GEARBOX AUDIO QUALITY DETECTION

Authors: Urina Lama, Anar Mehraliyev, Abdul Wahab
Supervisors: Nicolas Leberruyer, Hergys Rexha, Sébastien Lafond

VOLVO

EDISS

Problem Statement

Volvo's heavy-duty construction vehicles rely on gearboxes for power transmission and speed control. Faults in these components can lead to costly repairs, downtime, and safety risks.

Currently, gearbox testing is done manually by operators listening for anomalies which is a time-consuming and subjective process. This project introduces a machine learning-based solution that analyzes gearbox audio, identifies irregularities in it and pinpoint exact faulty gears. This enhances accuracy, efficiency, ensuring better quality control in Volvo's gearbox manufacturing and testing processes.
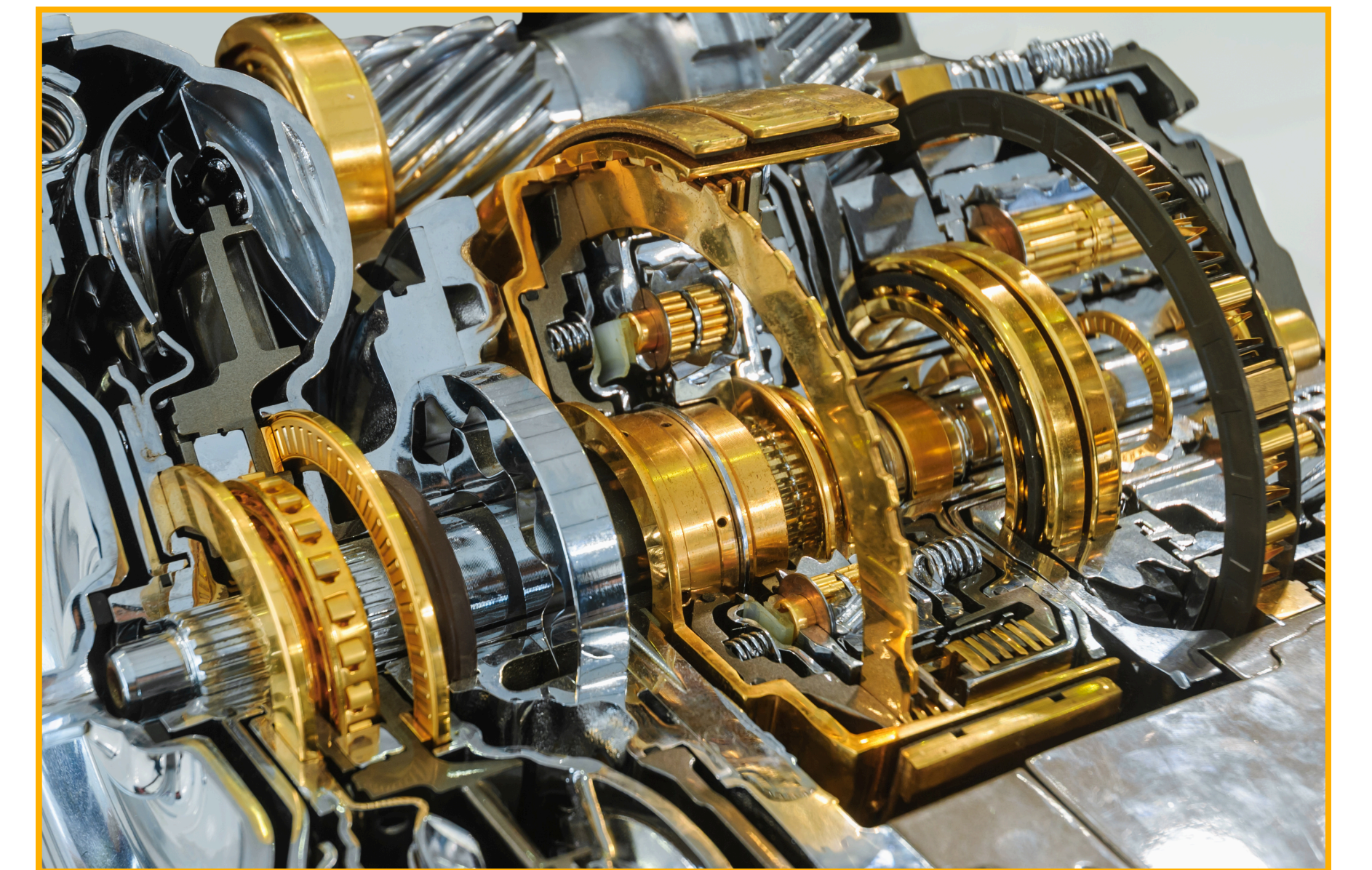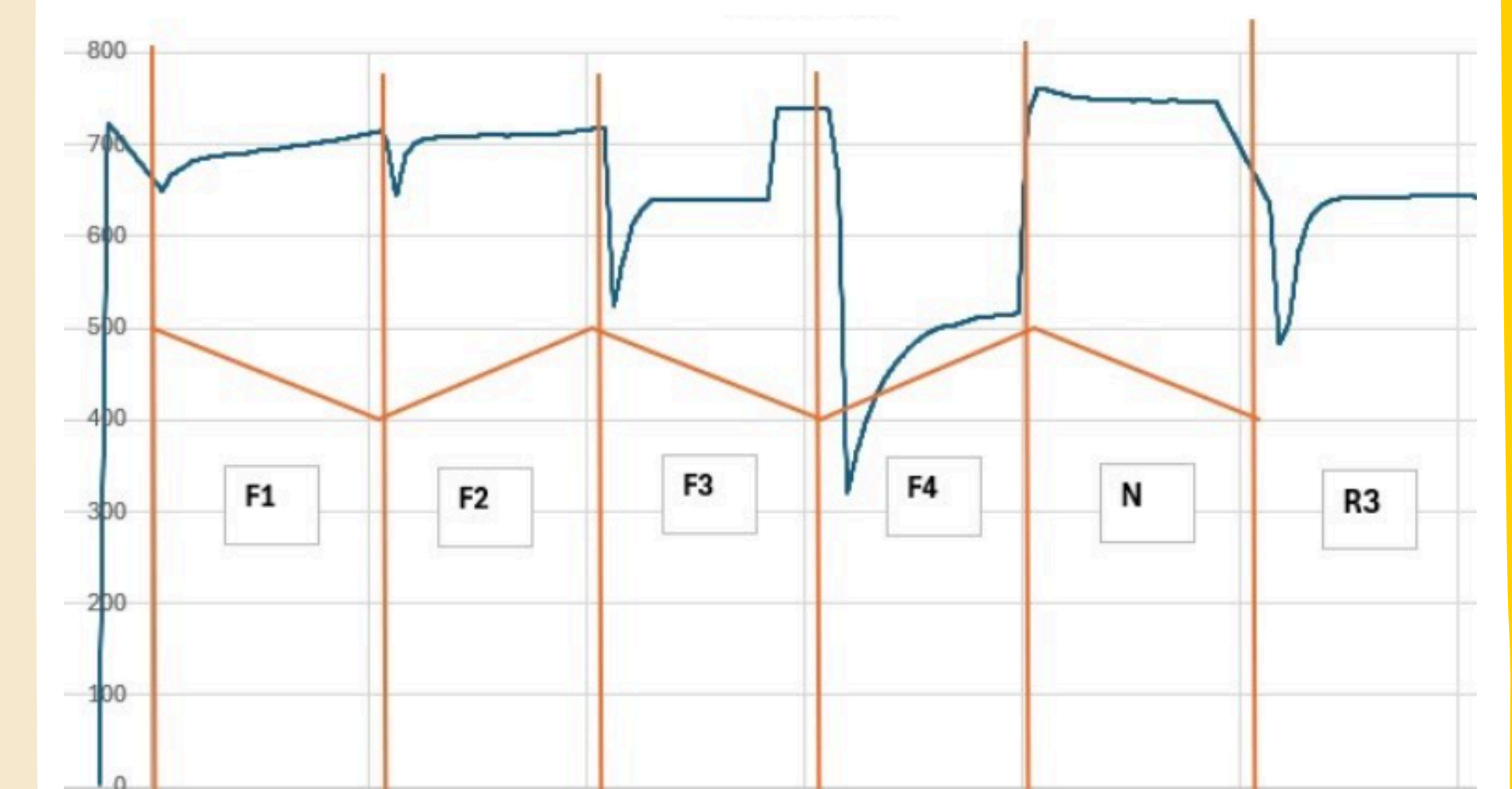
Objectives

1. Identifying faulty gears by training an anomaly detection model.

2. Augmenting faulty audio to enrich the testing dataset.
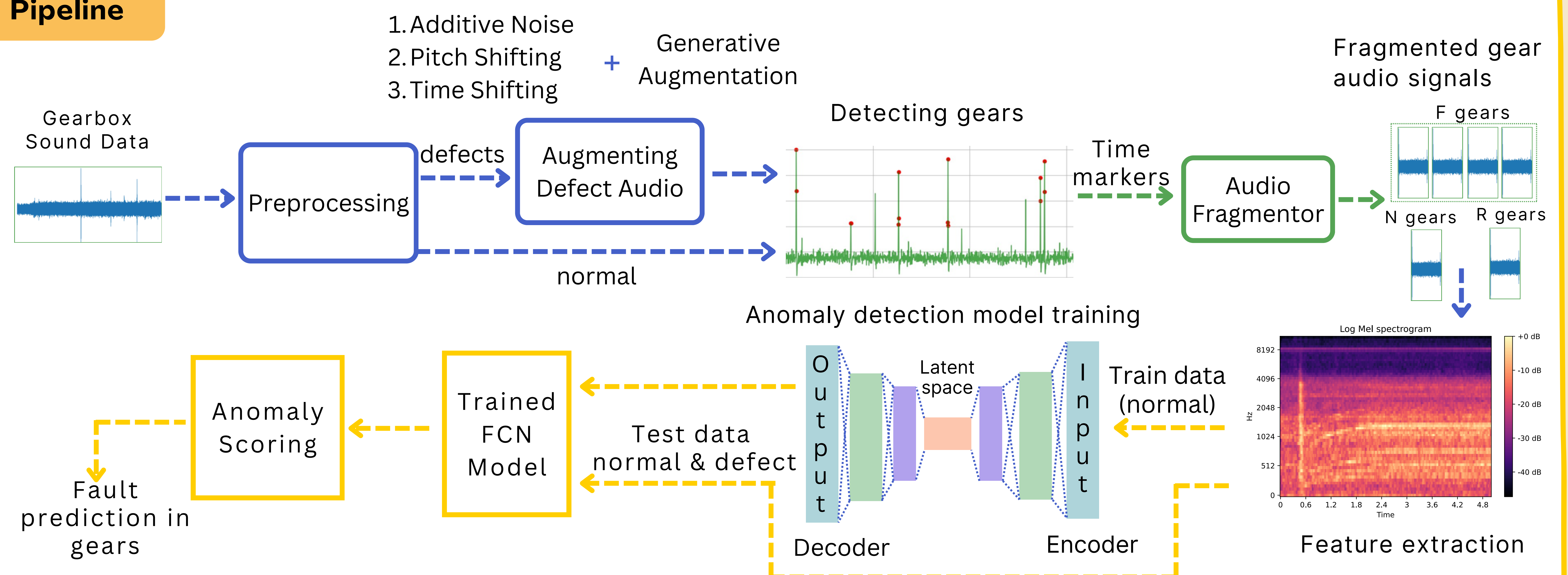
3. Providing an anomaly score for each model prediction.
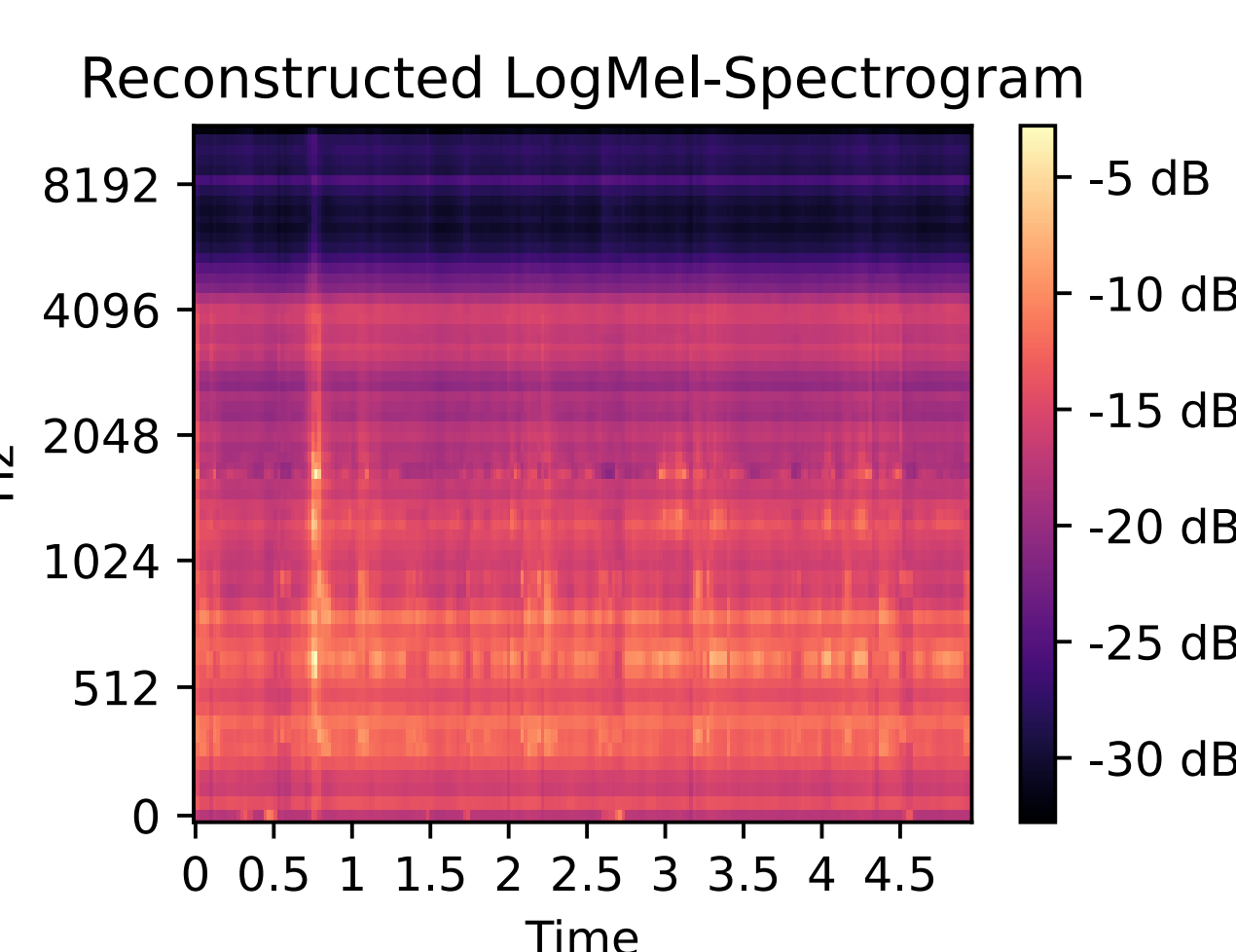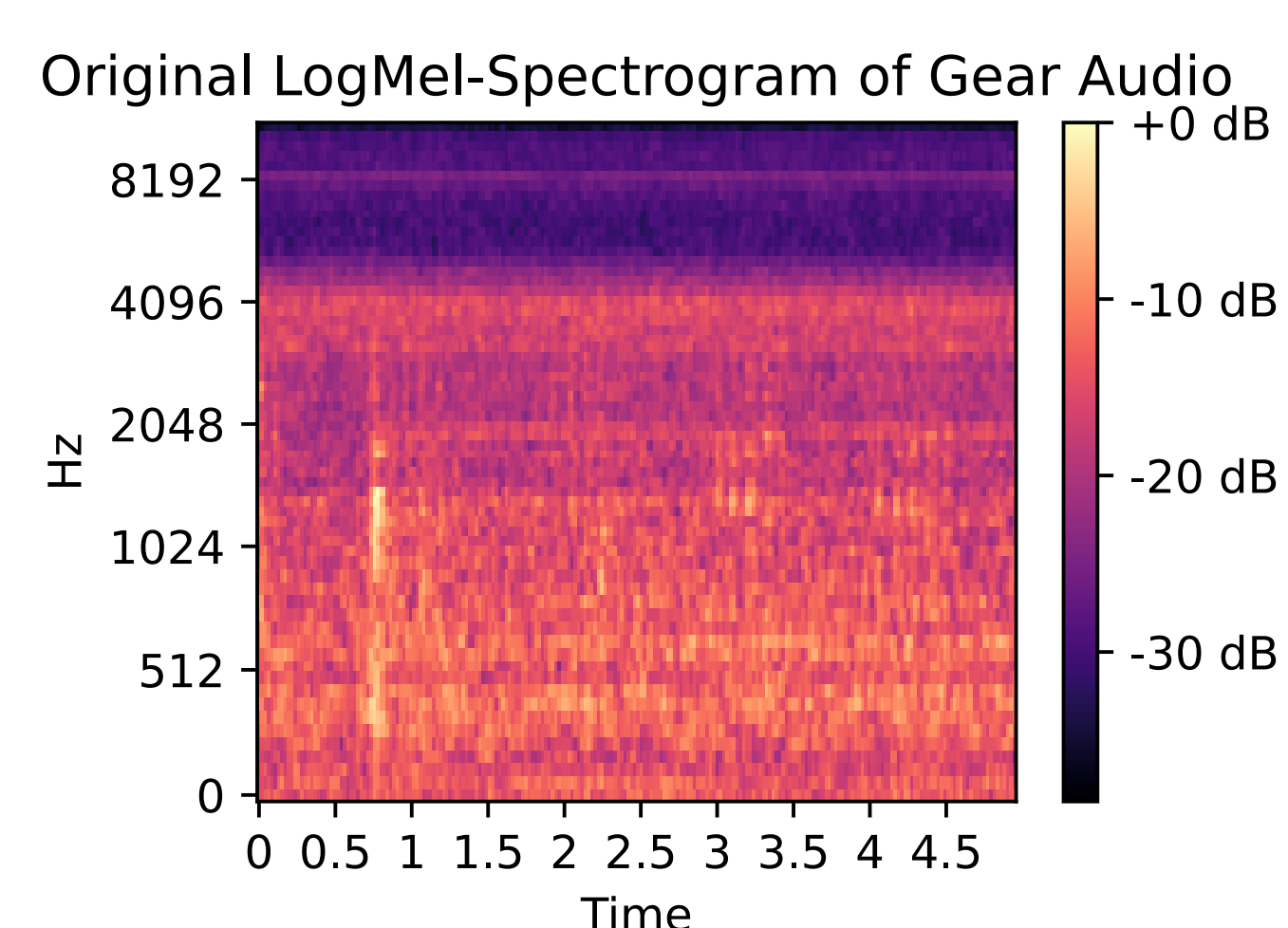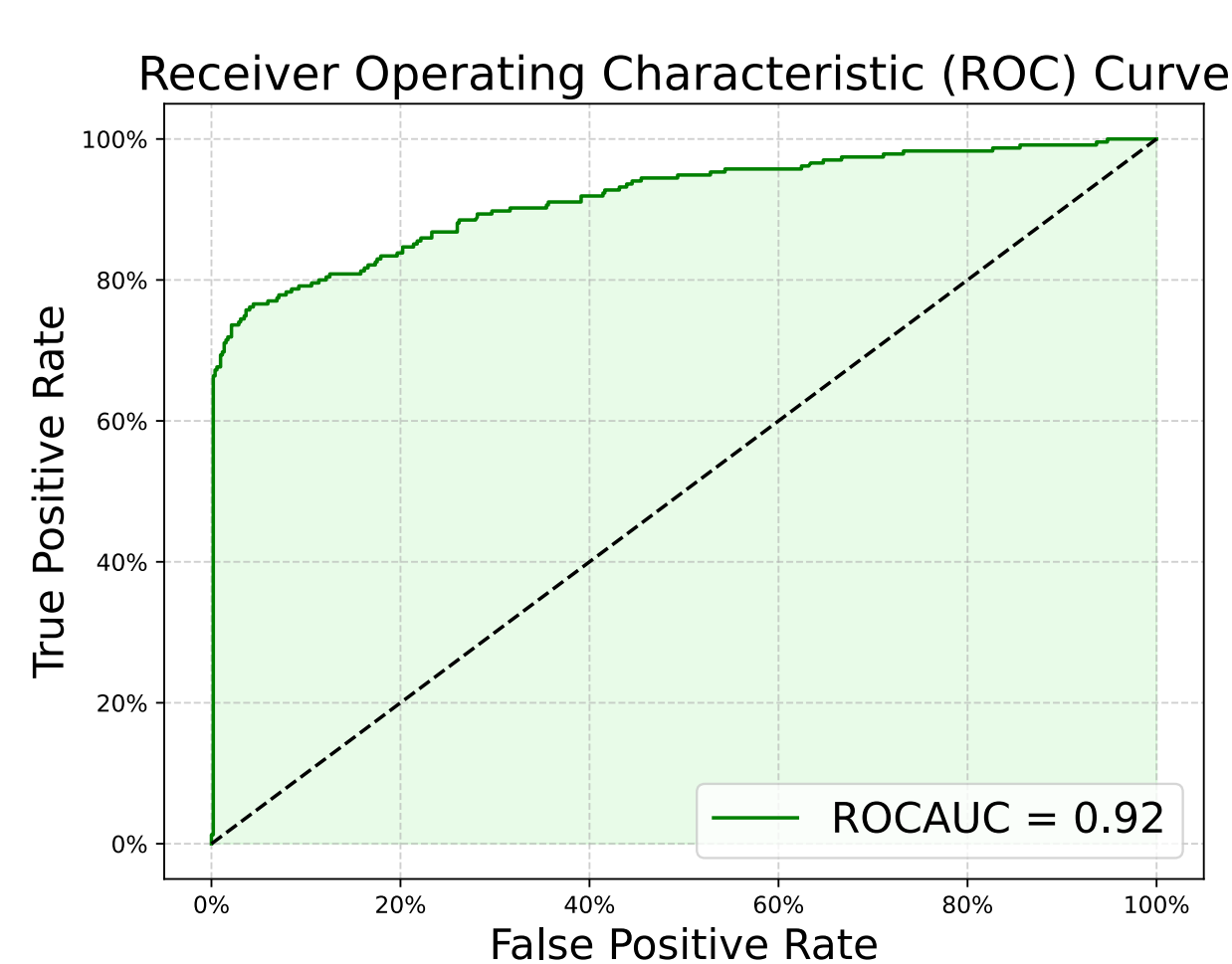
Dataset
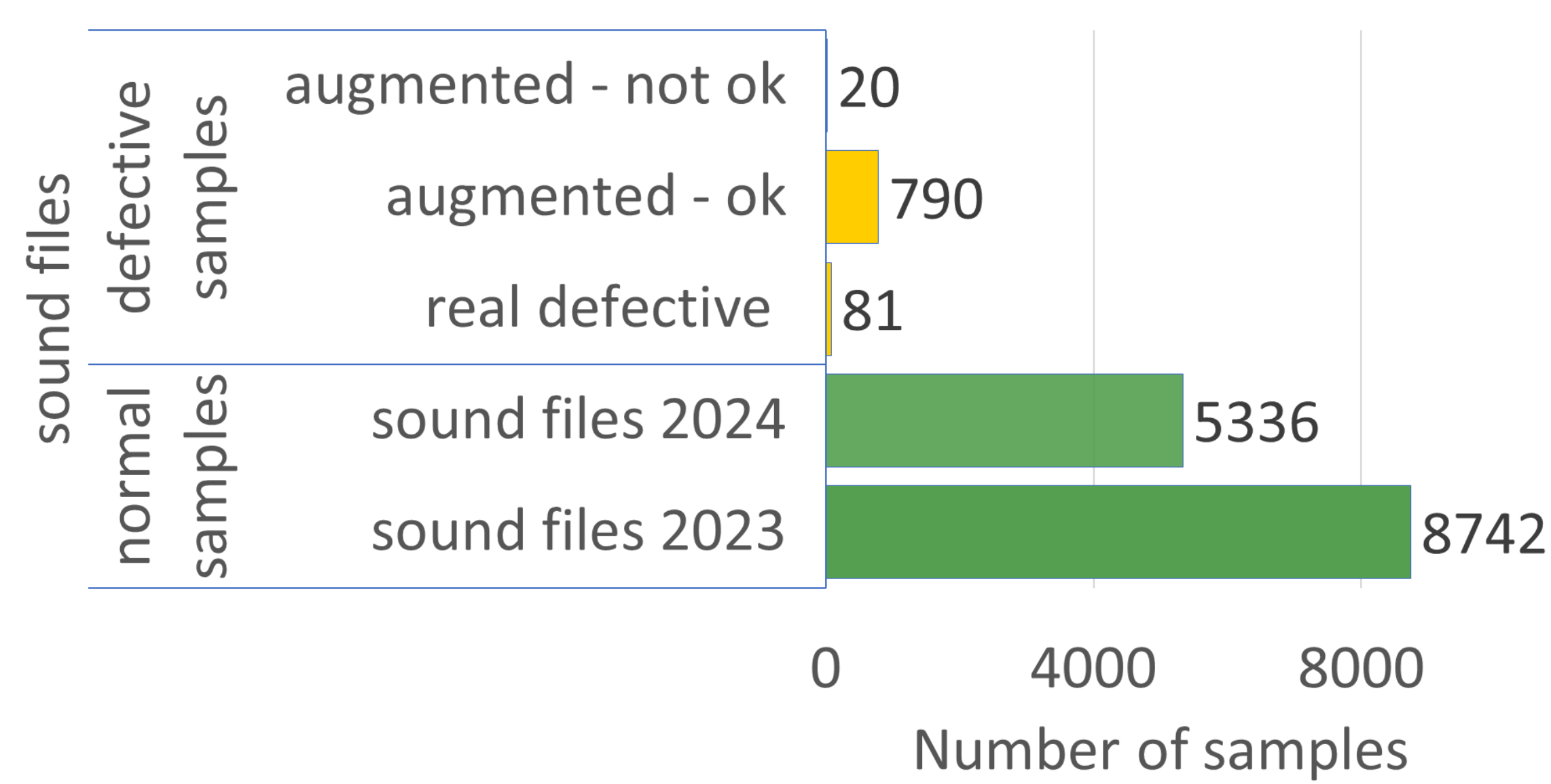
Sample

Pipeline

Results

Accuracy	90 %
Recall	71.4 %
Precision	94.9%
F1-score	81.5%

Challenges

- Absence of gear change time markers.
- Faulty sound samples are less than 1% of the dataset.
- Small faulty dataset for generative augmentation using C-GAN.

Future work

- Training a model to detect gear change points.
- Manually labeling the fragmented defective gears to improve recall measure.