Predictive Analytics Model for Healthcare Outcomes Using Machine Learning

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Name of the Organization: Academic ML Lab

Roll No: 0013

Organization Mentor: Dr Ritu Vashistha

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Strem: MBA in Healthcare Analytics

Batch: HA-01

History & Description of the Organisation

The organisation works on applying data analytics and AI to strengthen healthcare decision-making. Focus areas include hospital operations, patient risk prediction, and clinical analytics. Provides real datasets for academic ML research and model development.

Vision

To enable data-driven, AI-powered decisions in healthcare.

Mission

To build reliable, interpretable, and scalable AI models improving patient outcomes and operational efficiency.

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Board of Management
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President (Principal Executive & Academic Officer)
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President
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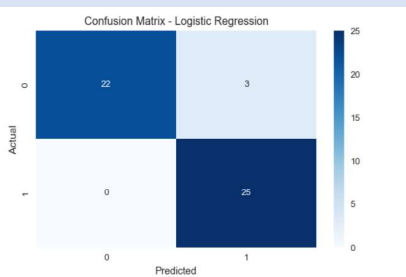
Deans of Schools & Institutes
- Dean: Institute of Health Management Research
- Dean: School of Pharmaceutical Management
- Dean: School of Development Studies
- Dean: SD Gupta School of Public Health
- Dean: School of Digital Health

SWOT ANALYSIS

Strengths: Modelling, Analysis, Real-world exposure.	**Weaknesses:** Documentation, Imbalance.
Opportunities: Deployment, Integration, Research	**Threats**: Data-quality, Variability, Adoption.

Methodology: Data cleaning, EDA, train-test split, baseline model building, hyperparameter tuning (Grid SearchCV), and final model selection (Random Forest). Performance evaluation using ROC–AUC/confusion matrix, followed by interpretation and report preparation.

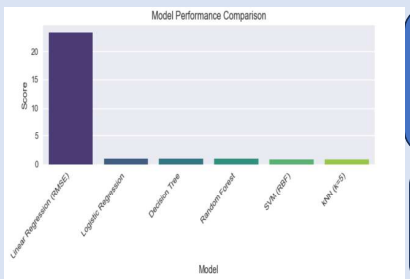


Gaps Identified

- Lack of clear data dictionary for variables.
- No standard SOP for data cleaning and modelling.
- Limited clinical explanations for some predictors.
- Need for stronger model governance and documentation.

LEARNING DURING INTERNSHIP

- Gained end-to-end understanding of the ML lifecycle.
- Strengthened Python, ML, EDA, and healthcare analytics skills.
- Improved result interpretation for clinical and managerial use.
- Enhanced communication, documentation skills.



THEORETICAL EXPOSURE VS. PRACTICAL EXPOSURE

- Theory: Supervised learning, preprocessing & EDA, key ML algorithms (LR, DT, RF), and evaluation metrics (Accuracy, Precision, Recall, ROC–AUC).
- Practical: Cleaned real healthcare data, built and tuned classification models, analyzed ROC/confusion matrix/features, and documented the full ML pipeline.

Key Insights:

- **Best model: Random Forest**
- **Metrics: High ROC–AUC and improved recall for positive cases.**
- **Important predictive factors identified through feature importance.**
- **Strong potential for real hospital deployment after validation.**
- **ML modelling improves prediction accuracy and decision-making**

CHALLENGES FACED DURING INTERNSHIP

- Handling imbalanced data.
- Choosing clinically interpretable features.
- Time-consuming hyperparameter tuning.
- Converting technical results into simple healthcare insights.

Conclusion: Developed a reliable healthcare prediction model using Random Forest with strong accuracy and ROC-AUC. Key predictors were identified, forming a foundation for clinical and operational decision support.