Lecture 9:
Computation helps... remember information?

How to Track Information?

What is your name?
Every person has a Name
- "Name" is label or placeholder
- Name is a variable (different than variable in math)
People have different values for Name
- Any value can be placed there
- Value varies across individuals

What if Information Change?

How old are you?
Every person has an Age
- "Age" is a variable
- People have different values for age
Value of age varies over time!
- Increases by one each year

What are Interesting Variables?

Examples?
- Money in your bank account
- Your GPA
- Number of facebook friends
- Top grossing film of all time
- Current President of United States
- Winner of World Cup
- Number of current points in basketball game
Can be referred to without knowing current value
What type of values do variables hold?
- Often strings (words) or numbers (integers and floating point)
Why the Interest in Variables?

Sometimes just want to know value

Sometimes value of variable changes our behavior
  - Current value of variable determines what we do

Variables in Scratch

Scratch contains some variables by default...

Examples?

“answer” can hold a string

Value of Variables Changes Program Behavior

“answer” can hold a number

What is output if user enters:
  - 95?
    - Excellent
  - 100?
    - Perfect
  - 105?
    - How did you do that?
  - 63?
    - Better luck next time?

How to see output “Great”?
  - 81, 82, ..., 89, 90

Variables in Scratch

Scratch contains some variables by default...

- Every Sprite has some associated variables

Examples?
Variables in Scratch

Scratch allows user to allocate/declare new variables
- Give variable any name you’d like
- Very important to give descriptive names
  - Helps other people understand your code
  - Helps YOU understand your code later
  - Can be displayed to user as well

Using Variables

Variables can hold numbers or strings
Can be used any place a number of string is used

Setting and Changing Variables

when the green flag button is clicked
set score to 0 (reset the score)
keep doing this:
paint towards the mouse-pointer
if you catch sprite2:
increase your score
Example

Want to be in Guinness Book of World Records
  • Talent for standing on one foot

What variable are you interested in?
  • “Longest Duration Balancing on One Foot”

Current Value?
  • 76 hours 40 minutes = 4600 minutes

What is algorithm to check if we are record holder?
  • If we balance longer, we are new record holder!

World Record in Scratch

How to Track Points?

Can you change Fish Chomp game so it tracks the number of fish eaten?

Old Code: No Points

Little Fish Scripts

Big Fish Scripts
Add Variable: Fish Eaten

New Big Fish Scripts

Is this code same?

Yes! Scratch variables are not mathematical equations. Same variable can appear on both sides of "set" block.

Variables Can Track Whether Something Happened

How to control moving to next level?

Stage

How to record that bananas have been picked up?

Variables Can Track Whether Something Happened

How to remember if something happened?

Basic format of adventure game

Character can enter portal and advance to next level only after gets certain object

How to know if cat picked up bananas yet or not?

Variables Can Track Whether Something Happened

How to control moving to next level?

Stage

How to record that bananas have been picked up?
How to Have Different Variables for Different Sprites?

Variables can be either:
- Visible to all Sprites (global, public)
  - Any Sprite can set
- Visible to only one Sprite (private)
  - Only one Sprite can set

Why use private variables?
- Similar Sprites can share same instructions, but act slightly differently
- Simplifies code
- Example: Two-person game

Today’s Summary

Today’s Topics
- Variables: hold different values over time, may be different for different Sprites
- Variables can hold numbers or strings
- Extremely useful!

Reading:
- “If you liked this, sure to love that” – recommendation systems
  - Posted on course web page

Announcements
- Assignment 3 due today
- Assignment 4 available: Pencil and paper (no programming)
  - Binary numbers and understanding existing code