Lecture 4:
How can computation... create animated stories?

Goals of First Part of Course

1. See range of problem domains where computation helps
   - How can computation...
     - help you make decisions?
     - automate tedious calculations?
     - find what you are looking for (when have lots of data)?
     - guess what will usually happen? (help with probability)
     - predict the future? (simulation)
     - let you play games?
     - win strategic games against you?

2. Learn basic programming concepts and techniques
   - How can you develop an algorithm to solve a specific problem?
   - How do you determine which algorithms are best?

3. Learn Scratch programming environment

Flowchart of Animated Story

Create outline of story
Show logical, sequential structure of story
Group actions into higher-level "scenes" or interactions
Give descriptive name to each group
Flowchart of Animated Story

"Initial state"
Background: Cat and dog in place

"Introductions"
Cat: What should we do?
Dog: I don't know.

"Colors"
Cat: I like it better when I see you....
Dog: I like it better when you..

"Disappear"
Cat: I like it better when you
Dog: I like it better when you

"Whirl"
Cat: I like it better when you
Dog: I like it better when you

"Fly"
Cat: I like it better when you
Dog: I like it better when you

"Change sizes"
Cat: I like it better when you
Dog: I like it better when you

"Dog eats cat"
Cat: I like it better when you
Dog: I like it better when you

"End"
Background: The End

Observations
1. Must specify initial starting state
2. Each step proceeds sequentially from one another
3. No decisions or choices in this flowchart (no branches)
   Animated story behaves the same every time
How to Transform Flowchart to Scripts?

- **Initial state**
  - Background, cat and dog in place

- **Introductions**
  - Cat says: What should we do?
  - Dog says: I don’t know

- **Colors**
  - Cat says: Let’s do tricks!
  - Cat changes to 5 different colors
  - Dog says: I liked you better orange
  - Cat changes back

- **Whirl**
  - Cat whirls 5 times
  - Dog says: I liked you better normal
  - Cat changes back

- **Disappear**
  - Cat fades out gradually
  - Dog says: I like it better when I can see you...
  - Cat reappears

- **Fly**
  - Cat moves to different locations on stage
  - Dog says: I like it better when you stay still
  - Cat goes back

- **Change sizes**
  - Cat becomes tiny
  - Dog says: I like that one!
  - Cat says: Why?

- **Dog eats cat**
  - Dog says: No reason
  - Dog walks until reaches cat
  - Cat meows and disappears
  - Dog says: Yummy

- **End**
  - Background and dog fade out
  - Background shows The End

Approach:
1. For each grouping in flowchart specify scripts
2. Specify scripts for cat and scripts for dog
3. How to determine when script can run? When should “Initial state” run? When should “Introductions” run? When should “Colors” run?

How to Tell Another Script to Run?

- **broadcast** sends a message to all the sprites (and the background)

  - This is useful if you want to tell other sprites when to do something.
  - What do you want them to do when they receive the message?

- **when I receive**

How to Run Desired Script?

- **broadcast** sends a message to all the sprites (and the background)

  - When I received the message... do this

- **when I receive**

Today’s Programming Concepts

Divide high-level functionality into logical units

Descriptive naming is important

Initial state must be specified

Parameters (to blocks) specify behavior

Goal is to make “non-fragile” code
Today’s Scratch Features

Execution within script proceeds sequentially

Tour of many Motion and Looks blocks
  • X-Y coordinate system for Stage

Two ways to activate scripts
  • When Green Flag is Clicked (initial state)
  • When I receive <message>
    - Corresponding block: broadcast <message>

Control Blocks
  • repeat <number of times>
  • repeat until <condition is true>

Today’s Summary

Today’s Topics
  • How to create animated stories in Scratch
  • How to outline a sequential flow chart of steps
  • How to broadcast and receive messages in Scratch

Reading:
  • “Specializing in Problems that Only Seem Impossible to Solve” [NyTimes, Dec 16 2008]
  • Scratch User’s Guide

Announcements
  • Assignment 1 should be turned in now
  • Assignment 2 available
    - Create animated story like today’s example
    - Any questions: Contact me or TAs – We are here to help!