STM JOURNALS
Scientific Technical Medical

Journal of Artificial Intelligence Research & Advances

Volume 1, Issue 1
www.stmjournals.com

An Implementation of Hospital Management System for Casualty based on Artificial Intelligence

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Abstract

This paper proposes Hospital Management System for Casualty Based on AI. Artificial Intelligence based casualty system provides decision making functionality without human intervention. These days thousands of people die as they do not get medical care within critical time. To get medical facility to the patient on time we have designed this system. Our system uses ANN Algorithm and kohonen's Algorithm which uses neural network theory for proper decision making and for providing the alerts simultaneously to doctors, ambulance, blood bank, police station and others, for providing medical facilities based on type of casualty in time critical instant.

Keywords: *Casualty Management, WAP Gateway, General Packet Radio Service (GPRS), Artificial Intelligence, Kohonen's Network.*

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INTRODUCTION

Road accidents cover major percentage of death. Every hour many hundreds of people die in accidents on roads. A major part of victims who die because of not getting medical facilities can be saved by the use of this system. Our aim is to design an intelligent Hospital Management System that provides agile safe rescue environment [1]. The most needed medical facilities after road accidents takes place like, reporting to hospitals, regarding the place where the accident took place, the seriousness of injury of the victim and also getting ambulance, specialist doctors, blood bank on time, reporting to police etc. are provided effectively and promptly so that the victim receives all these medical aid under time limitation. The idea behind our proposed system is completely new and the key features of our system are as follows:- This system can be utilized to save the lives to a great extent proving itself as the **life critical application.** In this system the concept of **Kohonen's Network** is used that computes complex relationship between inputs and outputs providing an intelligent decision making tool.

OBJECTIVE

The main objective would be to make a system which can work in user friendly environment and also to perform simultaneous operations for faster response. Casualty services like ambulance, specialist doctors, blood bank etc. are provided in efficient and quick manner so that the victim receives the medical care within golden period which means time difference between life and death. Informers are reluctant to provide support to victims for fear of police harassment. But the chain of help begins, according to the World Health Organization, with those who are present or who arrive first at the scene of a crash. Informer can play an important role in various ways by contacting the emergency service. This system can facilitate the simultaneous alert to police also for ling the report [2]. This system will be freely accessible to anyone. Any person can inform the system about the accident by using their mobile phones. At present this idea has not implemented at any of the hospital so this system can be utilized to save the lives in any of the hospital i.e. it will be a life critical application. This system uses the concept of artificial neural network, which is basically a decision making tool which can be used to model complex relationships between inputs and outputs [3].

DESIGN AND IMPLEMENTATION

Design of System

1. The design of our system is very user friendly and can be accessed very quickly.
2. The system design is very efficient and Structured as user can easily navigate through utilities
3. We have provided direct access to Third Party or Individual who is giving information about accident or causality.
4. Hospital is chosen on base of location, nearest hospital is selected.
5. We have even given direct access to ambulance to provide causality details for hospital.
6. Hospital faculty can give timely status of availability provide to system.
7. All the faculty and departments are contacted through message.
8. Booking is done on basis of causality.
9. Required blood is selected from blood bank and if blood is not available message is send to individual registered donors.
10. This system is designed in such a way that in mere time causality treatment is given [4].

Implementation of System

In order to implement this type of application we have used the Java Object Oriented Neural Engine to construct the Kohonen neural network. Java contains many free libraries which support to provide easy way to developed applications [5].

Kohonen Network - Implements the methods that are unique to the Kohonen neural network. This is where the Kohonen neural network is trained and recalls patterns.

Network - Contains the methods that are not unique to the Kohonen neural network. This class contains methods to calculate the dot product and vector length, among other common tasks.

Neural Reportable - A simple interface that allows the Kohonen neural network to return progress information as the neural network is trained.

Training Set - A training set holder object that can contain arrays of individual training items. The training set can hold both input and output elements. For the Kohonen neural network examples shown in this chapter only the input elements are used.

KOHONEN NEURAL NETWORK MODEL

The objective of a Kohonen network is to map input vectors (patterns) of arbitrary dimension N onto a discrete map with 1 or 2 dimensions. Patterns close to one another in the input space should be close to one another in the map. A Kohonen network is composed of a grid of output units and N input units. The input pattern is fed to each output unit. The input lines to each output unit are weighted [2]. These weights are initialized to small random numbers.

The structure of Kohonen Neural Network is shown below in Figure 1.

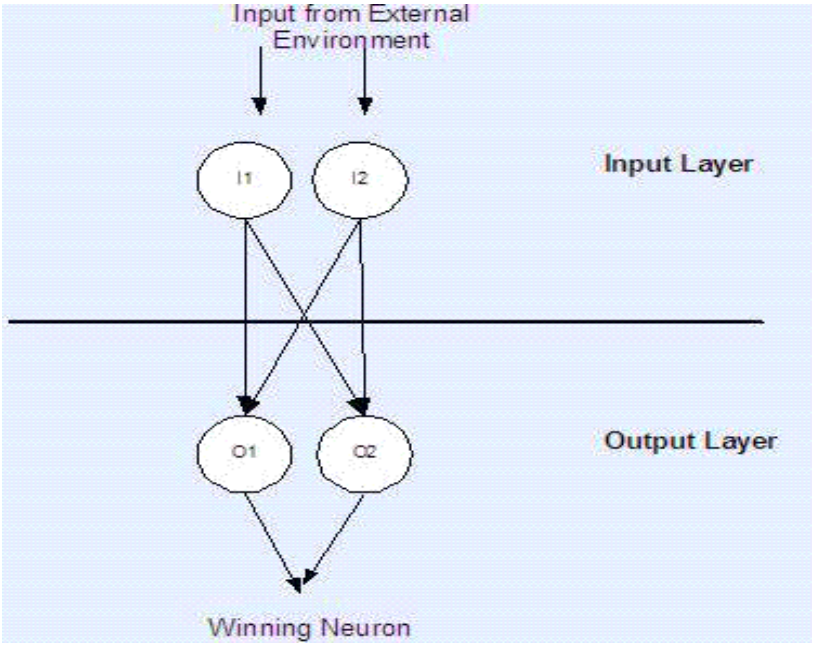

Fig. 1: *Structure of Kohonen Neural Network.*

The input neurons are used for giving input to a Kohonen neural network. These input neurons consist of the floating point numbers that make up the input pattern to the network. These inputs are required to be normalized in Kohonen Neural network. To normalize the input, first the vector lengths of the input data are needed to be calculated. It is done by first squaring the input vectors and adding them together [5]. In order to train the Kohonen Neural Network Model we have used following:-

a) Training Process

The training process for the Kohonen neural network is competitive where for each training set; one neuron will "win". This winning neuron will have its weight adjusted so that it will react even more strongly to the input the next time. As different neurons win for different patterns, their ability to recognize that particular pattern will be increased. These individual steps are summarized in the following figure:

Learning Algorithm

In learning algorithm for Kohonen neural networks, all units are arranged in sequence and are numbered from 1 to m. Each unit becomes the n-dimensional input x and computes the corresponding excitation. The n-dimensional weight vectors w_1, w_2. . .w_M are used for the computation. The objective of the charting process is that each unit learns to specialize on different regions of input space. When an input from such a region is fed into the network, the corresponding unit should compute the maximum excitation. Kohonen learning algorithm is used to guarantee that this effect is achieved [6].

Steps for Kohenen Algorithm

Start: Then-dimensional weight vectors w1,w2, . . . ,wm of the m computing units are selected at random. An initial radius r, a learning constant and a neighborhood function are selected.

Step 1: Select an input vector using the desired probability distribution over the input space.

Step 2: The unit k with the maximum excitation is selected (that is, for which the distance between wi and is minimal, i = 1, . . .,m).

Step 3: The weight vectors are updated using the neighborhood function and the update rule is as follows:

wi + (i; k)(:wi); for i = 1, . . .,m.

Step 4: Stop if the maximum number of iterations has been reached; otherwise modify and as scheduled and continue with step 1.

OVERVIEW OF APPLICATION

The architecture of the system is made up of various components which are working in synchronization. As the system is intelligence based it formally reduces human intervention to a lot extent and also saves time and money. Also it states the working and the different requirement of the system it also explains the various user who are going to use the system and what all are the characteristics of the system. There is no standard approach for constructing the same.

In this model whenever any casualty happens any person present at that particular location or site makes a message or sends a ping command to the system and send location of the incident spot from his/her phone, mobile device containing GPRS within it. Then the server is initialized by the admin who is supervising the system after initialization the server will automatically send alert message to the police and the ambulance with the help of WAP Gateway (Wireless Application Protocol) [7]. The ambulance will then immediately report to the accident spot, providing first aid treatment to the victim/victims and analyzing the incident. The ambulance then send the analysis report to the server and after getting the report, an acknowledgement is send to the caller. By the time police file the report of accident and if the call would be fake police will trace the caller's number. As the server gets the report, immediately it will send alert message to the hospital for preparing the services as per the need of patient/s. After that, selection of doctor is performed based on neural network theory on the basis of their specialization, experience and availability, and respective doctors will be called. Doctor will send acknowledgement about his/her availability otherwise next doctor is alerted. When any accident took place, there is always a need of blood bank, so to the appropriate blood banks an alert message is send with the required blood group. Blood bank then replies with available quantity. If sufficient quantity is not available or required blood is not present with the bank, the individual donor in that area will be selected and request message will be send. Meanwhile, admin is supervising the system and all the process is displayed to him on his console (all the decision that are taken).

RESULT

Our System is real time life critical application which emphasis on the availability of hospital facilities to the victim on the accident spot in very less time. AI works on different levels such as selection of Hospitals on the basis of accident spots and further providing alerts to Ambulance and Police at Once. Based on the report generated by the ambulance regarding the criticality of the accident, type of injury and the blood group is needed. The System sends alert to the Doctors and the Blood Banks on the basis of availability status. We can finally conclude our result as the System is proved to be a power tool for life savior for thousands of Life.

CONCLUSION

Casualty Management System is a comprehensive software system for hospitals to manage all activities thoroughly from the point of proper services to the victims. The software ensures the unction and optimization of resources. System comprises various functional subsystems which are combined to create unfed information, bringing complete control to the hospital. The software can easily be implemented in hospitals as it is based on management procedures which were studied and designed on a sound and scientific foundation. System is freely accessible to anyone, this enables end users to access the system from any PCs or from their mobile phones having GPRS facilities. Being an open system, it facilitates system expansion and easy connection and integration of information among subsystems now and in future.

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