Acronis

CASE STUDY

Formula E Team NIO 333 Leverages Artificial Intelligence and Machine Learning Services from Acronis

Acronis Professional Services develops AI/ML software for enhanced sensor failure detection, video analytics, and real-time strategy tools

BACKGROUND

Acronis has been developing new artificial intelligence and machine learning (AI/ML) capabilities to address the unique challenges before, during, and after Formula E races for Oxford-based NIO 333 FE Team ("NIO 333"). There are three use cases in particular being tackled.

KEY CHALLENGES

- Transition to offering managed services
- Migration away from Arcserve

KEY REQUIREMENTS

- Cloud-controlled offering
- Autotask integration
- Easy-to-use interface

PROTECTED RESOURCES

- 49 TB
- 29 Servers
- 19 Virtual machines
- 18 workstations
- 1,300 endpoints

KEY BENEFITS

- Modern cloud-controlled backup offering
- Ease of use
- New customers and revenue
- Support for backing up Hosted Exchange and Office 365

USE CASE #1 – SENSOR FAILURE DETECTION

USAGE SCENARIO

On a typical Formula E racecar, 50 or more distinct sensors are used to log car performance. This data is used for post-race analysis and strategy, as well as making potentially critical in-race adjustments. Unfortunately, because of the limitations NIO 333 had in place for cross checking the sensor data against set pre-defined limits and the types of correlational analysis being performed, it was common for individual sensors to fail in ways that were not noticed.

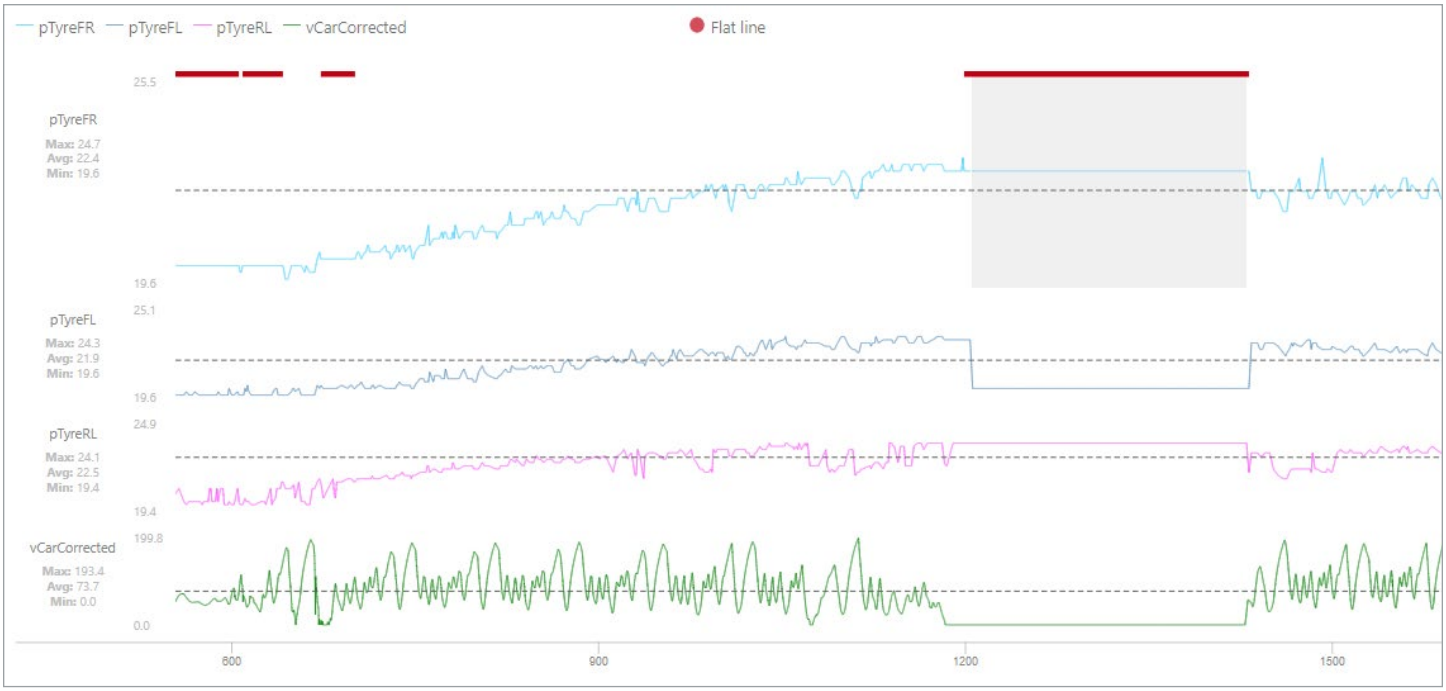
CHALLENGES

NIO 333 needed enhanced sensor failure detection that could spot and strongly correlate the smallest clues such as slowly drifting signals, small dropouts that were being confused with routine noise, and oscillating signals indicating a mechanical failure of a given sensor. Additionally, more intelligence was needed to discern noise spikes that created false positives, along with the ability to make adjustments in the sensors' sample rates without generating new data integrity issues (e.g., high sampling rates often make a signal look noisy).

ACRONIS SOLUTION

Acronis leveraged its AI and ML capabilities (see image below) to develop a robust sensor monitoring solution that picked up on the smallest anomalies and faulty sensor data, enabling NIO 333 to detect failures just in time. Lever-

aging its AI/ML platform, Acronis wrote customized, deep learning algorithms that were able to identify, label, and analyze all relevant vehicle and telemetry data. These models were provided to NIO 333 and they, in turn, are integrating them with scripts into their racing software



USE CASE #2 – VIDEO ANALYTICS

USAGE SCENARIO

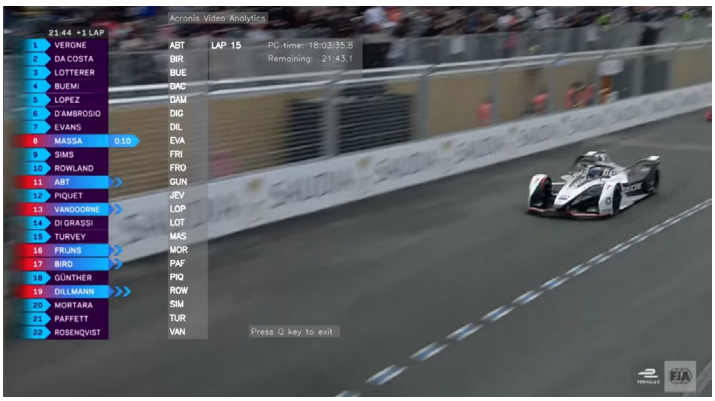
During a race, the TV broadcast provides a wealth of information particularly for NIO's competitors. This information includes data such as position, charge, speed, and power of all the cars on the track. With optical character recognition (OCR) and image recognition (such as the color and shape of competitor cars), data can be scraped from the TV broadcast, indexed, and analyzed to make critical in-race adjustments and post-race strategic reviews.

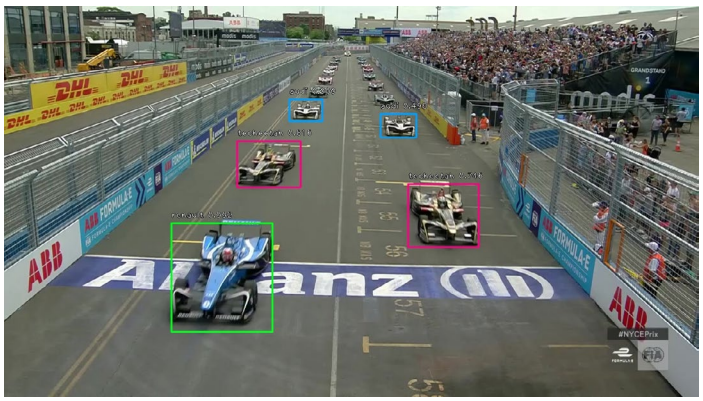
CHALLENGES

While the existing approach used by NIO 333 had been sufficient to identify basic letters and numbers from video images, it was based on 'first-principles' within machine learning and not particularly advanced. Current OCR algorithms have known shortcomings, such as distinguishing print like "PRO" and "FRO" and "9" and "4" on the TV images. Additionally, significantly more data is available through image recognition than characters alone.

ACRONIS SOLUTION

Acronis combined OCR with video indexing based on the YOLO (you only look once) model for NIO 333. Acronis' OCR solution is done in real time (100ms max lag) and scrapes data being shared during the TV broadcast, with a focus on the battery charge of competitors. This insight is particularly important for which drivers are in "attack mode" – four minutes during the race when the driver can use more power – and how much time remains of that four-minute period. This approach to video indexing involves an enhanced model to detect both the object (car) and the team (car color), as well as the pilot's helmet throughout the race. The result is a searchable index that can identify all cars on the racetrack at any time.





USE CASE #3 – LIVE STRATEGY TOOL

USAGE SCENARIO

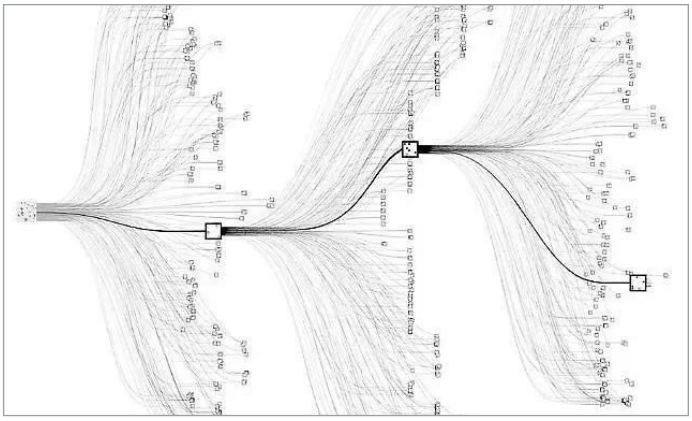
The ability to do pre-event simulations of race scenarios using conventional modelling methods is satisfactory, but AI/ML could play a role by modelling potential race outcomes based on events which disrupt the normal course of a race.

CHALLENGES

It is hard enough predicting and recommending the right response to standard race events (e.g., use of in-race power boost by competition or penalties). It is even harder predicting and recommending the right response to more random, disruptive race events such as Full Course Yellow and Safety Car (FCY/SC). Making a real-time strategic decision (e.g., how should NIO 333 manage its power for the rest of the race at any given time) would be the Holy Grail.

ACRONIS SOLUTION

While the first deliverable was presented to NIO 333 in June 2019, it is important to note this is a work in progress, especially considering all AI/ML systems get smarter and stronger as more data is analyzed. Acronis is designing a traffic model using new algorithms for making decisions during a race,combining it with models based on GPS data and thousands of simulations simultaneously.



Acronis is also integrating the video analytics and OCR data into a model that looks at car speed, power usage, tires, weather, and competitors' battery level, among other things. Ultimately, Acronis is developing a solution that will be able to make predictions and recommendations mid-race for NIO 333.