

Traffic Cozmo

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The background is a solid orange color. In the top-left corner, there are three vertical bars of varying heights, each composed of several overlapping semi-transparent orange circles. In the bottom-right corner, there are four vertical bars of increasing height from left to right, each also composed of several overlapping semi-transparent orange circles.

Problem Statement



How do we make Cozmo follow any race track pattern and recognize when to start, stop, slow down, based on external signals such as traffic lights?

Approach: Line Following



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- 4 sets of training data
 - 800+ images total
- 4 output nodes from 3 layer neural network
 - Forward, left, right, lost
- Recovery from lost position
 - Back up until familiar image comes to sight
- CrossEntropyLoss() function



Approach: Light Detection

- openCV: filter for red clusters of pixels
 - Based on threshold value
- Look at top 50% of image
 - Cozmo at set head angle



Demo Videos







Results





Results & Observations

- Line following works 70% of the time
 - Gets distracted by other objects
 - Trained on many different tracks, adjust model to avoid “jack of all trades, master of none” situation
- Light Detection
 - Lagging behind due to wireless
 - Need more image filtering
- Can use ML training for Light detection as well



Future Work

- Custom tracks with different bend radius
- More than one cozmo on the course at a time
- Faster image processing
- Decision making based on previous actions