# Chapter 13
# ML-Based Fall Risk Prediction to Substitute Personal Assistance for Hospitalized Elderly:
## Integrating Geriatric Assessment and E-Health Records

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## ABSTRACT

*Geriatric assessment serves as a holistic evaluation tool, encompassing various aspects of the elderly individual's health, including physical function, cognition, and psychosocial factors. Integration of CGA data with EHRs allows for a comprehensive analysis of the individual's health status and medical history, providing valuable insights into their risk factors for falls. The ML-based predictive model developed in this study utilizes these integrated data sources to identify patterns and trends associated with fall occurrences among hospitalized elderly patients. By analysing various variables, including mobility indicators, medication usage, and previous fall history, the model can generate accurate predictions of fall risks for individual patients. This ML-driven approach has the potential to significantly improve patient safety and quality of care by enabling healthcare providers to pre-emptively identify*

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*and address fall risks among hospitalized elderly individuals, thereby reducing the reliance on constant personal assistance while ensuring optimal patient outcomes.*

## INTRODUCTION

The global population is experiencing a significant demographic shift towards aging societies, with the elderly population representing an increasingly substantial proportion of the overall populace. Alongside this demographic transition, there arises the challenge of ensuring the well-being and quality of life for the elderly, particularly those hospitalized due to various health issues. Among the numerous concerns associated with the elderly population, fall incidents pose a critical threat to their health and independence. Falls among hospitalized elderly individuals not only lead to immediate physical injuries but also contribute to prolonged hospital stays, increased healthcare costs, and a decline in overall functional ability. This could lead to a fear of falling, which could lead to psychological issues like despair and a lack of participation in voluntary activities. Vitamin D deficiency, eyesight problems, balance concerns, walking difficulty, lower body weakness, foot pain, and a hazardous living environment are all prevalent dangers, in addition to getting older. Identifying characteristics linked to falling occurrences is critical in developing fall prevention strategies aimed at lowering the occurrence of falls and subsequent problems.

Consequently, there is a pressing need for innovative approaches to mitigate the risk of falls and enhance the safety of elderly patients during their hospitalization. In recent years, advancements in machine learning (ML) and artificial intelligence (AI) have opened new avenues for healthcare research and practice. ML algorithms have demonstrated remarkable capabilities in predictive analytics, offering the potential to identify and preemptively address the risk factors associated with falls among hospitalized elderly individuals.

This research endeavors to leverage ML-based fall risk prediction as a substitute for personal assistance in mitigating the risk of falls among hospitalized elderly patients. By harnessing data-driven insights and predictive models, this study aims to develop a robust framework capable of accurately assessing the fall risk of individual patients in real-time. Through continuous monitoring and proactive intervention, this framework seeks to empower healthcare providers with the tools necessary to preemptively identify and mitigate fall risks, thereby enhancing patient safety and well-being while potentially reducing the burden on healthcare resources.

This introduction sets the stage for the subsequent sections of the research, which will delve into the methodologies employed, the dataset utilized, the development and evaluation of ML models, and the implications of implementing such a predictive

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