Synopsis – Predicting Patient Response to Drugs

Name of Team Members: Nikhil Subhash Shelke (44)

Manas Sharad Torane (62)

Rohan Vishnu Pawar (24)

Pranay Sanjay Satpute (39)

Class: BE

Div: B

Domain: Machine Learning

Topic and Sponsorship: Predicting Patient Response to Drugs

Abstract : Predicting how patients respond to drugs is a crucial challenge in personalized medicine and pharmacogenomics. Machine learning techniques can analyze patient-specific data such as demographics, genetic markers, and clinical history to forecast drug efficacy and adverse reactions. This project aims to build predictive models using supervised learning algorithms like Logistic Regression, Random Forest, and Deep Learning approaches to identify responders and non-responders to particular medications. The outcome supports optimized treatment plans, reduces adverse drug events, and advances personalized healthcare. This project focuses on leveraging machine learning techniques to analyze multi-dimensional patient data—including genomics, clinical history, and demographic information—to accurately predict how patients will respond to specific medications. By applying supervised learning algorithms such as Logistic Regression, Random Forest, and deep learning models, the system aims to identify responders and non-responders, thereby optimizing treatment strategies and minimizing harmful side effects.

Keywords: Personalized Medicine, Drug Response Prediction, Pharmacogenomics, Machine Learning, Clinical Data, Patient Outcomes

Challenges identified : - Handling heterogeneous and high-dimensional patient data

- Imbalanced datasets due to fewer non-responders or responders

- Feature selection from complex biomedical signals

- Ensuring model interpretability for clinical decision-making

- Data privacy and ethical considerations related to patient

- Integration of multi-modal data (genetic + clinical)

Novelty or Industrial Application: -

- Useful for hospitals, clinical research, and pharmaceutical companies

- Supports development of clinical decision support systems (CDSS)

- Applicable in drug development pipelines for targeted therapy

Synopsis – Predicting Patient Response to Drugs

Base IEEE/ Springer / Equivalent publication (paper URL):

https://ieeexplore.ieee.org/document/7060697

List of References:

 - "Machine Learning for Predicting Drug Response in Cancer Patients," IEEE, 2021

 - "Pharmacogenomics and Personalized Medicine: Data-Driven Approaches," Springer, 2020

 - "Predicting Drug Response from Clinical and Genomic Data Using ML," ACM, 2019

 - "Deep Learning Models for Drug Efficacy Prediction," Elsevier, 2022

 - "Interpretable Machine Learning in Healthcare," Springer, 2023