KLEF (Deemed to be University),

Bowrampet, Hyderabad – 500043, Telangana, India.

A Project Report on

EMERGENCY WAIT TIME PREDICTOR

for the partial fulfilment of

grade for the subject

Artificial Intelligence and Machine Learning (24AD2001)

Submitted by

M. Prashamsa - 2420030692

Sathvik - 2420030685

Sheranya - 2420030747

of Section 03 Group 18

Under the guidance of

P. Venkateswara Rao

ABSTRACT -

Urban emergency departments (EDs) often face overcrowding, long wait times, and uneven patient distribution, resulting in delays in critical care and patient dissatisfaction. Patients frequently arrive without knowing how long they will wait, while hospital administrators struggle with limited real-time visibility into patient queues, resource availability, and staff allocation, making it difficult to manage demand efficiently.

This project aims to provide accurate, real-time wait time predictions for multiple hospitals within a city. It seeks to help patients make informed decisions about where to seek treatment, optimize hospital resource utilization, balance patient loads across facilities, and enhance overall transparency in emergency healthcare services.

The Emergency Wait Time Predictor is a cloud-based platform that integrates live operational data from participating hospitals. Real-time queue monitoring tracks patient arrivals, triage severity, consultation status, and treatment durations. Historical hospital data, combined with statistical modeling and machine learning algorithms such as regression analysis and time-series forecasting, is used to predict future wait times. The system presents these predictions on a centralized, web-based citywide dashboard, allowing patients and ambulance services to identify the most suitable facility based on urgency, proximity, and available capacity. Role-based access control ensures secure handling of sensitive hospital data, while integration with emergency services enables optimal routing and resource prioritization.

The platform is expected to improve patient experience through better decision-making, reduced wait-related frustration, and timely treatment. For hospitals, it will help distribute patient loads evenly, optimize staffing, and minimize overcrowding. Its cloud-native design ensures scalability, high availability, and resilience during peak usage or emergencies. Future expansions may include AI-driven demand forecasting, IoT-enabled tracking of bed and equipment availability, wearable health device integration, and appointment scheduling to further improve efficiency in urban healthcare delivery.

Base Research Paper Link : HOSPITRACK – A Cloud Based Hospital Management System

DESCRIPTION -

Urban healthcare systems face pressure to provide timely emergency medical care, yet emergency departments (EDs) often struggle with overcrowding, long wait times, and uneven patient distribution. Patients frequently arrive without knowing expected wait durations, leading to dissatisfaction, delays in critical care, and inefficient use of resources. Administratively, limited real-time visibility into queues and resource availability hinders informed decision-making.

The Emergency Room Wait Time Predictor (Citywide) addresses these issues via a unified, cloud-based platform integrating live data from multiple hospitals and applying predictive analytics to estimate wait times. Building on the HospiTrack framework, the system includes: Real-Time Queue Monitoring to dynamically track patient arrivals and treatment progress; a Predictive Analytics Engine using statistical models and machine learning to forecast wait times; a Citywide Dashboard showing wait times, proximity, and capacity for all participating hospitals; Role-Based Access Control to ensure secure data handling; and Integration with Emergency Services for optimal ambulance routing and rapid resource prioritization.

Cloud-native deployment ensures high availability, scalability, and resilience during emergencies. The system benefits patients through transparency and informed decision-making, and aids hospitals by balancing patient loads, optimizing staffing, and reducing overcrowding. Future enhancements may include AI-driven demand forecasting, IoT-based bed and equipment tracking, integration with wearable health devices, and appointment scheduling to further ease congestion. The solution bridges the gap between patient needs and hospital capacity, marking a step forward in urban healthcare delivery.

CONCLUSION -

Urban healthcare systems face growing pressure to deliver timely emergency medical care, yet emergency departments (EDs) often face overcrowding, long wait times, and uneven patient distribution. Patients frequently arrive without knowing how long they will wait, causing frustration, delays in critical care, and inefficient use of resources. On the administrative side, limited real-time visibility into queues and capacity hampers operational decisions.

The **Emergency Room Wait Time Predictor (Citywide)** addresses these issues through a cloud-based platform that integrates live operational data from multiple hospitals and applies predictive analytics to estimate wait times accurately. Its key components include real-time queue monitoring, a predictive analytics engine using statistical and machine learning models, a

centralized dashboard showing wait times and hospital capacity citywide, secure role-based access control, and integration with emergency services for optimal ambulance routing and rapid resource prioritization.

Cloud-native deployment ensures high availability, scalability, and resilience, even during large-scale emergencies. The system benefits patients by improving transparency and decision-making, while hospitals gain balanced patient loads, optimized staffing, and reduced overcrowding. Future enhancements may include AI-powered demand forecasting, IoT-based equipment and bed tracking, integration with wearable health devices, and appointment scheduling to further reduce congestion. This solution strengthens urban healthcare delivery by bridging the gap between patient needs and hospital capacity.