CompressionX unlocks the value of LiDAR data from Autonomous Vehicles

Autonomous vehicles & Advanced Driver Assisted Systems (ADAS) depend on sensors to provide mission-critical data about the external and internal environments to function. But only a small proportion of data is processed, and that takes place at the 'Edge', on board the vehicle.

So, there's a 'data value gap' creating a massive missed opportunity. SISP believes that ALL sensor data captured on the road has business and societal value which can only be realised if all sensor-derived data can be streamed in real time to the Cloud and mined using AI and Machine Learning driven data analytics.

The future of the autonomous vehicle and ADAS industry is creating and maximising actionable intelligence and value from its gathered data, by having all of it available for data analysis in real time.

Working with partners, SISP's CompressionX lossless compression solution is the key to bridging that data gap and realising the full potential of the data-driven next generation of autonomous vehicles.

The problem & the opportunity

A fully autonomous car can generate up to 80 terabytes of data every day.

Whilst certain data will continue to be processed at the 'Edge', on board vehicles, getting the full business and societal value from all sensor derived data means having all data available in the Cloud for data analytics. This enables businesses to turn data lakes into meaningful information, to draw conclusions and build smarter decision-making mechanisms.

Whilst Artificial intelligence and machine learning play a key role in enabling 'smart decisions' about the relationship between sensor-derived data stored in

the vehicle and that transmitted to the Cloud, they will not reduce or eliminate the need for enhanced data transmission capacity.

Real- time retrieval is vital for quick AI and ML processing in the Cloud. However, there are currently technical and financial barriers to real time transmission and Cloud-based analytics.

First, available bandwidth is insufficient for continuous real-time data upload of all the valuable data harvested by the vehicles' sensors. 5G may help, but data suggests that a car could only upload and download about 10% of its collected data. Also, vehicles are constantly moving with variable network speeds that can drop to well below 10 MB per second and are therefore not sufficient for continuous real-time data upload.

Second, charges for Cloud storage and processing are prohibitive.

The Solution

CompressionX will be a vital component in meeting the exponentially expanding demand for real time transmission between autonomous vehicles and the Cloud.

The most useful sensor equipped to autonomous vehicles will be LiDAR which is used to detect obstacles in the path of the vehicle. CompressionX achieves 75%+ compression on LiDAR by processing the LiDAR data in batches of approximately 1 second.

CompressionX is capable of processing 1 million LiDAR records per second and autonomous vehicles generate far less data eliminating latency issues.

SISP is unique amongst lossless compression solutions for LiDAR data, it compresses and transmits sensor data in real-time.

Proof of Concept for LiDar from an Autonomous Vehicle

We recently took LiDAR recorded on an autonomous vehicle and compressed and transmitted in real-time over 4G which allows for an historic map of where the vehicle has been and what the surroundings were like at that point in time.

The solution we created for the Proof of Concept for Lidar from an Autonomous vehicle was created using a two-stage process.

Stage one was designed to accumulate 1 second's worth of Lidar data and to restructure it into a smaller format where the GPS information and one of the Axis had been moved to create grouping.

Stage two was to run the final reformatted data through the SISP compression apparatus.

The transform process took .2 of a second to transform 1 second of LiDAR. The compression process took .22 of a second to compress the 1 second of

LiDAR. This process was run in a linear manner so the entire time taken to process 1 second of LiDAR was 420 milliseconds although this process could be changed from a single thread process to a multi-threaded process. This option is not required currently because the compression apparatus is already waiting for data from the sensors however in the future when the LiDAR equipment on the autonomous vehicle improves this may become a necessity.

This data was transmitted via 4G from a moving vehicle to the Cloud. The entire goal being to get the data compressed and transmitted in the same (or less) time as it took to gather the data. Using a 4G connection via Vodafone the compressed LiDAR was sent within 507 seconds, it is important to note that sometimes the signal disappeared and sometimes only 3G was available so buffering of the compressed LiDAR was required.

Meeting the industry need

SISP's CompressionX has the following key features and benefits:

- Modelled against generic compression
- Fast prefix encoding
- Flexibility and sustainability
- High compression ratios
- Rapid decompression.

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With our partners, let us enable real time access to the value extracted by applying Cloud-based analytics to all your sensor derived data.