Neural Network Line Follower

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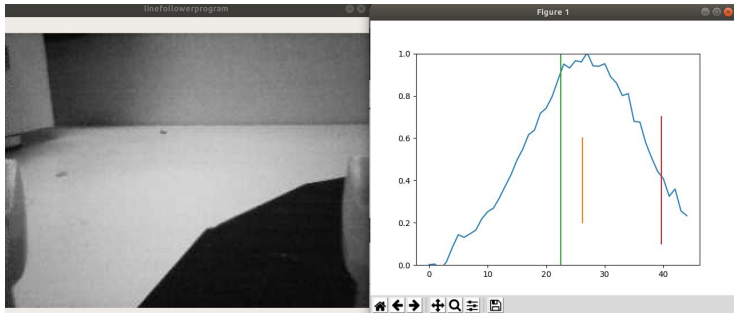
Problem Statement

- Intelligent Line Follower utilizing neural networks
  - Trained to follow a road smoothly
  - Capable of recovery once the road is lost
  - Capable of detecting and handling intersections
    - Receives input from joystick to choose left or right turn

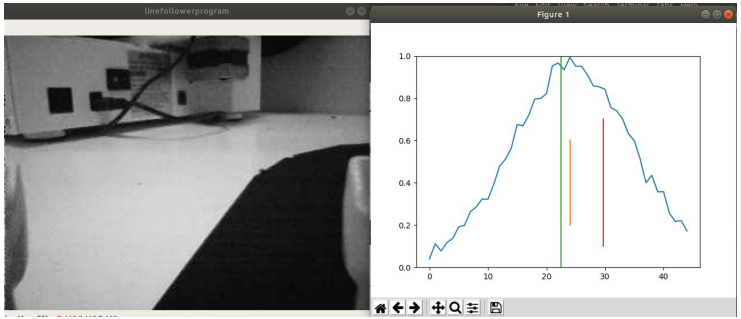
Approach

- Recreation of Dean Pomerleau's PhD Thesis from 1989
- Mapped Gaussian functions onto the road in order to calculate how much to turn
  - Used mean squared error function
  - Took weighted mean sum of the Gaussian output and converted it into a steering direction
- Normal classifier for 90 degree T-intersections
  - Waits for user input upon detecting an intersection
  - Used pygame's joystick library

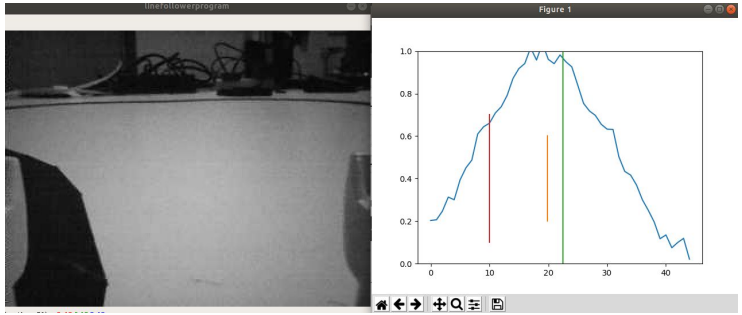
Demo



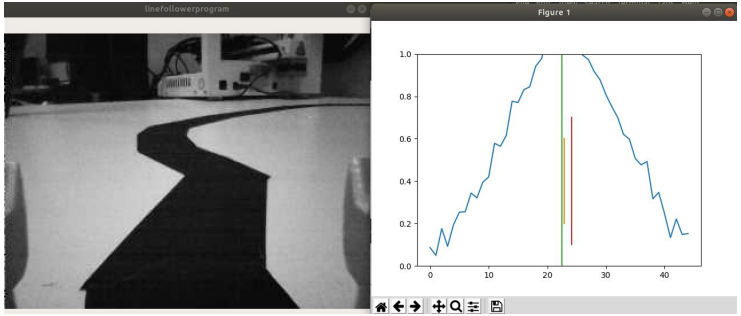
Sharp right turn



Mild right turn



Sharp left turn



Almost straight

Backup Video Demo

Doing left, left, right turns at intersection

Results

- Robot is capable of consistently following the road
- Can recover if road is off-camera
- Successfully identifies intersections and follows given path

Future Work

- Varied types of intersections (different angles)
- Merges
- Visual indicators to control speed, motion, etc.
- Obstacle identifier on intersections
- Better recovery