Capstone Project DSI-830

Grant Moe • 10.29.2021

Proposals

Traffic Safety
State Policy vs. Car Crashes

Autonomous Racing (Simulated)
Training a Simulated Self-Driving Car to Race

Autonomous Racing (Real)
Training a Radio-Control Self-Driving Car to Race

Traffic Safety

Problem Statement:

As a data Scientist with California Office of Traffic Safety, explore the effect of state policy on auto collisions by state.

Methodology

- Unsupervised learning - patterns
- Predict California changes

Traffic Safety - Data

Source

- National Highway Traffic Safety Administration
- Massive databases
  - 2005 ~ 2019
  - 2016 ~ 2019

Processing

- Primary challenge
- Paring down to what actually matters

Traffic Safety - Metrics

Unsupervised

- Find useful distinction(s) between states

Supervised

- Create model able to predict with some accuracy

Traffic Safety

Challenges

- Manipulating huge data
- Determine actual meaningful relationships

Timeframe

- Possible

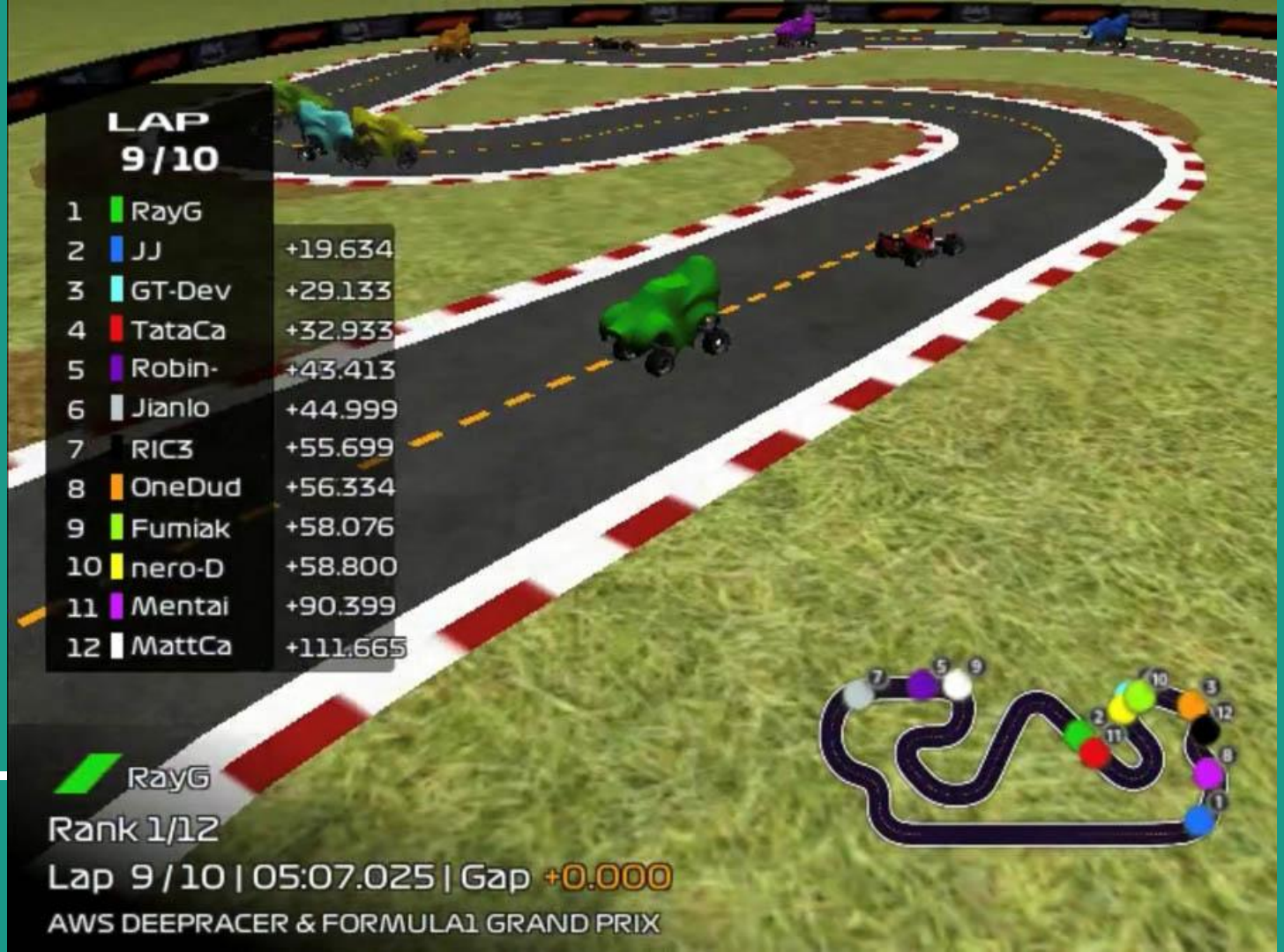
Simulated Racing

Problem Statement:

As a member of an Indy Autonomous race team, determine how best to train our car to win.

Methodology

- Leverage simulation frameworks
- Use neural nets to train
- Participate in online race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9/10
1 RayG
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10 nero-D +58.800
11 Mentai +90.399
12 MattCa +111.665
RayG
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Simulated Racing - Data

Source

- Several simulation frameworks built for this purpose
- Records of manually driving

Processing

- Convert image data to usable format
- Integrate inertial/odometry data if possible

Simulated Racing - Metrics

Training

- Complete a lap
- Improve lap times

Validating

- Compete in DIY Robocar simulated race
- Compete in AWS

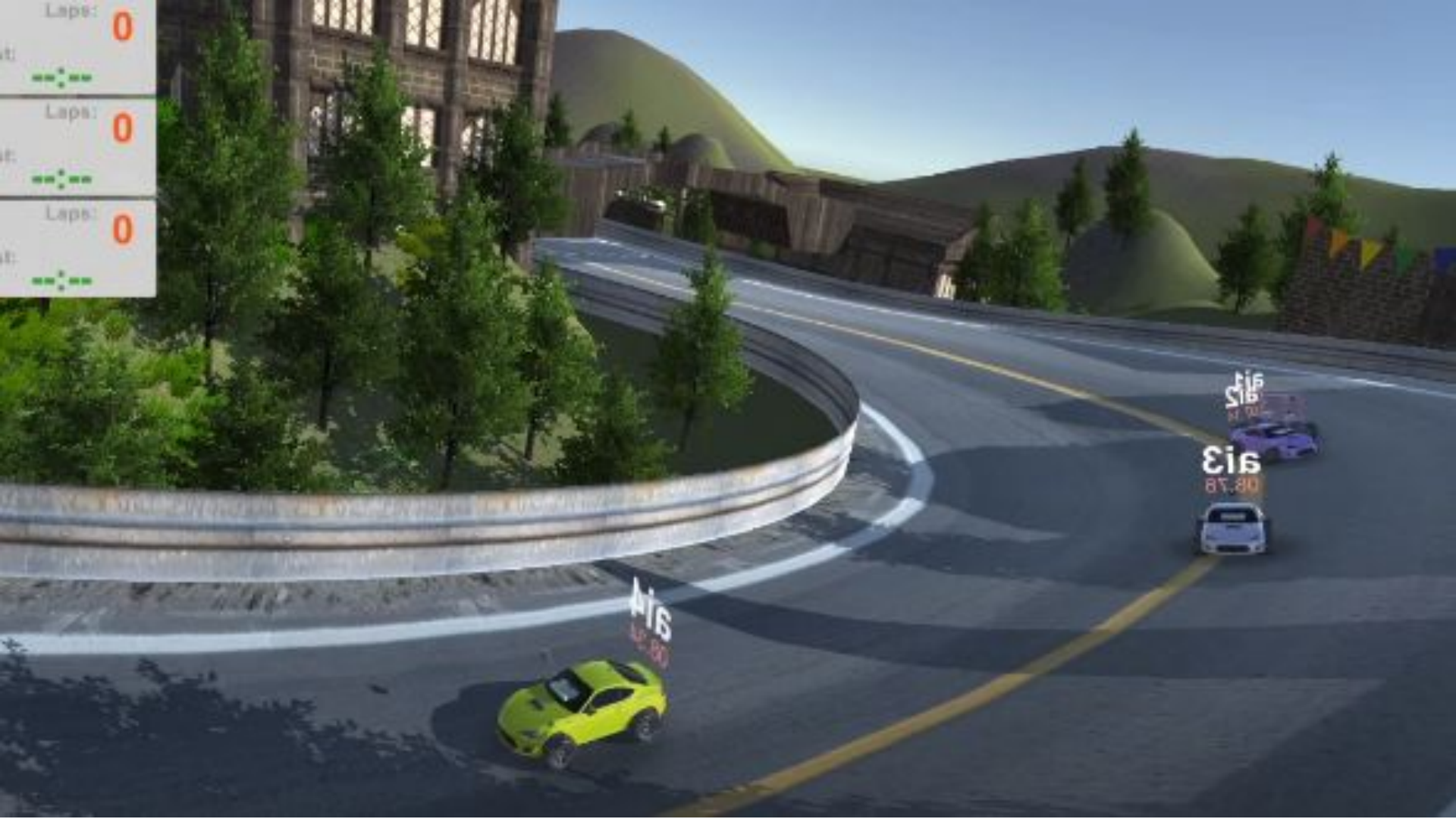
Simulated Racing

Challenges

- Avoiding pre-existing work
- Collecting sufficient data

Timeframe

- Doable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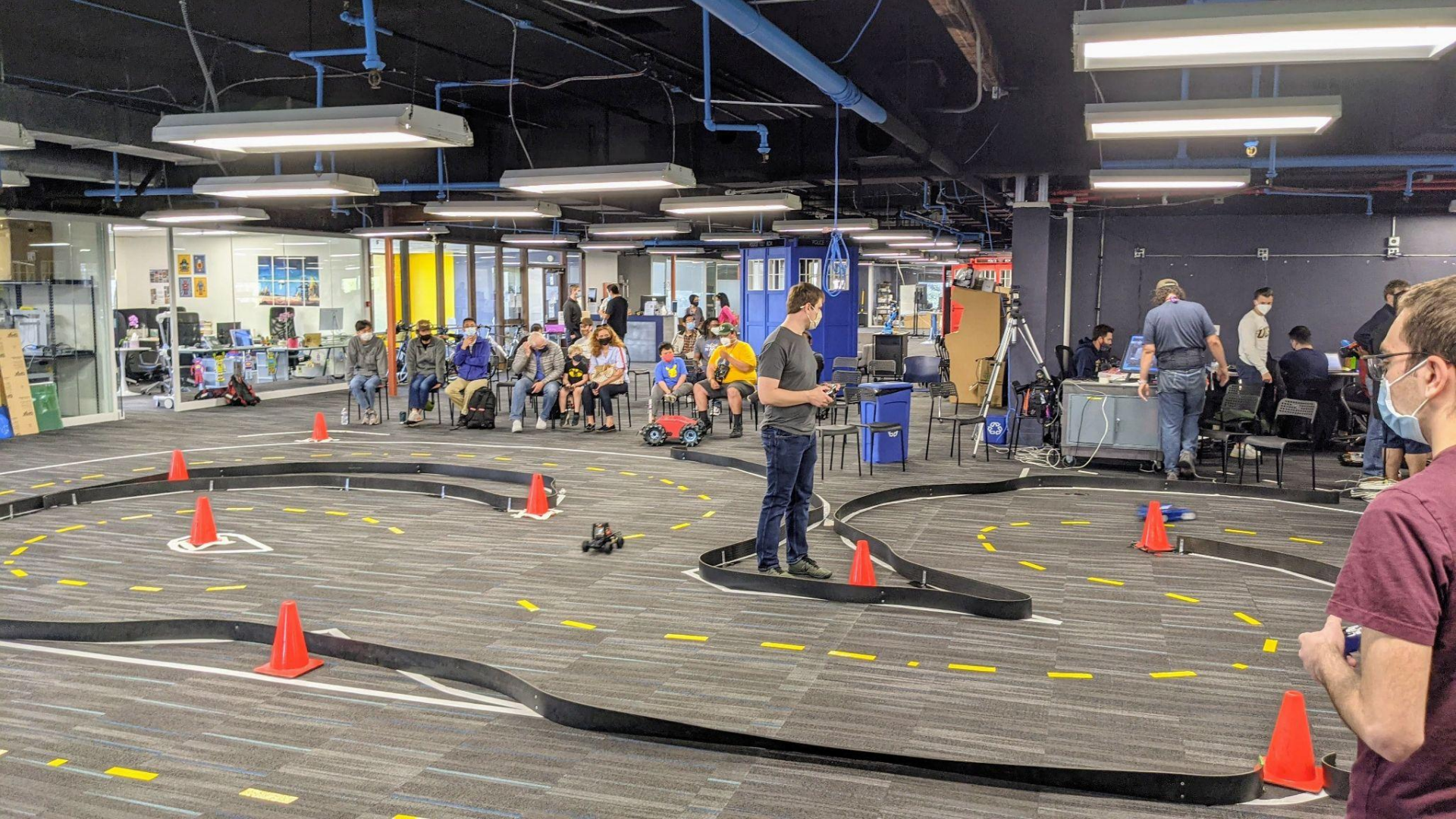

Robocar Racing

Problem Statement:

As a member of an Indy Autonomous race team, determine how best to train our car to win.

Methodology

- Drive around test track
- Use neural nets to train
- Compare lap times

Robocar Racing - Data

Source

- Record manual driving
- Build own track*
- Road trip to Oakland on weekends for DIY Robocar competition track

Processing

- Massive challenge
- Convert image data to usable format
- Integrate inertial/odometry data if possible

Robocar Racing - Metrics

Training

-
- Complete a lap
- Improve lap times

Validating

- Compete in DIY Robocar in-person race*
- Compare lap times to DIY Robocar champions

Robocar Racing

Challenges

- Collecting sufficient data
- Successfully processing data

Timeframe

- Somewhat questionable