Technology that Impacts Business

Machine Learning & Artificial Intelligence - Applied to Medical IoT Data

Introduction

Advanced analytics and Artificial intelligence (AI) are finding increasing traction in healthcare industry. A need to develop complex algorithms and analytical models to emulate human learning in the analysis of intricate and tangled medical data is on the rise.
For the industry these intelligent technologies hold promise to enable precision and efficiency in healthcare provisioning.

Customer background

- A Norwegian Data Science and Artificial Intelligence company was in the process of developing an AI-as-a-Service platform for Healthcare industry.
- The client was having an edge over the others in the industry, when it came to solving problems related to sustainable development using Artificial Intelligence, Data Science and Machine Learning.

Requirement

- The primary requirement was to detect % levels of oxygen leakage from ventilator mask.
- The client required an Audio Classification solution for embedding into their Human Health Indicator Application. They were going through a number of issues pertaining to audio filtering and segmentation needed for performing Ventilation Mask Leakage Analysis.
- Focus was on feature selection and feature engineering. One of the major challenges was presence of acoustic noise in the audio samples, identification and removal of this acoustic noise was a key requirement.

Scope

- Build, test and deploy audio classification solution/ system containing analytical models based on Vent files.
- To build binary classification model to identify the ventilator mask leakage.
- To build multi-class classification model to identify the percentage of leakage through the ventilator mask.
- Arrive at an optimal audio classification solution after comparing several classification techniques.

Solution

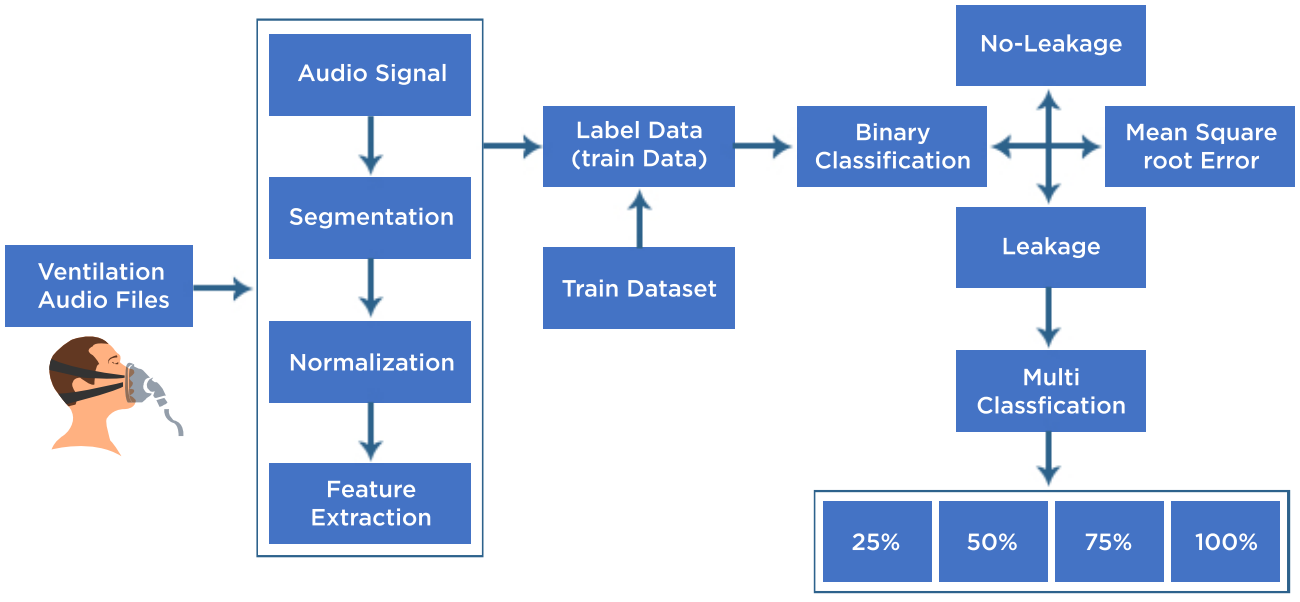
Aress software built an audio classification solution applying several classification techniques before finalizing on the optimum solution:

- Use of spectral and energy features for vent files audio segmentation.
- Feature extraction and engineering covering several audio features both from the time and frequency domain using cepstral coefficients, bandwidth, and energy novelty functions.
- Unsupervised audio stream segmentation, content visualization, data labeling data, cross validations post applying model for Classification.
- Classification models studied: SVC, Ensemble Random Forests.
- Gradient boosting and Grid Search methods used for parameter tuning and Optimization.
- Libraries used: Python LibROSA, SciPy, & Scikit-learn

Business Benefits

- The optimized & tested audio classification solution containing analytical models were delivered ahead of the committed timelines, enabling an in-time integration into the larger application.
- Analytical model containing complex algorithms helped enable higher precision and enhanced efficiency.
- The solution provided a first cut platform for incrementally building further advanced analytics capabilities into the larger healthcare solution.

Solution Architecture Overview



Contact Us

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