DEEC
DEPARTAMENTO DE ENGENHARIA ELECTROTÉCNICA E DE COMPUTADORES
TÉCNICO LISBOA

Big Data Measuring Systems

LAB 4 Short Report: Cloud Sensor Platforms

Week day	Date	Hour	Group	Students Numbers	
Friday	24/4/2020			Paolo Frazzetto	94942

Step 1

Channel ID	**1058393 (Features & Analysis)** **1065024 (Customer view)**

Step 6

JSON payload size	**95 byte**
MSGPACK payload size	**79 byte**
Observations: As expected, the same entry encoded as MSGPACK payload is smaller in size than the corresponding JSON file.	

Step 10

Post-processing for rotation speed

The rotation speed frequency follows a linear behavior proportional to the supply voltage. The post-processing consists of the inversion of this linear model with $f_1 = 13.9 \times V + 0.006$. Next, the main frequency is the angular velocity of the shaft that gets divided by 50 for the gear ratio and again divided by 60 to convert it from Hz to RPM.

Post-processing for unbalancing weight

The amplitude of the weight feature has been modeled as $f_2 = (8 \times 10^{-4} weight) \times (4.35\ speed)^2)$ taking into account the double dependency on the rotating speed and unbalancing weight. If $f_2 > 0.05$ (an arbitrary threshold) the inverted formula gives the estimated weight, that otherwise is set to zero.

Post-processing for gear's health condition

Similarly, the health conditions follows $f_3 = \left(0.02(health - 100)\right)^2 \times (0.0085\ speed)$ that leads to a rounded estimate of the health if the feature is heuristically greater than $f_3 > 0.001$, otherwise it is set to $100\ \%$.

Step 11

Motor state variables evolution

The motor state variable follows a repeated cycle of ≈ 10 minutes. The speed increases linearly up to half cycle and then it decreases with the same behavior, thus resulting in a triangular wave with little noise. At around the maximum speed, from roughly minute 4 to 7, the unbalancing weight is added. The estimated weight is firstly 80g and after one minute it reaches 100g. Here however the post processed points are noisier, so better parameters or model would be required to get a more accurate estimate. Concerning the health, it is at top conditions on the first half of the cycle and then it decreases exponentially to 10%.

Conclusions

The experiment has been carried out successfully. The sensor and feature extractions have been integrated in the ThingSpeak platform by means of dedicated channels and visualization tools. Moreover, cloud computing was used to post-process the sensor data similarly to what happens in real life scenarios, where cloud computing is exploited for remote monitoring, analysis and maintenance.