Data, Math and Methods

Week 5, State Machines Project

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Today

- State Machines Project
  - What we learned about State Machines into a project

State Machines in code

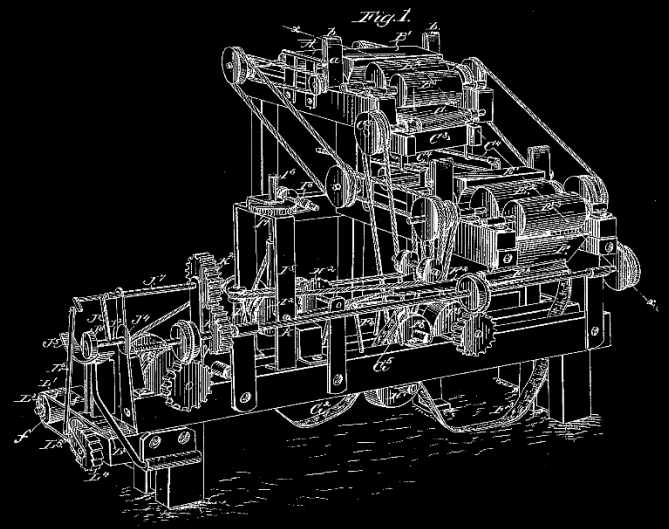
- Let’s code up a simple state machine
- State can control an output – for example color / sound sample in the loop / displayed image

Machines

- Repetition from the last class:

Inputs >

*In some form that the machine will understand = we call that an **alphabet***



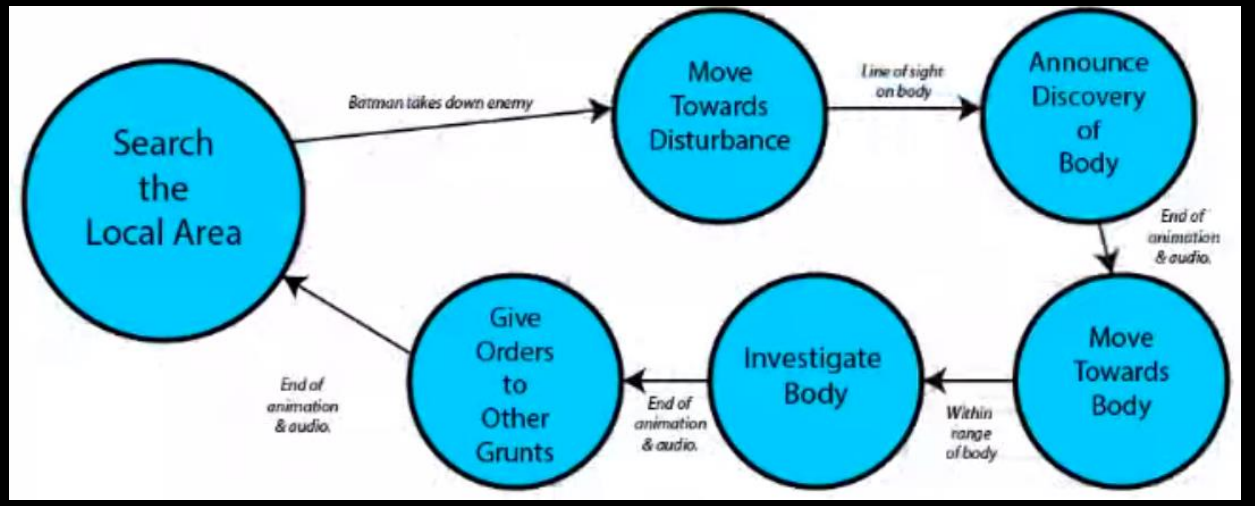
> **Outputs**

Again some which we are expecting

Machine has a **state** (turned on / off / waiting for input / etc …)

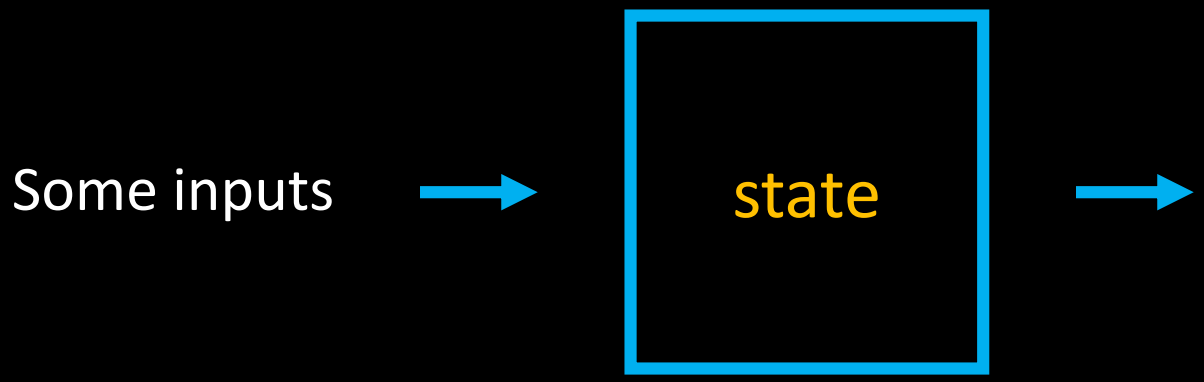
State Machines uses

- So for example as AI in Games:



State Machines

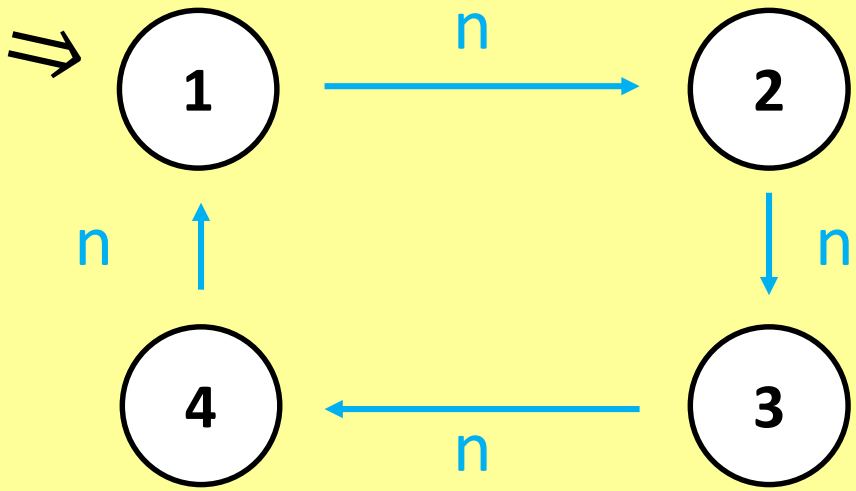
- In our coding scenario we want this:



- Depending on the state choose:
  - Output color
  - Output image
  - Output looping sample
  - …..

State Machines example

What does this machine do?

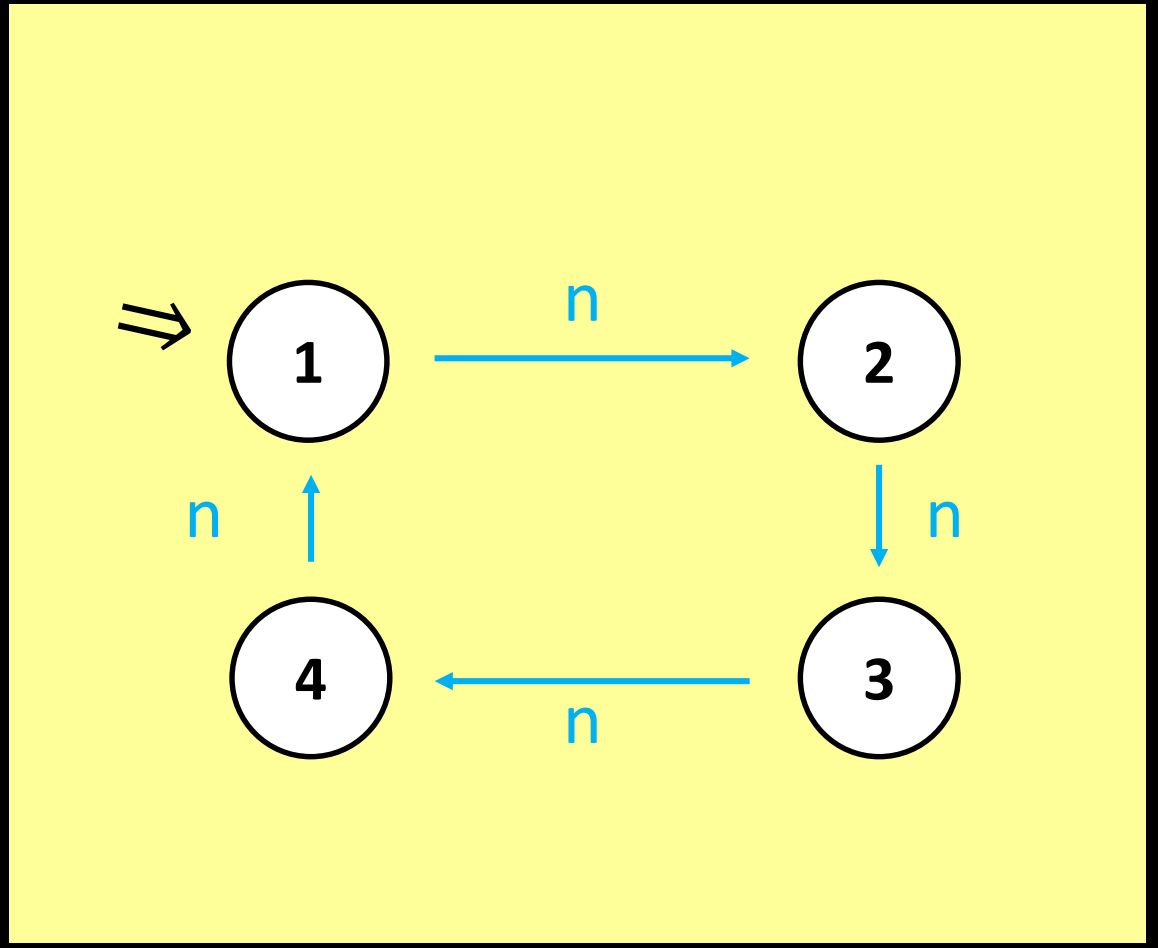


It loops through states (1 to 4) when pressing “n”.

In this case we don’t have an “accepting” state, as an output we can read which state we are on

State Machines formalized:

- Set of **states** (1,2,3,4)
  - **Start:** starting state (1)
- Accepting **alphabet** (“n”)
- **Transitions** between states
  - 1 => 2 with “n”
  - 2 => 3 with “n”
  - … etc
- **Mapping** between the state number and outputted color (for example)
  - 1 => red, 2 => orange, 3=> green, …



Today’s coding task

- Build a state machine inside the rest of the code which controls the behavior
- We get some inputs (for example key presses) and in the end we want to map the machine state onto a output (a color, or a sound sample being played)
- (Important!) Allow your code to work with any state machine – don’t hardcode just one behavior, but let me change the control state machine mechanism to (in theory) any possible state machine!

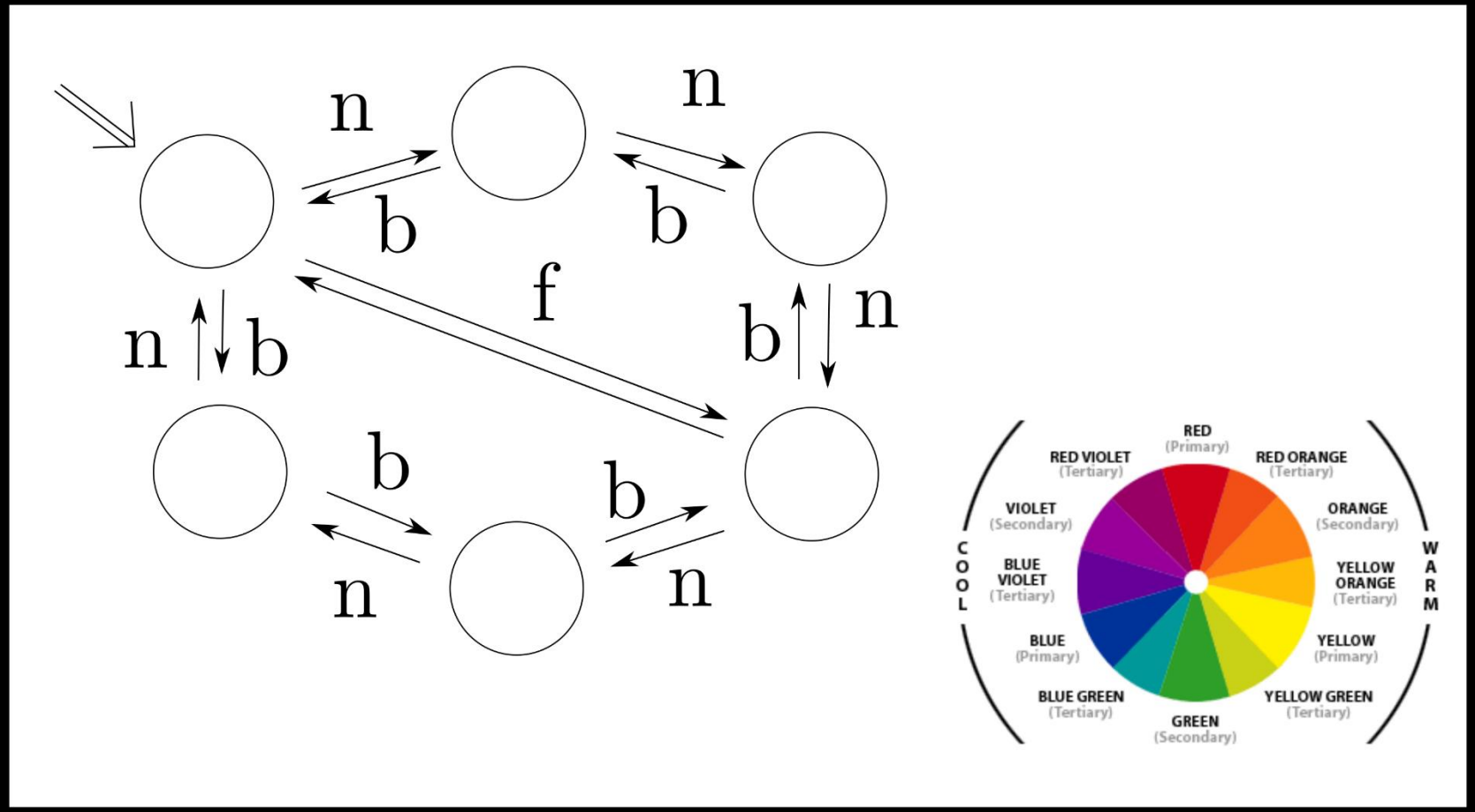
Homework

- Work on this task and have something to show me in the next class
- Include your drawing of the state machine on paper (design of the logic of behavior of it) when showing me.
- Ideally: machines with more than 5 states (unless there's a smart reason why you only need less :D)
- **Due: next class (in April)**

Suggested steps:

- Step 1: make at least one of the starter codes run (choose which one you want to use color/audio/your own...)
  - Help each other in the class so that everyone can run at least one of them on their machine!
- Step 2: plan out a state machine on paper - input alphabet would be the key presses.
  - Keep this drawing, you'll show this alongside your project.
- Step 3: get coding :)

Example:


n
b
n
b
n
b
f
b
n
b
n
b
n
n
b

RED
(Primary)
RED ORANGE
(Tertiary)
ORANGE
(Secondary)
YELLOW
ORANGE
(Tertiary)
YELLOW
(Primary)
YELLOW GREEN
(Tertiary)
GREEN
(Secondary)
BLUE GREEN
(Tertiary)
BLUE
(Primary)
BLUE
VIOLET
(Tertiary)
VIOLET
(Secondary)
RED VIOLET
(Tertiary)
COOL
WARM