

Hospital Locator and Bed Availability Detector for Emergency Cases

Syed Farzana¹, Kanakam Sasikalyan², Jasti Manikanta³,
Kommala Manoj⁴, Choppa Prasanth⁵

¹Assistant Professor, Department of Computer Science, KKR& KSR Institute of Technology and Sciences(A), Guntur, Andhra Pradesh, India

^{2,3,4,5}Undergraduate Students (B. Tech), Department of Computer Science, KKR& KSR Institute of Technology and Sciences(A), Guntur, Andhra Pradesh, India

Abstract - In tertiary hospitals, understaffing and overcrowding are directly related to a lack of available hospital beds. The issue for certain tertiary healthcare facilities is not just a lack of available inpatient bed spaces, but also a lack of qualified healthcare professionals, such as physicians and nurses, who are unable to treat more patients than the facility is equipped to handle. The public and health officials have expressed alarming concern about the COVID-19 worldwide pandemic. The primary issue that many nations encounter during the epidemic is a lack of medical resources.

Nowadays, there are a lot more patients, thus in an emergency, they must be taken as quickly as possible to the hospital where they can receive treatment. The need for ambulances increased along with the noticeably higher patient population. There are thousands of ambulance services operating today, serving unidentified persons. Finding the nearest ambulance in that location becomes very difficult for a person. We developed a piecewise smooth model to describe the constraint of hospital beds in order to analyze how a lack of hospital beds affected the Emergency outbreak. Using GPS, the closest hospitals are found, and Google Map APIs can then be used to find the path from the current position. A patient can use this to discover the closest hospital as well as infrastructure like available beds, specialist consultants, etc. To deliver services using PHP and SQL databases as the server, the application uses a client-server architecture. The technology can be integrated in ambulance services to find hospitals more efficiently, especially in emergency situations.

Key Words: Bed Availability, Hospital, Patients, Google Maps APIs, Ambulance

1. INTRODUCTION

1.1 Background of Study

Hospital bed occupancy prediction and optimization, or capacity planning, is a growing field. The objective is to optimize business operations and boost productivity in the healthcare sector. As a hospital in one of the world's largest cities, you may be aware of the hospital shortage. Since these circumstances are so irritating, forecasting the bed occupancy in advance and then using those predictions to optimize

patient placement is an intriguing and relevant topic. It also predicts the bed availability during the following 72 hours.

1.2 Problem Statement

To get the information about the occupancy of beds and necessary items for the patients especially in emergency cases, a client-server application must be bought into usage to identify them to make aware of patients and make them easy to find.

1.3 Aim and Objective of Study

The main theme of Hospital Locator and Bed Availability detector for emergency cases is to develop a webservice based system to provide optimal services for the emergency cases through the following objectives:

- Provide a application that user can easily interact with it and provide all the information the hospitals infrastructure and doctors availability.
- Finding the optimal routes of closest hospitals using Google Maps APIs.
- With this system we can reduce the number of deaths during emergency situations, hospitals with bed, specialist consultants' availability through the application service.

1.3 Scope of Study

The Project locates hospitals in pandemic scenarios in a unique way, especially in emergency cases. Based on the minimal distance, hospital requirements, and infrastructure, search for and sort the results. To discover nearby hospitals and the distance between patients' locations and those hospitals, we are using Google Maps APIs in this case. The application includes fast access to a list of specialists' contact information as well as comprehensive hospital data for each hospital, making it ideal for making same-day appointments. The future potential of this application is to create a real-time network of nearby specialists who are available to treat patients. Additionally, this breakthrough will allow for the booking of online appointments, which benefits patients by

saving them time. Hospital administration makes advantage of the functional health-care software now in use. As stated in the methodology section above, we can create an application to find all pertinent information about the hospital. To give services to patients/people hurt in accidents or other emergency instances, the system can be connected onto the ambulance platform.

1.4 Limitation of Study

This web-based system mainly works over the internet connection. With the help of the Google Map Application Program Interface, the closest hospitals can be found using GPS, and from there, the path may be taken. It is necessary to have a strong internet connection; else, the application would yield poor results.

2. REALATED WORK

Background Planning during epidemics, such the COVID 19 pandemic, requires an accurate estimation of the number of beds required by ward type (such as ICU). Ten-day projections on the required number of beds for COVID-19 patients across various wards were used by the COVID-19 taskforce at the Ghent University hospital. The planning tool integrated a Poisson model for the daily number of new admissions with a multistate model for the movement of admitted patients to different wards, discharge, or death. The required number of beds by ward type for the upcoming 10 days, as well as the worst- and best-case boundaries, were simulated using these models. Results The models successfully predicted the needed number of beds for various hospital wards. Predictions made in the short run were particularly accurate because they are less vulnerable to unexpected changes in the number of beds on a particular ward. Code snippets and setup information are supplied to let the reader apply the planning tool to their own hospital data. Conclusions With an accurate forecast of the required capacity by ward type, we were able to quickly set up a planning tool that would be useful during the COVID 19 epidemic. Other epidemics can use this methodology as well.

Short-term hospital bed availability forecasting has proven to be a challenging problem, but computer modelling and artificial neural networks have proven to be an excellent solution. a computer based to simulate the non-stationary arrivals, different patient kinds, and general complexity found in hospital systems, simulation models have been developed. For the data that were available on bed usage, patient type prevalence, and patient lengths of stay, that model was valid.

Two arrival schedules were used in the simulation to mimic patient arrivals: one was for elective (non-emergency) patients, and the other was for emergency patients. Due to the distinct arrival patterns of emergency and elective patients, two streams of arrivals were selected. As actual

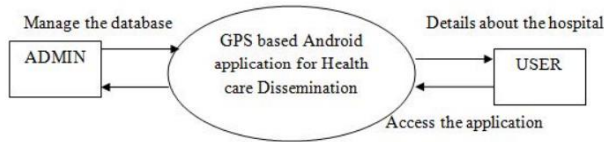
hourly arrival data were not available for empirical trend determination, these arrival trends of each stream of patients and its breakdown throughout each day of the week were determined based on talks with specialists. In order to make the mix of patient arrivals reflective of what a typical hospital may encounter, these percentages were then adjusted to take into account all the patient kinds that weren't included in the model. Our objective has been to forecast the availability of beds during the next 72 hours or on each day. Hence, the future bed availability can enhance the operation process and improve efficiency in the health-care industry for emergency situations.

3. PROPOSED SYSTEM

An automated system must be implemented to identify them, to make the patients aware of them, and to make them simple to find in order to obtain information regarding the occupancy of beds and essential materials for the patients, particularly in emergency situations. to learn about bed occupancy and the supplies that patients, especially in an emergency, need. Find hospitals that are closer to the patient's location by using Google Maps APIs. Locate the hospital with the fewest travel distance and the most beds available. Find another minimum location in the list provided by the system if the hospital within the minimum distance does not have any beds. To make the user's search simple, the hospitals are listed according to the necessary departments and services. Instead of forcing patients to switch hospitals in order to receive the essential care and services, we provide the relevant information about all hospitals directly from the applications. This project has two different application kinds. The application's administrator adds all the information regarding the cities, regions, hospitals, illnesses, symptoms, departments, and various services that are offered. In order to enjoy all the services, users or patients must register with the application. Users can browse the hospitals and services offered, as well as search using terms related to cities, hospitals, and departments. The suggested application is a very varied application that registered users of the application can access with ease. The GPS feature allows users to find the closest hospitals. The programme retrieves the closest hospitals based on the user's current location and gives information about the hospitals and their offerings. Patients can choose a hospital based on the results and users can access the hospital's route map based on the results as well.

This paper introduces a readily accessible application that uses Google Maps to show users other hospital users' assessments of hospitals as well as routes, directions, and traffic updates. The suggested system also includes automatic navigation functions, such as showing users the best route to take from their current location to their destination and calculating the distance-based driving time. In order to provide solutions, this system has been created and uses PHP, JSON, MySQL, Google Maps APIs, and Google

Direction APIs. Users act as the client in this application's client/server design, while PHP and a MySQL database act as the server.



Google Map APIs

The application programming interfaces (APIs) for Google Maps are a collection that enable communication with its services. For the Web, iOS, and Android, it will enable us to create location-based apps that range from being really basic to extremely complex. An online mapping tool and technology offered by Google is called Maps. The software offers in-depth details on geographical areas, sites, street maps, a route planner for driving and walking, as well as aerial and satellite views of countless locations in many different nations around the world. You have the power to design unique maps thanks to the Google Maps API.

Before accessing any Google Maps API Services, you must first obtain an API Key from Google Cloud Platform.

- Making An API Key
- Activate billing
- Protect your libraries and API key.
- Enable Sought-After Libraries

Various APIs are available through the Google Map APIs those are: Places API, Distance Matrix API, Directions API, and Geofencing API are all included.

Computer Simulation Forecasting

Simulation is a preferred method for learning about complex, inter-related systems, and as such, a valid and accurate computer simulation model is capable of producing reliable predictions of future performance of those systems. While discussion of computer simulation an example application of computer simulation shows its ability to capture the behavior of whole systems. Bagust, Place, and Posnett (1999) study hospital bed usage and the effect of emergency admissions on the system, through the use of computer simulation. By modeling a whole hospital and enabling the tracking of various measures of interest, the authors are able to reach significant conclusions regarding the availability and usage of beds: specifically, that when the hospital in this study was more than 85% occupied, the risk of running out of available beds became significant, with long-term impact. "Even a relatively low risk of failure can disrupt the

operation of a hospital for a considerable time: at 85% mean occupancy, a hospital that runs out of beds for four days in a year may be disrupted for up to eight weeks in total" (p. 157). This example demonstrates the type of larger-context analysis that can make simulation models powerful for forecasting. Simulation as a forecasting method, however, is not without its drawbacks. The drawback associated with computer simulation is that, like the statistical models above, it must be manually adjusted to some degree as the real system changes. From the review of literature thus far, it is apparent that simple, static methods which dynamically predict and generate the short-term hospital bed availability in next 72 hours.

3. CONCLUSION

An online application must be used to identify the patients and make them easy to find in order to obtain information regarding the occupancy of beds and the products the patients need. The main goal of this project is to develop a GPS system in which an ambulance is equipped with a GPS tracker. In this way, even the general public may keep track of all ambulances nearby and, in an emergency, we can call the closest ambulance to the patient's position. This will enable time savings. By determining the shortest path method, GPS technology is used in this system to enable patients get at the hospital in the lowest amount of time possible.

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