



# **ForeSightFury- Challenge on Predictive Analytics**

#### Sub Domain- Fault Detection and Diagnosis in Rotatory Machines

## Introduction

Fault detection and diagnosis play pivotal roles in ensuring the reliability, safety, and efficiency of complex systems across various industries. ForeSightFury presents a challenge for the participants to develop a fault detection algorithm to detect and classify fault in a motor drive system. In general, the procedure consists of (1) extracting relevant features from the data either manually or automated using certain techniques, and (2) using the extracted features to develop a machine/deep learning algorithm for fault classification.

#### **Dataset Description**

Vibration data was collected using accelerometers. Accelerometers were placed at the drive end of the motor housing. Vibration signals were collected using a 16 channel DAT recorder, and were post processed in a Matlab environment. All data files thus are in Matlab (\*.mat) format.

The sampling frequency of the data is 12 kHz. Motor bearings are seeded with faults using electrodischarge machining (EDM). Faults ranging from 0.007 inches in diameter to 0.021 inches in diameter are introduced separately at the inner raceway, rolling element (i.e. ball) and outer raceway. Faulted bearings were reinstalled into the test motor and vibration data was recorded for motor loads of 0 to 3 horsepower (motor speeds of 1797 to 1720 RPM).

The bearing specifications is given below:

Inside Diameter	<b>Outside Diameter</b>	Thickness	<b>Ball Diameter</b>	Pitch Diameter
0.9843	2.0472	0.5906	0.3126	1.537

\*All dimensions are in inches

Defect frequencies: (multiple of running speed in Hz)

Inner Race	<b>Outer Race</b>	Cage Train	<b>Rolling Element</b>
5.4152	3.5848	0.39828	4.7135

### **Judging Criteria**

The participants will be judged based on the following metrics:

1. Data Preprocessing

2. Problem Solving Approach (PSA): Feature engineering, extraction, correlation analysis, trend detection, etc.

- 3. Methodology: Selecting suitable algorithm for fault detection and classification
- 4. Result & Discussions

5. Inferences and Managerial Implications: Results Interpretability, application in real world, organization benefits etc.

### **Data Nomenclature**

Normal Baseline Data:

Motor Load (HP)	Approx. Motor Speed (rpm)	Normal Baseline Data
0	1797	Normal_0
1	1772	Normal_1

Faulty Data:

Fault Diameter	Motor Load (HP)	RPM
0.007"	0	1797
0.007"	1	1772
0.014"	0	1797
0.014"	0	1797
0.021"	0	1797
0.021"	0	1797

## Link to data:

https://drive.google.com/drive/folders/1On3prTR\_QRiElGtGrMJCiPsMufkDB-wB?usp=sharing