.edu
- Lab Hours in 1370 CS
  - Monday, Wednesday: 12-2pm
  - Tuesday, Thursday: 4-6pm
  - Text books available for use in room