# PhD Research Proposal

## Title:

An Autonomous AI Agent Framework Integrating Data Mining and Generative AI for Intelligent Healthcare Decision Support

## Research Area:

Artificial Intelligence, Data Mining, Generative AI, Healthcare Informatics

## Abstract / Proposal Summary:

The exponential growth of healthcare data presents both opportunities and challenges in delivering timely, accurate, and personalized medical care. Traditional clinical decision support systems often lack the ability to adapt autonomously, extract deep patterns from complex datasets, or communicate effectively in natural language. This research proposes the development of an intelligent AI agent framework that integrates data mining techniques for knowledge discovery and Generative AI (GenAI) for context-aware communication and report generation.

The proposed agent will autonomously extract actionable insights from structured (e.g., EHRs, lab reports) and unstructured (e.g., physician notes) healthcare data using data mining algorithms. It will then utilize GenAI models, such as BioGPT or Med-PaLM, to generate explainable clinical recommendations, summaries, and patient communication in natural language. The research will explore how such an agent can support early diagnosis, treatment planning, and clinical documentation in real time while ensuring interpretability, privacy, and compliance with healthcare standards like HL7 and FHIR.

The framework will be validated using publicly available medical datasets like MIMIC-IV. Evaluation metrics will include accuracy, interpretability, clinical relevance, and user satisfaction. This research aims to contribute a scalable, intelligent, and transparent AI agent architecture for next-generation digital healthcare systems.

## Keywords:

AI Agent, Data Mining, Generative AI, Healthcare, Clinical Decision Support, Natural Language Generation, MIMIC-IV, Explainable AI