Chapter 2
Enhancing Elderly Health Monitoring Framework With Quantum-Assisted Machine Learning Models as Micro Services

A. Bhuvaneswari
Adhiparasakthi Engineering College, India

R. Srivel
Adhiparasakthi Engineering College, India

N. Elamathi
Adhiparasakthi Engineering College, India

S. Shitharth
https://orcid.org/0000-0002-4931-724X
Kebri Dehar University, Ethiopia

K. Sangeetha
Kebri Dehar University, Ethiopia

ABSTRACT

Monitoring systems for the elderly gather a variety of information, including blood pressure, insulin level, oxygen saturation, and more. Machine learning is a multidisciplinary method for identifying patterns in data by applying mathematical algorithms and iterative computing processes. Machine learning models are implemented as microservice-based architecture, which makes code components more maintainable, testable, and of course, responsive. The supervised model, unsupervised model, and reinforcement model are the three machine learning models that are employed as micro-services independently. This study focuses on blood sugar level among other indicators used to monitor older people, because it is the primary factor determining how well each organ functions. In this work, the machine learning model is enhanced with quantum variationally algorithm to improve their efficiency and accuracy. With an accuracy rate of 81%, the quantum assisted unsupervised model performed better than the other two models when it was being executed.

DOI: 10.4018/979-8-3693-1479-1.ch002

1. INTRODUCTION

Monitoring the physical and mental well-being of elderly people is a crucial step in identifying any possible problems and ensuring that they receive prompt medical care if necessary. This can involve keeping an eye on vital signs like blood pressure and heart rate, keeping an eye out for accidents like falls, and keeping an eye out for changes in mood or cognitive function. There are numerous tools, including wearable technology, remote monitoring systems, and routine check-ins with medical professionals that could be used for health monitoring. Health monitoring for senior people is to enhance their general health and well-being, avoid difficulties, and make sure they get quick medical help if necessary. (Sivakumar et al., 2023)

Machine learning enables computing systems to adapt and consequently enhance their performance by drawing conclusions from observable data obtained from sensors. In (Ma et al., 2018) the authors used machine learning algorithms to find false positive RFIDs. When machine learning is used it may be easier to track the health of elderly individuals and also to analyze huge volumes of data to find patterns and trends that aren't always visible to the human eye. Continuously it monitors the clinical parameters that is vital signs of the patient and also detects the variation in their health condition over a period using the Internet of Things (Gubbi et al.,2013; Liang et al.,2019).

For Example, Machine learning algorithms (Haghighi & Farivar, 2020) train the model to identify patterns in heart rate patterns that may indicate an impending heart attack or to detect changes in gait patterns that may indicate a higher risk of deteriorating. The Machine Learning algorithms are applied to identify the initial indications of diseases like dementia and to monitor the changes in temperament or intellectual routine.

Artificial Intelligence (Sun et al., 2019) and Machine learning models are applied in the identification of people who are at high risk for particular health problems and to forecast future health outcomes. This enables healthcare professionals to focus interventions on people who are most in need and adopt a proactive approach to patient care. In general, machine learning can be extremely helpful in monitoring the health of the elderly by providing insights that may be difficult or impossible to obtain using other techniques and by helping to ensure that elderly individuals receive prompt and effective care when it is required. Various machine-learning techniques can be broadly categorized into three categories (Chou et al., 2019). Three learning methods: supervised learning, unsupervised learning, and reinforcement learning.

1.1 Supervised Learning

The most prevalent machine learning method is Supervised Learning, where the data with label is used to train the model and that model aims to predict the output based on input features. The model is used to predict results for new input data after being trained on past data. There are a few supervised learning algorithms which include linear regression, logistic regression and decision tree.

Bioinformatics, speech recognition, spam detection, and object recognition are some of the applications of supervised learning (Akbar, G., et al, 2018). The investigation is done on the way people remember the biological details like the color of the eyes, prints on the finger and earlobes in the field of bioinformatics. The latest mobile devices are smart enough to understand our biological information and then confirm us in order to boost the security of the mobile.(Wu, R., et al,2018). With a speech recognition program, a user can speak to the system and the program will recognize them. Digital assistants like Siri