"Prioritizing Patient-Centric Care: Resolving Long Queues in African Healthcare Systems by Use of Artificial Intelligence."

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Abstract

Long patient waiting times in African healthcare systems pose significant challenges, impacting patient health and well-being while straining healthcare resources. This poster explores the potential of Artificial Intelligence (AI) in addressing this critical issue. AI offers a transformative approach by predicting patient demand, optimizing resource allocation, and prioritizing high-risk patients. By leveraging AI-powered models, healthcare providers can reduce patient waiting times, enhance system efficiency, and ensure timely access to care. This poster highlights successful AI implementations in healthcare, showcasing potential applications in African hospitals, and emphasizes the importance of patient-centric care in fostering improved healthcare outcomes in the region.

Introduction

Long patient waiting times are a severe problem in Africa. For example, in Ethiopia, patients are forced to wait an average of 4.5 hours to receive service in the outpatient department (Outpatient Department of Jimma University Specialized Hospital, 2019). This can have a devastating impact on a patient’s health and well-being. Patients may delay or forgo care, which can lead to worse health outcomes. Long waiting times can also be a financial burden for patients, who may have to take time off work or school to travel to the hospital. In this technology-oriented world, Artificial Intelligence (AI) has the potential to be a powerful tool for addressing this problem. AI can be used to predict patient demand, allocate resources more efficiently, and identify patients who are at risk of waiting too long. By using AI, healthcare providers can improve the efficiency of their systems and ensure that patients receive the care they need as quickly as possible.

Main Objectives

1. Identify the severity and impact of long patient waiting times in African healthcare systems, with a focus on the adverse effects on patient health, well-being, and healthcare resource management.
2. Explore the potential of Artificial Intelligence (AI) as a powerful tool to address the problem of long patient waiting times in African hospitals.
3. Discuss the challenges and opportunities of integrating AI into healthcare systems in Africa to optimize patient care and improve overall efficiency.
4. Provide recommendations for the implementation of AI-powered solutions to predict patient demand, allocate resources efficiently, and prioritize patients based on their medical needs, thereby reducing patient waiting times and enhancing patient-centric care.
5. Present successful AI implementations in healthcare, both within Africa and in other regions, as potential models for adoption and adaptation in African healthcare systems.

Mathematical Section

Moving Average (MA) Method

The Moving Average (MA) method involves calculating the average of a fixed number of consecutive data points within the time series to create a moving average value. This value represents the expected value for a particular time period, considering the recent history of observations.

Moving Average (MA) = \( \frac{\text{sum of "n" most recent data points}}{n} \)

Where:

"n" is the number of consecutive time periods (window size) used to calculate the moving average.

The Moving Average (MA) represents the average value for a specific time period, considering the most recent "n" data points.

Results

For example, if we have the following waiting times data for the past 5 days: Day 1: 10 minutes Day 2: 12 minutes Day 3: 15 minutes Day 4: 8 minutes Day 5: 11 minutes
Let’s say we want to calculate the 3-day moving average for Day 5: Moving Average (MA) = \( \frac{15 + 8 + 11}{3} = \frac{34}{3} = 11.33 \) minutes

So, the 3-day moving average for Day 5 is approximately 11.33 minutes. This will help in Predictive Analysis to improve efficiency in Scheduling to meet the needs of every different hospital.

These results will help train the AI scheduling app to predict waiting times and whether the hospital will be able to serve patients according to the current state of the system. It has to be considered that it has people of who managed to register that day.

Conclusions

• The ARIMA model can be used to make predictions for future time points based on the historical data, making it suitable for forecasting patient waiting times in healthcare settings. For example, if you have historical data on patient waiting times, you can apply the ARIMA model to understand the underlying patterns, trends, and seasonality in the data. Once the model is trained, you can use it to forecast waiting times for future time periods, helping healthcare providers to optimize resource allocation and improve patient scheduling.

Forthcoming Research

AshleTech is an ongoing solutions provider. Contact Audry Ashleen Chivanga (a.chivanga@alustudent.com) for forthcoming research.

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