apollo

Special System Presentation

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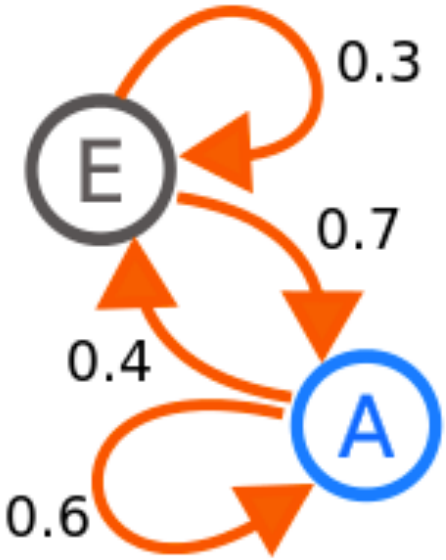
Outline

- Introduction
- Theory
- Sensors
- Operation
- Conclusions/Current Progress
- Future Work

Introduction

- Inspiration can lead to great art.
- The goal is algorithmic composition to create human-like melodies that can be influenced by the robot's environment.
- Decided to use Markov chains, an IR distance sensor, and a webcam.

Theory



- Markov chains take an input state and compare it to a chain that gives a set of potential next states in the chain.
- Each potential next state has a different probability determined by a learning set.
- Room for improvement with more complex algorithm.

Sensors

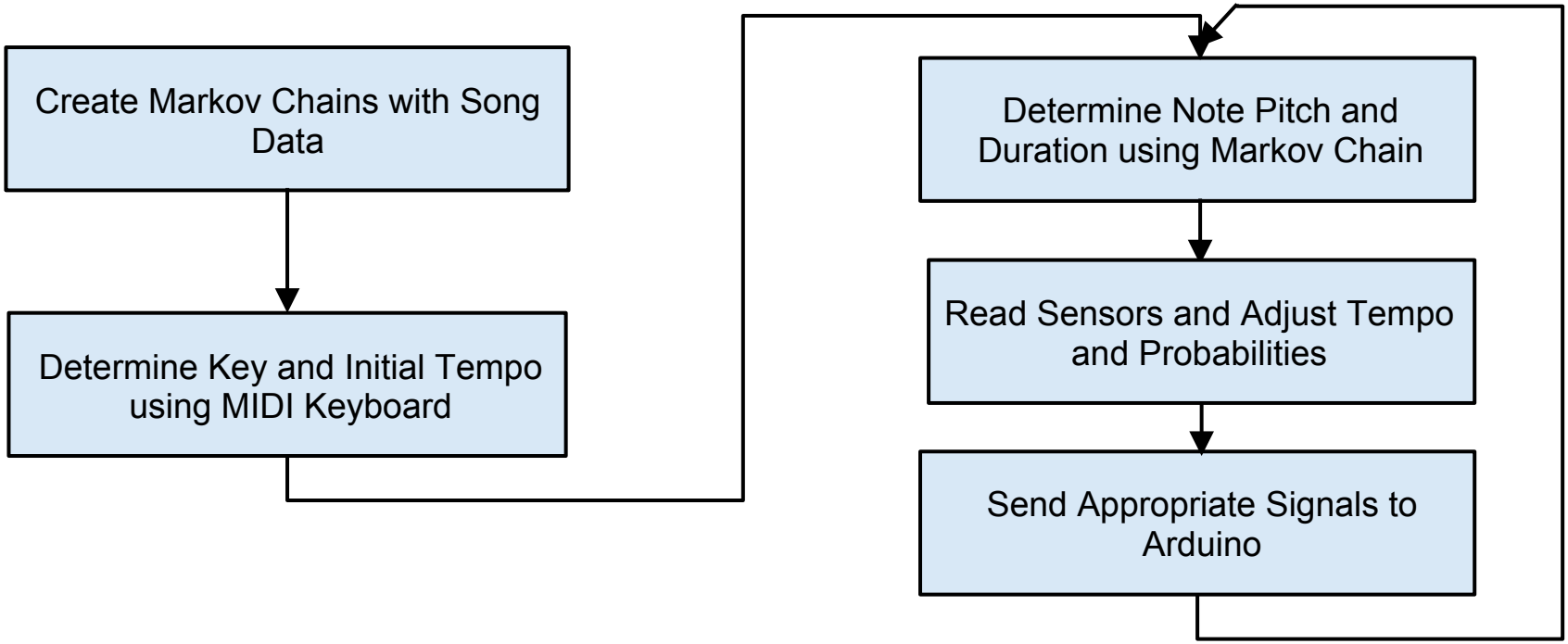
Sharp Long-Range IR Sensor

- The closer spectators get, the “faster” the robot will play.
- Accomplished by changing the tempo.
- Listed range of 20cm to 150cm.

Apple iSight Webcam

- Webcam determines main color.
- Modifies weights of note duration probabilities based on main color.

Operation


Create Markov Chains with Song Data
Determine Key and Initial Tempo using MIDI Keyboard
Determine Note Pitch and Duration using Markov Chain
Read Sensors and Adjust Tempo and Probabilities
Send Appropriate Signals to Arduino

Current Progress

- Platform Assembled (One Note Needs Fixing)
- Electrical Work Finished (One Note Needs Fixing)
- Sensors Incorporated
- Preliminary Algorithm Implemented

Future Work

Future work includes:

- Fix first 4 notes bug.
- Fix start/stop timing bug.
- Improve timing accuracy.
- Improve platform/electrical appearance.

Potential Improvements:

- Implement more complex Markov chain.
- Impose verse-chorus structure.