

Bearing Remaining Useful Life(RUL) Estimation

This project is focused on the **estimation of the remaining useful life (RUL) of bearings**, a critical problem since most of failures of **rotating machines** are related to these components, strongly affecting **availability, security and cost effectiveness** of mechanical systems and equipment in industries.

Four run-to-failure bearing datasets were provided to build prognostics model, and **3** remaining bearings datasets can be used to evaluate the accuracy of estimated RUL. Monitoring data of these 3 test bearings were **truncated** so that you were supposed to predict the remaining life, and thereby perform RUL estimates.

Data characteristics:

Both learning and test datasets were given in folders. Each one contains vibration ASCII files named "acc_XXXX.csv". The data acquisition parameters are given below and must be considered carefully.

- **Vibration signals (horizontal and vertical)**
 - Sampling frequency: 25.6 kHz
 - Recordings: 2560 samples (i.e. 1/10 s) are recorded each 10 seconds (pic1)
- For each ASCII file, the data were arranged as the following table:

Column	1	2	3	4	5	6
Vibr. signal	Hour	Minute	Second	μ-second	Horiz. accel.	Vert. accel.

Requirements:

The output document should include detailed illustration of the following parts:

1. The methods or flow of data preprocessing and feature engineering.
2. How to choose machine learning models and tune the parameters?
3. How to evaluate the results and **why**?
4. What insights or lessons learned from this task?