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JORNADA I+D MESIO 2017

SUPPLY CHAIN ANALITYCS

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TOPIC:

Optimization of algorithms and reduced dataset to keep performance on edge devices

PROPOSED RESEARCH:

Project phases:

- **Phase-1:** To develop an industrial Internet of Things (IIoT) algorithm that models large amounts of data to predict anomalies or failure from machines with high accuracy. The data will be generated by industrial sensors and transfered to a cloud provider, the model must be developed and its prediction accuracy measured.

- **Phase-2**: To develop a version of the algorithm that can run on an edge IoT gateway, where computing power and storage space are limited. In turn, the device´s proximity to the device where the model runs will enable fast response without latency or transmission issues. Novel techniques to reduce the high frequency data to its minimum requirement to conserve model´s accuracy as well as code optimization to overcome a reduced dataset or batch processing challenges will be the goal for this phase.

- **Phase-3**: Comparison of results between both sets of models running at the same time should highlight the validity of the approach taken and quantify the savings in bandwidth, computing power required and latency delays realized.

CURRENT & FUTURE POSSIBILITIES:

Finding novel techniques to reduce the need for unnecessary data granularity or computing power opens the door to sophisticated applications that can react autonomously to anomalies, saving precious resources and reducing the cost of industry operation. Creating new ways to identify what´s essential to keep a high model effectiveness and optimally package the algorithms to run with minimal footprint will increase the number of devices that can run algorithms at the edge, thus enabling machine to machine distributed intelligence.

TOPIC:

Rebalancing Stocks among retail points of sale

PROPOSED RESEARCH:

Create an end to end solution to rebalance stock among stores. Enable reallocation of overstock where risk of lost sales exists.

Project phases:

- **Phase-1**: Develop classification and predictive algorithms using Machine Learning to identify where in a network overstocks are located and where the risk of lost sales exists
- **Phase-2**: Develop an optimization algorithm to calculate best routings to execute the rebalancing of stock taking into account the insights from Part 1. Best routes algorithms should target two different goals:
  o Optimize distribution of stock between distribution center and stores (hub to spoke replenishment)
  o Optimize pick-up and delivery to rebalance stock among retail stores (spoke to spoke replenishment)
- **Phase-3**: Develop a visualization layer/user interface using the R package Shiny

CURRENT & FUTURE POSSIBILITIES:

Currently the lateral movement of stocks among stores is done in a reactive way. Overstocking is a reality and lost sales due to out-of-stock situations is a challenge many retailers are facing . We envision a future where rebalancing stock in the stores happens proactively taking into account predictive insights to reallocate the stocks in a smart way:

Maximizing product availability

Reducing stocks outs and lost sales

Decreasing products loss due to expiration date

Optimizing transportation cost