Development of Intelligent Healthcare Monitoring System using Machine Learning Model

Tanima Bhowmik*
Department of CSE (AI & ML)
Institute of Engineering & Management
Kolkata, India
Email: tanima.bhowmik@iem.edu.in

Debajyoti Mitra
Department of CSE (AI & ML)
Institute of Engineering & Management
Kolkata, India
Email: Debajyoti.mitra2022@iem.edu.in

Pratyusha Chatterjee
Department of CSE (AI & ML)
Institute of Engineering & Management
Kolkata, India
Email: pratyusha.chatterjee2022@iem.edu.in

Nirban Roy
Department of IoTCSBT
Institute of Engineering & Management
Kolkata, India
Email: nirban.roy2022@iem.edu.in

Shreyan Kundu
Department of CSE (AI)
Institute of Engineering & Management
Kolkata, India
Email: shreyankundu@gmail.com

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***Abstract*—Intelligent Healthcare Monitoring Systems (IHMS) results from recent technological advancements and showcases creative methods for managing patient care and wellness. IHMS uses state-of-the-art technologies, including sensors, artificial intelligence (AI), and data analytics, to provide proactive medical care and real-time health monitoring. One of the most essential features of IHMS is its capacity to predict health outcomes using advanced machine-learning techniques. These algorithms focus on the unique health needs of each patient by analyzing large datasets to predict an individual's vulnerability to particular health concerns. This proposed model aims to improve patient care by incorporating predictive machine learning models into IHMS. It demonstrates how well the Hybrid Model (RF-DT) performs when correctly identifying health risk levels, outperforming several machine learning algorithms. A remarkable accuracy of 99.70%, 99.39% for F1 score, 100% for precision, and 98.50% for recall is attained by the hybrid model, highlighting its potential to transform patient outcomes, promote proactive healthcare management, and change the way healthcare is delivered.**

***Index Terms*—Machine Learning Model, Hybrid Model, Patient Risk Assessment, Intelligent Healthcare Monitoring System (IHMS), Healthcare Delivery Optimization**

I. INTRODUCTION

The recent convergence of technology and healthcare has risen to inventive approaches intended to improve wellness management and patient care [1]. A pioneering example of these innovations is the creation of Intelligent Healthcare Monitoring Systems (IHMS). IHMS uses cutting-edge technology like artificial intelligence, data analytics, and sensors to enable proactive healthcare treatments and deliver real-time health information. The ability to forecast health outcomes using complex machine learning (ML) algorithms is at the heart of intelligent health monitoring systems [2]. By examining large-scale datasets that include physiological measures, medical history, lifestyle decisions, and environmental factors, these predictive models can anticipate a person's vulnerability to specific health risks or possible adverse outcomes. With the help of these predictive capabilities, IHMS can assess a patient's status and evaluate whether or not medical intervention is necessary, allowing for the most efficient delivery of healthcare. The present study explores the complexities of integrating predictive machine learning models into intelligent health monitoring systems, emphasizing the identification and management of patient-specific health requirements [3]. This study intends to shed light on the revolutionary potential of IHMS in transforming healthcare delivery through a thorough analysis of the underlying technology, techniques, and related obstacles [4]. Additionally, this article will examine the effects of predictive analytics in IHMS on clinical decision-making, patient involvement, and the healthcare system's effectiveness. IHMS promises proactive, individualized healthcare management by utilizing data-driven insights, ultimately improving patient outcomes and well-being.

II. LITERATURE SURVEY

Deepak Kumar Jain et al. [5] proposed wearable sensor and IoT-based health monitoring systems. Pre-convoluted Fast Recurrent Neural Networks(P-FRNN), which provided better accuracy and faster computation times, were introduced for data classification. P-FRNN uses hyperplane clustering activation and self-organization concepts.

Chike Nwibor et al. [6] presented an IoT-based remote health monitoring system for measuring heart rate (HR), blood pressure (BP), and blood oxygen saturation levels (SpO2). The technology achieves continuous vital sign monitoring using ML techniques and a single photoplethysmography (PPG) signal. Subsequent investigations will focus on user experience viewpoints and possible therapeutic uses, such as tracking individuals taking antihypertensive drugs and forecasting variations in vital signs.

S. Arun Kumar et al. [7] suggested reducing premature heart attack and lung illness mortality. This paper proposes an intelligent health monitoring system integrating ML, IoT, and cloud services. Sensors gather vital signs, and 86% of