Background

Redback collects all sorts of data: engineering calculations, a variety of simulations, and live data from the many sensors on the car. There are so many things that can be done with this data - it really is up to your imagination and interest in the underlying engineering problems. We need some people interested in data analytics, modelling etc to help us get value out of that data - that's where you come in!

Project overview

You will be in groups of 2-3 students. We will give you a large dataset, taken from Assetto Corsa. We want to get interesting insights or tools from all this simulation data. In this project, you will perform analysis/modelling on our data, and give a short presentation on your findings.

Data

The source of the data you'll be using is our driver simulator, Assetto Corsa (AC). AC is a racing game with a detailed and highly configurable physics engine. Not only can we choose precise configurations of our cars, but we also get access to the game's physics output - this means we can generate large amounts of data on any car we like.

For this project, you will be given access to the inputs, and recorded outputs, from 133 different car configurations. For each configuration, we placed 1 bot on the track, and recorded its data as it completed laps of the track.

In each folder, you get a configuration csv (input_parameters.csv), and 1 output csv (output.csv). You also get a data dictionary in the form of an xlsx file - there is one sheet for inputs and 1 for outputs. The data dictionary tells you the definition and units of each entry, but for technical terms you should google the definitions and then ask Raman for further clarification if necessary.

One important note. Due to our simulation method, there was always a second car on the track, around the pit area. When pitting, the bot sometimes crashes into this car, and this explains occasional extended lap times.

Project suggestions

These are suggestions to get you started. There are so many possibilities - treat these as some suggestions in case you don't know where to start. It is completely up to you what you work on! You will not be penalised or rewarded in any way for choosing these topics or choosing your own.

- Descriptive analytics - can you find any interesting relationships?
- Which car setup is fastest? What parameters stood out? Did some parameters work well together?
- Which car setup gives highest variance? Which is the most consistent?

- Which one would you pick for a drag race? What about for a race with lots of tight turns?
- Can you plot the path of a car around the track?
- Can you find the points where the car is slipping? Do some cars slip less than others?
- Modelling and predictive analytics
- Can you predict the lap times of a car with a setup you haven't seen before?
- Can you suggest a "fastest" or "optimal" car?
- Under what conditions will the car slip when turning?

Team formation

You should choose your teams among yourselves - get in touch with other team members to form a team of 2-3 members. Inform Raman of the members of your team by a message from one of you on MS teams.

What are we looking for in your presentations?

- An attempt to solve a real problem. E.g. don't just show that there's a relationship between 2 variables - tell us why that relationship is useful to know about!
- A real desire to work with and support your colleagues - a team-first mentality is a big plus.
- A clear explanation of what you have made, and why you have made it.

Submission
You will present your findings in a 10-minute online presentation on TBA, around our normal meeting time of 12pm.

You must submit your code/notebooks etc either as a link to a public git repo, or in an MS Teams folder that will be created for this purpose at a later date. The choice is up to you and your team.

More information about presentation times will be given closer to the submission date.