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IMPLEMENTATION OF TIME PREDICTION SYSTEM FOR THE PATIENTS IN HOSPITAL USING PARALLEL PATIENT TREATMENT TIME PREDICTION ALGORITHM

Anjali Phaltane[1], Megha Waghmare[2], Noorin Sayed[3]

[1] *Assistant Professor, Department of Computer Engineering, G.H.RAISONI Engineering College, Chas, Ahmednagar, India*
[2] *U.G. Student, Department of Computer Engineering, G.H.RAISONI Engineering College, Chas, Ahmednagar, India*
[3] *U.G. Student, Department of Computer Engineering, G.H.RAISONI Engineering College, Chas, Ahmednagar, India*

Abstract —*Patients queue management in hospitals are tough task to handle it manually. Patient wait delays and patient overcrowding is challenging task in hospitals. For each patient in the queue, total treatment time of all the patients before him is the time that he has to wait.* Therefore, we have got an inclination to propose a Patient Treatment Time *Prediction (PTTP) recursive to predict the waiting time for each treatment task for a patient. Through the mobile application queue will recommend to patients. Queue will get update in real time. We have got an inclination to use realistic patient information from various hospitals to induce a patient treatment time model for every task. Supported this large-scale, realistic data-set, the treatment time for each patient at intervals this Queuing Recommendation (HQR) system. As a results of the large-scale, realistic data-set and additionally the demand for fundamental quantity response, the PTTP recursive and HQR system mandate efficiency and low-latency response. Our planned model to suggest a good treatment arrange for patients to attenuate their wait times in hospitals.*

Keywords- *Apache spark, Big data, Queue recommendation, Patient Treatment Time Prediction, Random Forest Algorithm.*

I. INTRODUCTION

Currently, most hospitals are overcrowded and they are not able to provide proper queue management. To Provide a Patient queue management and waiting time prediction is challenging and quite tedious job as each patient vary in different operations such as checkup, different tests like X-ray, CT scan, blood tests, sugar level to identify their disease. Out of these tasks some of the tasks are independent whereas some tasks are waiting to complete other dependent tasks .Most of the times patients have to wait in different queues for different tests. In order to complete required treatment in minimum time waiting time of each task is predicted in real time.

PTTP algorithm is learning algorithm for calculating the waiting time. We call each of these phases/operations as treatment tasks or tasks . Each treatment task can have varying time requirements for each patient, which makes time prediction and recommendation highly complicated. A patient wait until their number came. In such a case, more than one task might be required for each patient. Where as others might have to wait for the completion of dependent tasks. Most patients must wait for unpredictable but long periods in queues, waiting for their turn to accomplish each task. We focus on helping patients complete their tasks in a predictable time. Also helping hospitals schedule each treatment task queue and avoid over peopled and inadequate queues. We use massive realistic data from various hospitals to implement a time prediction system.

The waiting time of each treatment task is predicted by PTTP, which is the sum of all patients' waiting times in the current queue. A Hospital Queuing-Recommendation (HQR) system recommends an efficient and convenient treatment plan with the least waiting time for the patient..

II. RELATED WORK

For improving the accuracy of the data analysis, regression algorithm and optimization method of classification have been proposed. Based on the correlation criteria multi branch decision tree was proposed. Fast action detection, robust and accurate shape model matching, big data analytic framework for peer-to-peer botnet detection are such fields in which random forestalgorithm is used. A random forest method based on weighted trees was proposed to classify high-dimensional noisy data. Incorrect prediction can be done by using random forest containing noisy decision tree for testing dataset. Different types of recommendation algorithm have been applied in related fields. In parallel computing and data analysis Apache Hadoop and Spark are widely used. The speed of data mining as well as analysis for big data is an important factor. Using the Map Reduce and RDD various data mining algorithms were proposed. Keeping the patient and time characteristics in mind to train the patient treatment time prediction we can use random forest algorithm. A

Classification And Regression Tree (CART) model is used as a meta-classifier in the random forest algorithm Because patient treatment time consumption is a continuous variable. An HQR system based on the PTTP models has been proposed. Our attempt is to solve the problem of hospital queuing.

III. LITERATURE SURVEY

In self adaptive induction of regression trees with the help of new algorithm for the incremental construction of binary regression tree. It is also called as SAIRT and it handles symbolic and numeric attributes. Depending on the dynamics of the data stream to obtain new patterns this algorithm automatically adapts its internal parameters and model structure.

Parallel Boosted Trees for Web search Ranking. A current learning program for machine learned web search ranking known as Gradient Boosted Regression Trees is also the domain for very large data sets. For large scale web search ranking data sets we present experimental results on shared memory machines and clusters.

Fast Action Detection via Discriminative Random Forest Voting and Top-K Sub volume Search. Because of cluttered backgrounds and the large intra class variations multi class detection in complex scenes is a challenging problem. To generate discriminative votes from individual interest points random forest is constructed. A top-K sub volume search algorithm has been developed to find out the actions in a single round of search.

IV. PROPOSED SYSTEM

1. Software Pre-requisites:
The basic and initial software requirements are as follows,
(a) Windows XP Professional
(b) JavaVirsion JDK 1.7 and Above
(c) MYSQL 5.5
(d) Android Phone
(e) Apache Tomcat Server/XAMP
(f) Java/J2EE

2. We propose a PTTP algorithm and an HQR system. Considering the real-time requirements, enormous data, and complexity of the system, we employ big data and cloud computing models for efficiency and scalability. The PTTP algorithm is trained based on an improved Random Forest (RF) algorithm for each treatment task, and the waiting time of each task is predicted based on the trained PTTP model. Then, HQR recommends an efficient and convenient treatment plan for each. Patients can see the recommended plan and predicted waiting time in real-time using a mobile application.

3. A PTTP algorithm is proposed based on an improved Random Forest (RF) algorithm. The predicted waiting time of each treatment task is obtained by the PTTP model, which is the sum of all patients' probable treatment times in the current queue.

4. An HQR system is proposed based on the predicted waiting time. A treatment recommendation with an efficient and convenient treatment plan and the least waiting time is recommended for each patient..

V. THE OPERATION OF THE SYSTEM

Operation of the system is based on the different algorithms:

1) Patient Treatment time Prediction(PTTP) Algorithm :-
The use of PTTP algorithm is to build a PTTP model which is based on both patient as well as time characteristics. The PTTP model is derived from an RF algorithm and is trained from massive, complex and noisy hospital treatment data. It has been a challenging task because of the massive hospital data and lack of data management. Due to which lack of data can occur such as unavailable data for the patient's gender and age. This mostly occur because of manual operation and change in events during treatment and also because of treatment data only having start time but no end time. The time management cannot be properly because the time required for every other treatment may vary. The management of time is strictly only done while hospital queuing management and recommendation. Therefore the speed of applying PTTP model and HQR scheme becomes difficult.

2) Random Forest (RF)Algorithm :-
By calculating patients treatment characteristics the waiting time can be known. The PTTP model is built by using RF algorithm which is formed by using the time consumption used by the patient for treatment. The different aspects obtained by using improved RF algorithm are:

The data is cleaned of unwanted features such as name of the patient, contact info and address. In an improved RF algorithm a CART model is used as a Meta classifier. Even though the pre-processing errors have been removed, some other errors may still exists, such as the time consumption of a particular patients treatment cannot be accurate always. In an improved RF model a weighted voting method is applied in the prediction process known as tree classifier. The tree classifier helps in classification accuracy of RF algorithm which further compresses the errors. The PTTP algorithm which is based on the improved RF algorithm have high accuracy and performance.

3) Hospital Queue Recommendation (HQR) Algorithm :-
A PTTP based Hospital Queue Recommendation System is developed after the training of the PTTP model for each treatment task using hospital treatment data. Patient are given easy and convenient treatment plan for their treatment. The total time required for the treatment is predicted by the PTTP model according to the gender of the patient, age and time. The other factors such as department availability, proper machines for the treatment and the services. The predicted patient treatment time is added to the waiting time of the patient .According to the waiting time allocated the treatment task of the current patient is sorted.

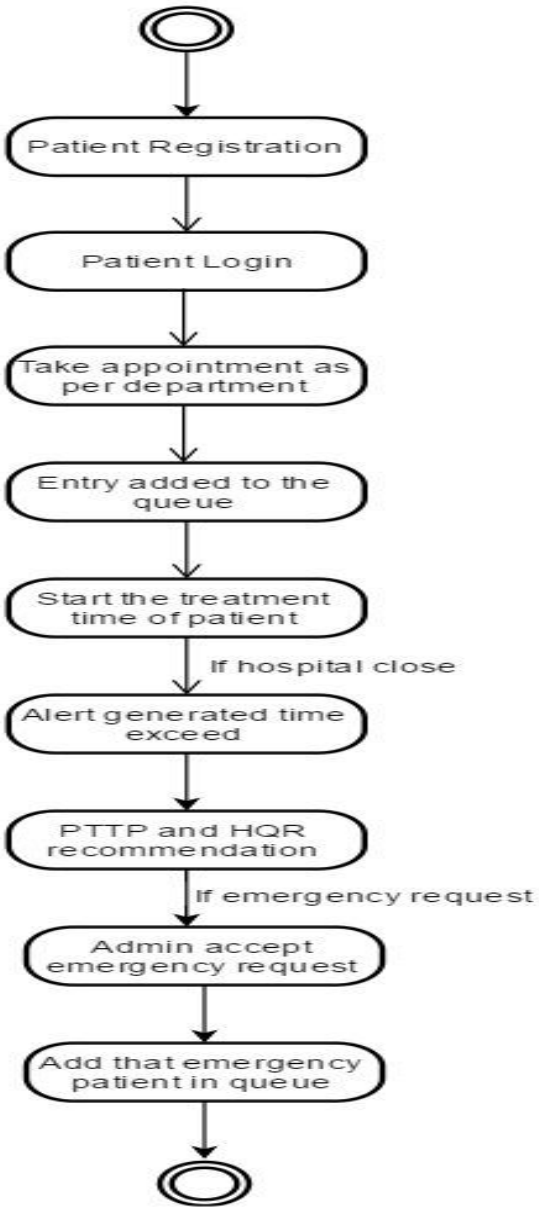

Fig.1: State Transition Diagram.

VI. ARCHITECTURE DESIGN

The software architecture of a program or computing system is a depiction of the system that aids in the understanding of how the system will behave. Software architecture serves as the blueprint for both the system and the project developing it, defining the work assignments that must be carried out by design and implementation teams. The architecture is the primary carrier of system qualities such as performance, modifiability, and security, none of which can be achieved without a unifying architectural vision. Architecture is an artifact for early analysis to make sure that a design approach will yield an acceptable system. By building effective architecture, you can identify design risks and mitigate them early in the development process. An architectural design model is transferable. It can be applied to the design of other systems. It represents a set of abstractions that enable software engineers to describe architecture in predictable ways.

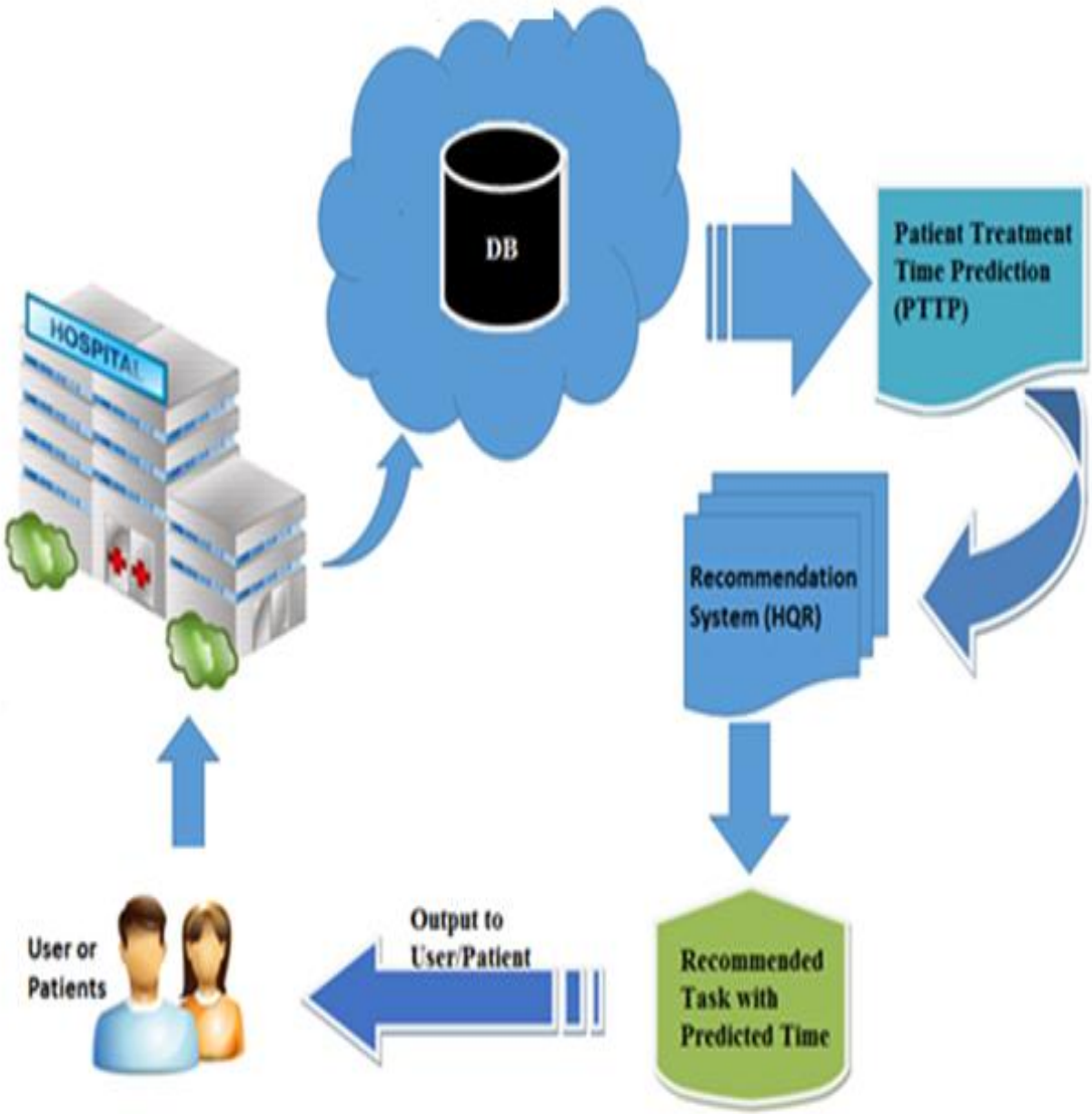

Fig.2: Architecture Diagram

VII. CONCLUSION

Thus we provide a parallel system in which we use database to store patient's information to provide accessibility. By using PTTP and HQR algorithm we provide an efficient queue recommendation through application which will drastically reduce the time being consume while standing in a queue.

VIII. RESULT

Following are the snapshots of complete flow of execution.

Fig.3: represents the successful completion of average time calculation in map reduce framework

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