How can computation create art?

What are different approaches of "Computer Art"?

1. Human uses computer to modify digital images
2. Human uses computer as drawing/painting tool
3. Human designs algorithm; computer follows to create exact picture (e.g. drawing in Scratch) - Homework 2
4. Human designs algorithm w/ some randomness, unknown result
   - Human examines results, picks most appealing
   - Or, computer "evaluates" and shows best (according to some metric)
5. Human interacts with computer
   - Algorithm translates pitch to shape; volume to size; movement to color
   - Golan Levin makes art that looks back at you

1) Modify Digital Images

2) Computer as Paint Editor
3) 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 of 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
- Takes no input!

How?

What steps? algorithm?

Watch screencast from course website for full details

Art in Scratch: Pen
Art in Scratch: Pen

- `set pen color to [ ]`
- `set pen size to [ ]`
- `move [ ] steps`  

To choose a color:
- `set pen color to [ ]`  
- `Get the eye dropper by clicking in the square.`  
- `Use the eye dropper to click on the color you want.`  
- `Color appears in square.`

Art in Scratch: Stamp

- `stamp`  
- `clear all the stamps and lines`  
- `repeat 9 times:`  
  - `move [ ] steps`  
  - `move`  
  - `turn [ ] degrees`  
  - `stamp a print of your costume on the stage`  

The pen shade goes from 0 to 100.  
0 is the default.  
50 is the default.  
100 is the default.  

Note: if the pen shade is 0, then the pen color will be black.  
If the pen shade is 100, the pen color will be white.
Develop code for house now...

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

Screencast on Course Website

4) Art with Randomness
4) Art with Randomness

http://www.kurzweilcyberart.com/aaron/history.html
4) Algorithm with Randomness: Version A: Brownian Motion

Specification

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

Repeat forever
- Move randomly up/down and left/right
- Change to random (nearby) color
- If reach edge, go back to center

Brownian Motion

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

Repeat forever
- Move randomly up/down and left/right
- Change to random (nearby) color
- If reach edge, go back to center

4) Algorithm with Randomness: Version B: Random Turns

Specification

Initial state
- Stage is empty
- Marker begins in middle

Repeat forever
- Change to random (nearby) color
- Move in irregular arc of circle
- If reach edge, move to center

Random Turns

Initial state
- Stage is empty
- Marker begins in middle

Repeat forever
- Change to random (nearby) color
- Move in irregular arc of circle
- If reach edge, move to center

What does this code forget to do????
Programming Concepts

General
• Think about initial state
• Incrementally test code as you go
• Scripts must be activated to run (when flag clicked)
• Execution within script proceeds sequentially
• Control : forever, repeat <times>, if <question> then

Blocks in Scratch
• Movement: X-Y coordinate system for Stage
• Pen and stamps
• Random numbers

Today’s Checkup

What happens if you don’t specify the initial state of your program?

Which are likely to be used for initialization?

Announcements

Homework 2 due before class Monday
• See web page for hw details
• Any questions with cs202-tas@cs.wisc.edu

Homework 1 Graded – Available thru Learn@UW

Optional: TED Talk
• Golan Levin makes art that looks back at you
• http://www.ted.com/talks/golan_levin_ted2009.html