ARTIFICIAL INTELLIGENCE IN PREDICTING HEART FAILURE

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ABSTRACT

Heart Failure is a major chronic disease that is increasing day by day and a great health burden in health care systems worldwide. Artificial intelligence (AI) techniques such as machine learning (ML), deep learning (DL), and cognitive computer can play a critical role in the early detection and diagnosis of Heart Failure Detection, as well as outcome prediction and prognosis evaluation. The availability of large datasets from difference sources can be leveraged to build machine learning models that can empower clinicians by providing early warnings and insightful information on the underlying conditions of the patients.
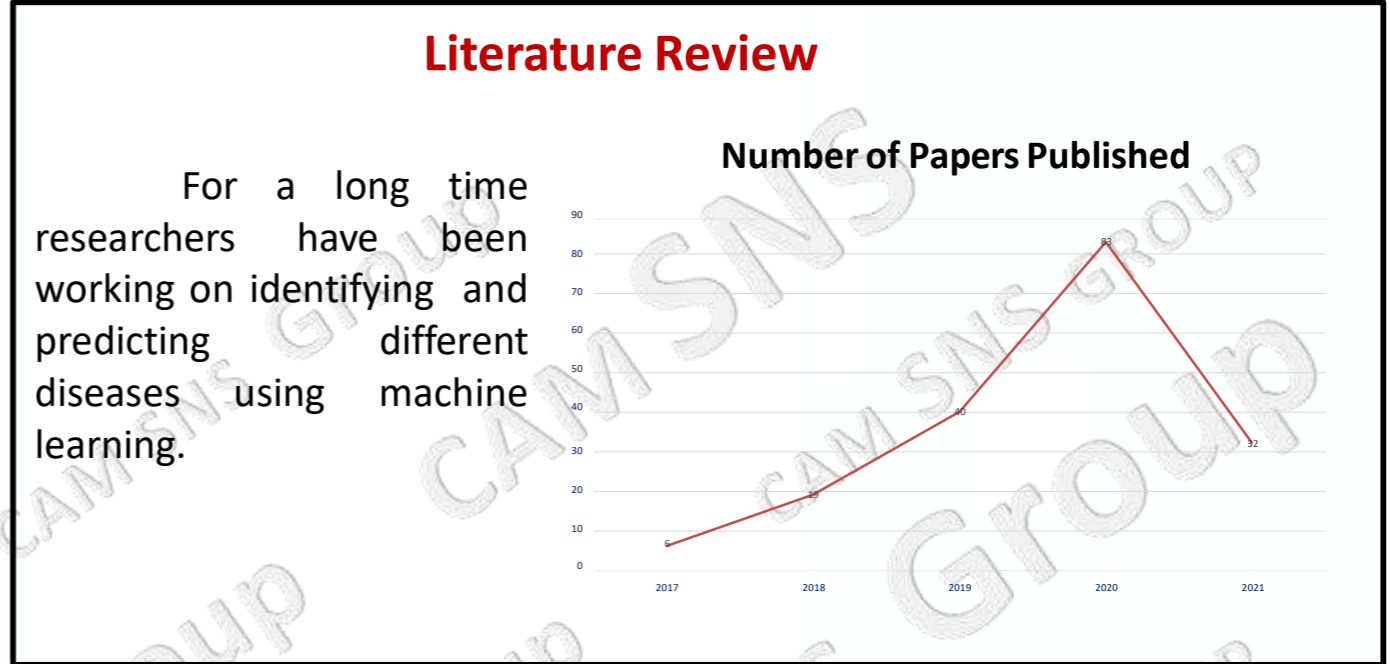
Keywords: Heart Failure; Machine learning; Supervised learning; unsupervised learning

AIM

- Simulate Human Intuition
- Decision Making
- Object Recognition

Artificial Intelligence

Machine Learning

Deep Learning

OBJECTIVES

- Optimize Patient Care
- Improve Efficiency
- Improve Clinical Outcomes

Machine Learning Techniques

Machine Learning
- Supervised Learning
  - Classification
    - Support Vector Machines
    - Discriminant Analysis
    - Naive Bayes
    - Nearest Neighbor
  - Regression
    - Linear Regression GLM
    - SVR, GPR
    - Ensemble Methods
    - Decision Trees
    - Neural Networks
- Unsupervised Learning
  - Clustering
    - K-Means, K- Mediods Fuzzy C-Means
    - Hierarchical
    - Gaussian Mixture
    - Hidden markov Model

Steps in Building ML Algorithms to Predict heart Failure

Selection of dataset and Preprocessing
| Data Overview | Detect and remove out layers | Detect and impute missing data | Data enhancement using random number generators | Applying suitable normalization techniques |

Model Selection
| Understanding classes | Machine learning model Selection |

Model Implementation
| Import Data | Implementing Import Data models |

Performance Measurement
| Calculate accuracy | Analyze the result through confusion Matrix |

Result Comparison
| Compare the Accuracy among all Models | Calculate Final Output |

Literature Review

For a long time researchers have been working on identifying and predicting different diseases using machine learning.
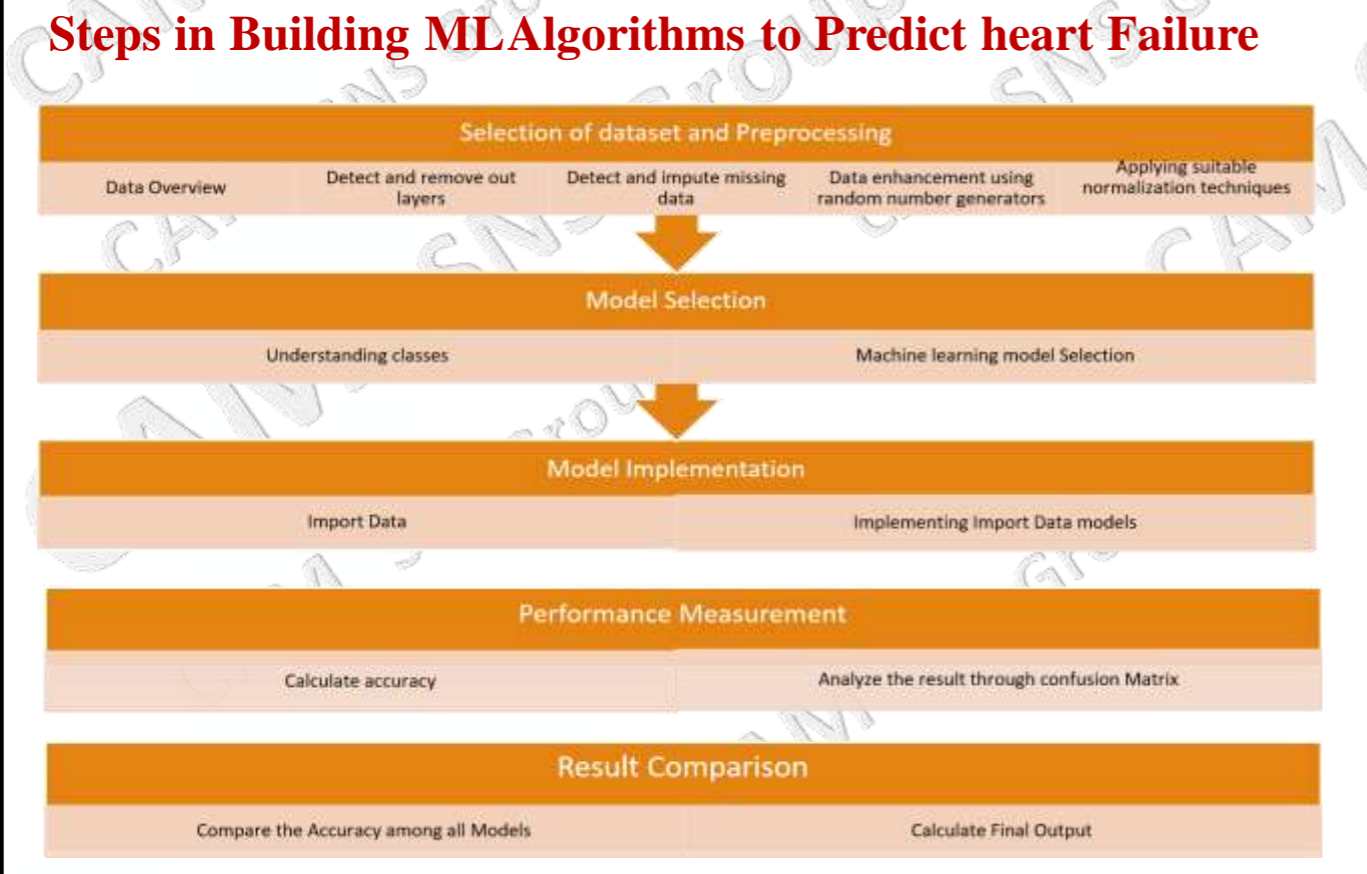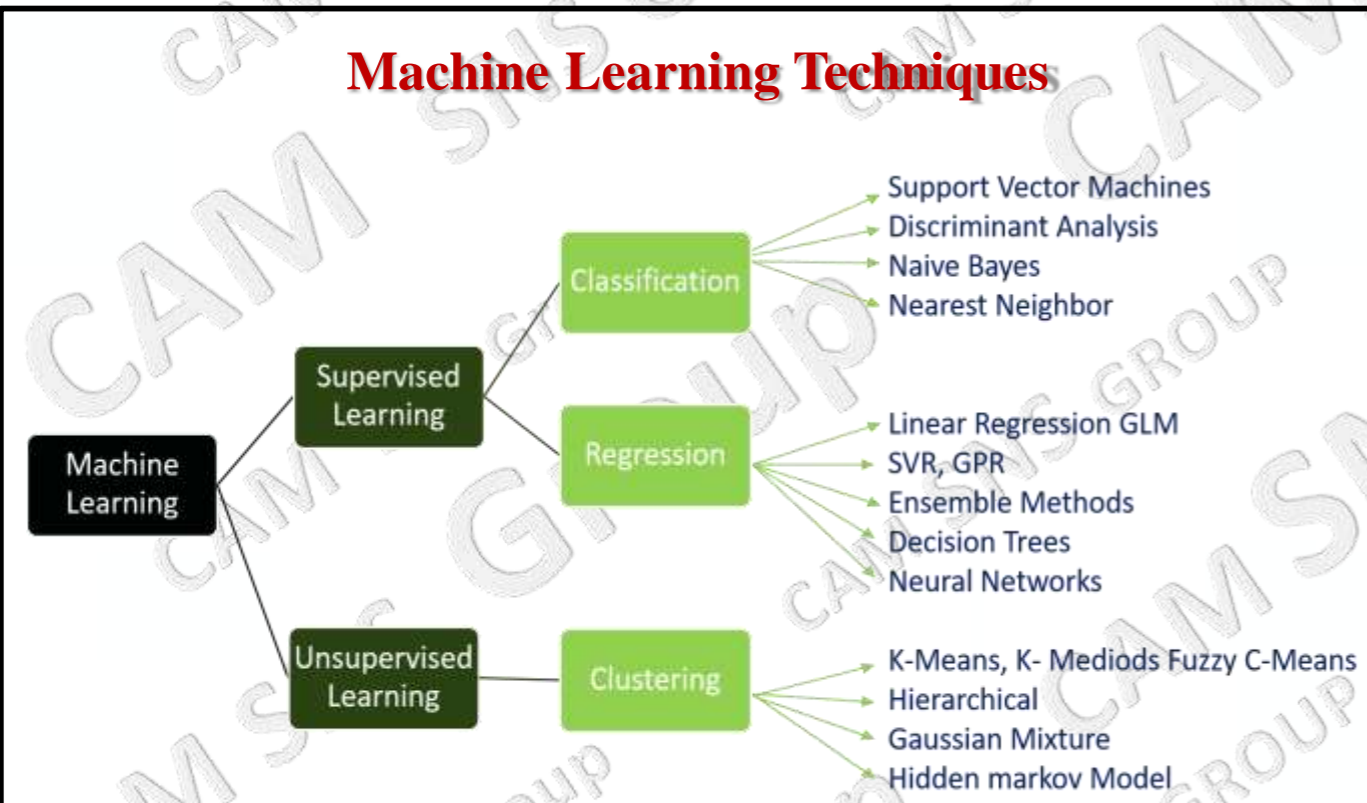
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Machine Learning Training

- We attempted to perform machine learning on the data we received from the MAX30102 sensor.
- Collected data from 10 people, 6 of whom were smokers and 4 were nonsmokers. Each file had around 100000 lines of data.
- The machine learning was performed on MATLAB using the built-in machine learning toolkit.
- The machine learning was done on the KNN model and was extremely successful. We managed to get an accuracy of 97.8 %.

Start
Import Libraries
Set the Files Column Format
Read Dataset from CSV File
Split Data to Classes and Features
20% of the Data for test — 80% of the Data for training
Model = KNN Classifier
Start Training Using KNN Model
Store Trained Model in a File — Get Trained Model Score

The contents in the dataset file

Machine Learning on MATLAB showing KNN with 97.8% Accuracy

Conclusion

- Clinical decision-making is reliant on synthesizing high-quality data to help solve patient problems.
- As the amount of available patient data increases, it is likely clinical decision-making will be augmented by AI techniques in the future.
- There are a large variety of ML approaches and the most appropriate algorithm choice will be guided by the research question and the type of data available.

Acknowledgement