

Evolutionary Driver

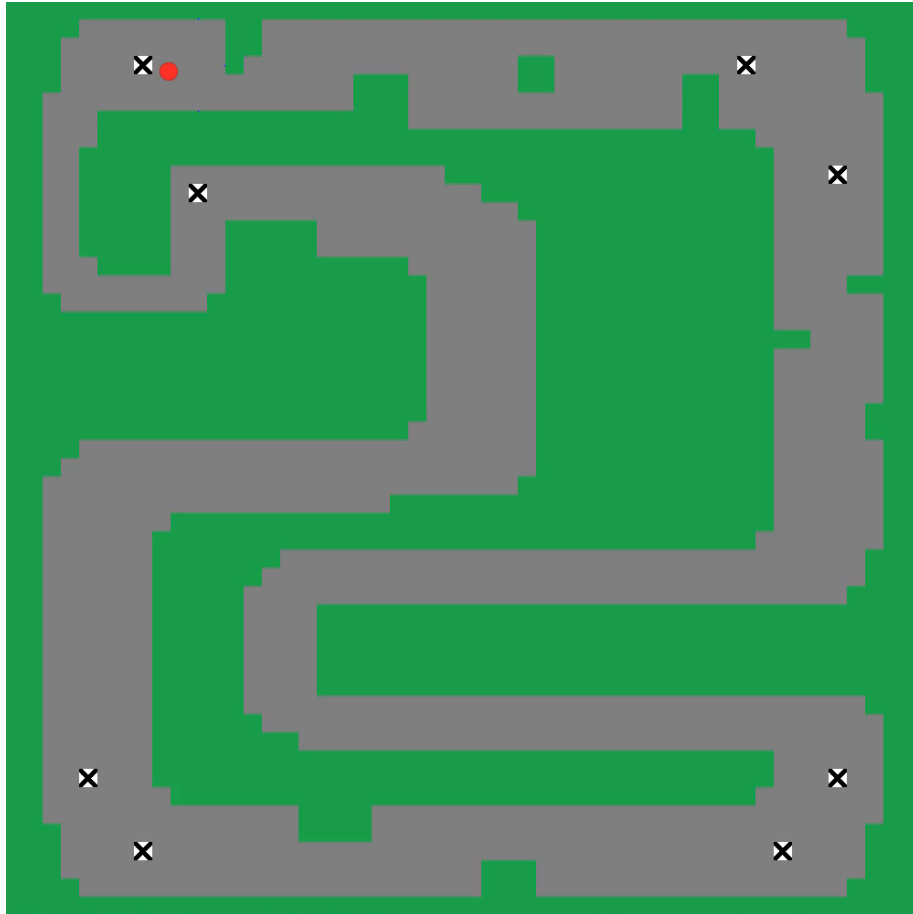
Presented by Matt Pasco

What is it and Why?

- What?
 - Game written in Python
 - AI Driver “learns” to drive around a course using sensors
 - Custom implemented ML algorithms
- Why?
 - To learn about genetic algorithms



The Simulation

[illegible]

AI Algorithms

- Perceptron
 - Fast actually pretty well
- Linear Regression
 - Slower, smoother
- Multi-Layer
 - Perceptron
 - LR
 - Both handle obstacles

```
def think(self, inputs):  
    # add dummy input for bias weight  
    inputs.insert(0,1)  
    # dot product, returns an array of dimension outputs  
    dotProducts = numpy.dot(inputs,self.weights)  
    # apply sigmoid to each output value and round  
    outputs = numpy.around(numpy.apply_along_axis(Driver.sigmoid,0,dotProducts))  
    return outputs  
  
def thinkReg(self,inputs):  
    # add dummy input for bias weight  
    inputs.insert(0,1)  
    # dot product, returns an array of dimension outputs  
    dotProducts = numpy.dot(inputs,self.weights)  
    return dotProducts
```

Boring Stuff

- Initial Population 100, Top 10 selected
- [-5, +5]% mutation rate
- $\text{Fitness} = 400 * (\# \text{ waypoints visited})^2 + \text{total dist.} + \text{dist. from start}$
- Training took anywhere from 15-60 generations
 - 30m to 2.5 hours
- Convergence Criteria
 - Fitness has not improved in 10 generations