International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 3 Issue: 4 1781 – 1786

Online Remedy Finder for Homeopathy

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Abstract— Due to the large number of questions asked by the homeopathy doctors before administrating treatment to patients, a large amount of time is wasted in collecting this information. Thus, it puts into the minds of the patients that visiting homeopathy doctors are wastage of time. This discourages patients from going to homeopathy doctors. Also, due to a large amount of data being collected, there is a lot of paperwork and manual data collection. The proposed system will assist the doctor in collecting the information as well as making decisions for diagnosing and curing the diseases. This paper discusses on data mining of the patient database, the disease database and its remedies.

Keywords- *homeopathy; machine learning; electronic health record; apriori algorithm.*

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I. INTRODUCTION

While visiting homeopathy doctors, lot of factors like, age, gender, diet, occupation, marital status, allergies and past medical history have to be taken into consideration before treatment. Currently, all this data is being stored manually on paper, and each patient has a separate file or folder in which all the details are stored. As all the data is stored manually, there is a possibility that the data can be misplaced or damaged. Also, generally, the patient has to carry the file to the clinic during each visit and the doctor reviews the file before starting with the treatment. With the increase in the number of patients it has been difficult to manage all the paper work. In addition to this, a lot of time is lost in the management of the paperwork. An attempt has been made to create an automated Homeopathy Remedy System which will help doctors store data systematically. This system will help the doctors easily review and modify the data and reduce the amount of time spent by the patients at the doctor's clinic. The proposed system aims at eliminating paperwork by storing the data digitally. Also, it aims at reducing the amount of time taken by the doctor for each patient. The system should be developed in a platform independent language which is the biggest drawback in a system studied, which was developed by Dr. Dilip Dixit . [5]

The proposed system will have a register and login facility. Once the registration is done, the patient will have to fill a questionnaire which contains details like the patient medical history, allergies and family details. All these details will be stored in the database. Patients can update their details at any point of time. There will be a different login for the doctor and the patients. The doctor can update the medical database as and when needed. Storing data in digital form will make it easier for the doctors to keep track of all patients.

The proposed system will also contain a forum where patients can directly contact the doctor to clear any minor difficulties they might face. The forum will also help other patients with similar problems to contact each other. Instead of calling the clinic to book appointments, it can be done automatically through the automated appointment feature in the remedy finder. Patients can send appointment requests to the doctor who will then revert back with the appropriate timing of the appointment. Any changes in the timing of appointments or any holidays taken by the doctor can be conveyed to all the patients easily. This will keep the patient's updated about the doctors' schedule and also make sure that they know if the doctor is not available on any particular day. The patients will also be promptly updated if any appointment is rescheduled.

Once the symptoms are entered in the remedy finder, the system will analyze the data entered and provide the doctor with the list of probable diseases along with their remedies. This will help the doctor verify their diagnosis easily. The doctor can also generate e-prescriptions using this system. E-prescriptions are fast, convenient, legible and economical. This proposed system is easy to use and an attempt is made to make it more interactive as compared to the other systems.

II. LITERATURE REVIEW

Remedy finders such as ABC Homeopathy and WebMD were extensively researched and studied while creating this system.[3][4]These free online homeopathy tools suggest remedies based on symptoms you enter. It relies on gathering a detailed picture of your complaint before homeopathic remedies can be correctly prescribed. In ABC Homeopathy, the questionnaire is very vast. [4] Also the system is not very user friendly and it is very likely that the patient may not fill the forms with full interest. And as the questionnaire is extremely vast the patients may get frustrated while filling it. The site is also very difficult to navigate through and use. Another fault with the system is that the remedies do not consider past history and other medical histories like allergies. The results of the remedy finder might not be fully accurate. In such cases, it is very important that the patients confirm the diagnosis with a certified homeopathy doctor or else the medication might have disastrous consequences. The patients using ABC Homeopathy cannot contact any doctor to clarify the results of the output provided to them. The aim of this proposed system is to rectify these drawbacks. [4]

In WebMD though this system was interactive and easy for the patients to use, it did not have a feedback system or a forum where the patients can clarify their doubts with the doctor. In some cases, if multiple diseases were predicted,

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there was no way in which the patients could know which one of them was the disease they were suffering from. The questionnaire cannot be modified later on. If additional questions are to be added, it's not possible to do so. With changing times, the diseases and the remedies change so a provision for the future modification of the system is very essential.

An unpublished desktop application created by a practicing Homeopathy doctor, Dr Dilip Dixit was studied, the system was created in C language. This system had two main drawbacks. The first is that the system was created in C this application is not platform independent. The second is that since this system is being used only by the doctor and has no interaction with the patients the doctor himself has to feed in all the data which is very tedious. [5] In our system, since all the data related to the patient will be fed in by the patient itself, it saves a lot of work for the doctor and also since it is an online system, the patients can feed in the data from home instead of the clinic and hence this will also save a lot of time in addition.

Keeping all the above problems in mind an attempt has been made to create a system where a homeopathy doctor can interact with his/her patients easily and also provide the questionnaire according to his/her requirements. The main aim of this project is to develop a system to reduce the burden of paper work for the doctors. Due to all the data being computerized, it becomes easier for them to handle all the information easily and modify them when needed. The entire patient history is available at a glance for the doctor to review. This system generates a list of possible diseases that the patient might be suffering from based on the answers to the questionnaire provided by the doctor. The list is generated in descending order of percentage along with all the possible remedies for each disease. This will help the doctors as well as the patients. The doctors will have a way to verify their diagnosis and keep track of all the possible medicines for each disease. As each disease has many medicines, this will ease the work of the doctors. Also, the patients can use this system to find out the diseases they suffer from without visiting the clinic. This can help them in cases of minor diseases where a doctor is not needed or at times when a doctor is not available.

This system reduces the paper work for doctors as all data collection is now automated. Manual insertion of data into the database, which is another disadvantage faced by doctors currently using various automated data storage systems is also eliminated. Since the patients have to fill the online forms before taking an appointment, the data is pre-inserted into the database before the doctor meets the patient. This reduces the time taken to enter the data. Once the data is entered into the database, the system predicts the probability of the diseases the patient might suffer and the list of diseases is stored for reference by the doctor. The patient can select which part of the body is affected and fill the questionnaire about that affected part first. The interactive interface of the questionnaire will keep the patient from getting bored or frustrated with the length of it. The main challenged faced during making the system is the different strategies used for asking the questions to the patients depending on their symptoms. This challenge was remedied by the use of checkboxes to collect the data instead of textboxes.

III. ARCHITECTURE OF THE REMEDY FINDER

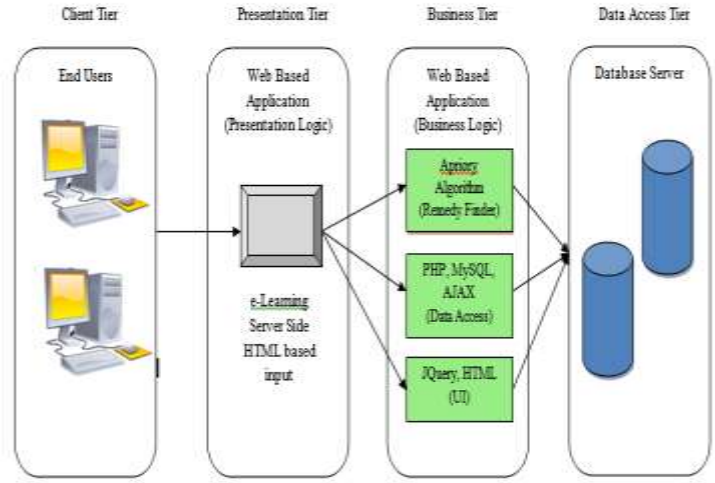

Figure 1. Architecture of Remedy Finder System

The architecture of the system is a N-Tier client server. In this architecture, the presentation, application processing, and data management functions are separated. The Data Tier consists of databases which consist of data of Medicines, Diseases, Symptoms, Patient and Doctor Details, Appointments etc. The Business Tier consists of all the processing logic of the system. The Presentation Tier consists of the input and output details and basically the UI of the system and the Client Tier consists of the doctors and patients using this system.

A. Creating a Doctor or Patient Account

To start with this system, the user has to either create a doctor or patient account. The Registration page will collect all the basic details of the user and store it in the database. These details will be used later during the 'Remedy Finder' or 'e-prescriptions'.

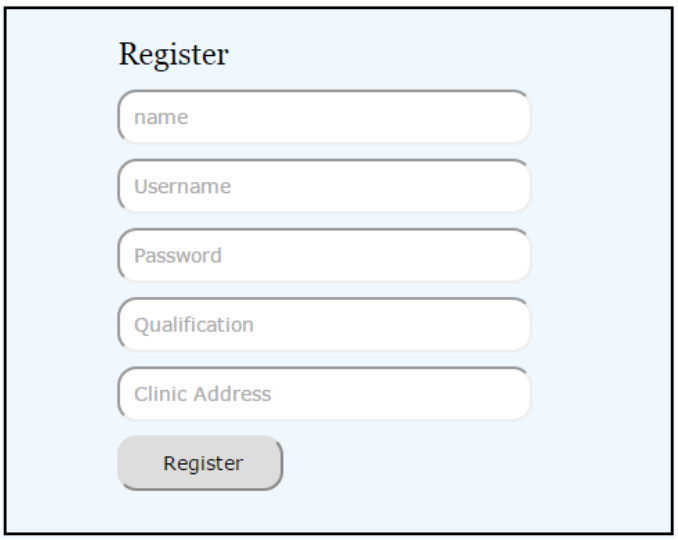

Figure 2. Registration form for Doctors

After registering, the doctors can accept or reject appointments as per their schedule, answer patient queries and view the diseases the patient is suffering from based on the symptoms the doctors enter. The e-prescription is

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automatically generated on selecting the remedies. This prescription can then be mailed to the patient.

Once the patient registers, the appointment page is the first page visible. On this page, the patient can select the doctor as well as the date on which he desires to take the appointment. This is reflected on the doctor's appointment page as well. The patient can also discuss topics with the other patients or doctors. In this way he can learn about the experiences of the other patients suffering from the same disease as well as ask doctors for advice.

View Appointments

Appointment Id	Doctor	Date	Status	Action
1	Calvin Cleetus	28-03-2015	Accepted	Approve / Reject
3	Calvin Cleetus	01-04-2015	Accepted	Approve / Reject
4	Calvin Cleetus	30-03-2015	Pending	Approve / Reject
5	Vanessa Pais	28-03-2015	Accepted	Approve / Reject
7	Calvin Cleetus	31-03-2015	Accepted	Approve / Reject
9	Calvin Cleetus	31-03-2015	Accepted	Approve / Reject

Figure 3. Doctor's Appointment Page

Set Appointment

Doctor

Dr. Zenia Gomes (MBBS)

Date

submit

Figure 4. Set Appointments

View Appointments

Appointment Id	Doctor	Date	Status
1	Dr. Jenny Mandy	28-03-2015	Accepted
3	Dr. Zenia Gomes	01-04-2015	Accepted
4	Dr. Jenny Mandy	30-03-2015	Pending
5	Dr. Jenny Mandy	28-03-2015	Accepted
7	Dr. Jenny Mandy	31-03-2015	Accepted
9	Dr. Jenny Mandy	31-03-2015	Accepted

Figure 5. Patients View Appointments Page

B. Remedy Finder for the Doctors

The Remedy Finder is a software to assist the doctors in diagnosing diseases the patient suffers from as well as assisting the doctors in prescribing remedies. It can also be used to keep track of all the diseases and remedies including the newly discovered ones. The doctor has to enter the appointment ID of the patient and he is redirected to the remedy finder page where he can select the affected organ. Once this is done, a list of all the symptoms which can affect that organ is displayed. On selecting all the symptoms which the patient suffers from, a list of diseases which can contain those symptoms are displayed. The doctor selects the diseases he feels is appropriate and a list of remedies is displayed. The doctor can select the appropriate remedies and an e-prescription is created. This e-prescription can be emailed to the patient.

1. Implementation Strategies

Each symptom that the patient selects in the questionnaire is matched with the symptoms of the diseases in the database and every disease that has at least one symptom which the patient enters will be included in the dataset. The Apriori algorithm is then used to find out the frequency with which the symptoms appear in the various diseases and select the disease with the highest frequency. The Apriori algorithm is used for mining frequent itemsets for boolean association rules.

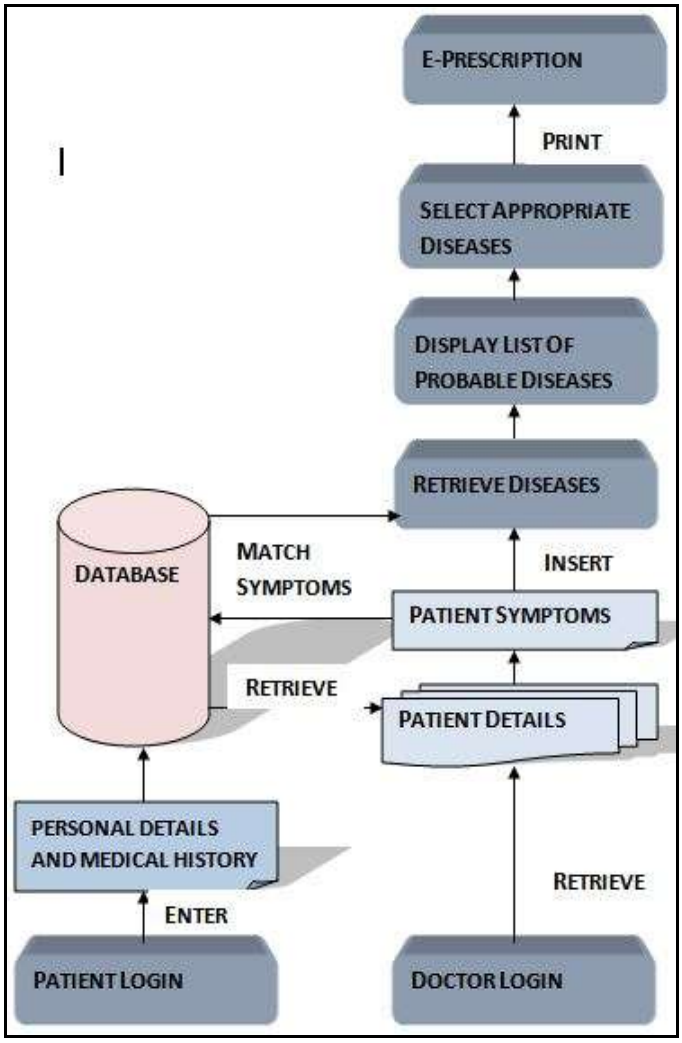

Figure 6. Design of the Remedy Finder System

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2. Apriori Algorithm

Key concepts for this algorithm are:

- Frequent itemset: Set of items which have minimum support (Denoted by L_i for the i^{th}-itemset)
- Apriori property: Any subset of frequent itemset must be frequent
- Join Operation: To find L_k, A set of candidate k-itemsets is generated by joining L_{k-1} with itself. [1]

Apriori Algorithm :

- Find the frequent itemsets: the sets of items that have minimum support.
- Iteratively find frequent itemsets with cardinality from 1 to k.
- Use the frequent itemsets to generate association rules.
- Join Step: C_k is generated by joining L_{k-1} with itself.
- Prune step: Any (k-1) –itemset that is not frequent cannot be a subset of a frequent k-itemset..[2]

3. Apriori Algorithm Pseudo Code

C_k: Candidate itemset of size k
L_k: frequent itemset of size k
L1= {frequent items};
for (k= 1; L_k!=∅; k++) do begin
C_{k+1}= candidates generated from L_k;
for each transaction t in database do
increment the count of all candidates in C_{k+1} that are contained in t
L_{k+1}= candidates in C_{k+1} with min_support
end
return $U_k L_k$; [2]

4. Implementation of the Remedy Finder

When the patient registers for the first time, the age, gender and other vital details of the patient are stored in the database. On taking appointment with a particular doctor, an appointment id is assigned to that appointment. This id is used later on when a doctor uses the Remedy Finder. The Remedy Finder can be accessed only by the doctor as a patient can misuse it to falsely prescribe medicines which can be misused.

A doctor can access the Remedy Finder either by entering the appointment id of a patient or by clicking on the appointment in his appointment list. The Remedy Finder page will be accessible only if the appointment has been accepted by the doctor. Once the Remedy Finder page has been reached, the personal details of both, the patient and the doctor are retrieved and validated, to ensure that the patient as well as the doctor exists.

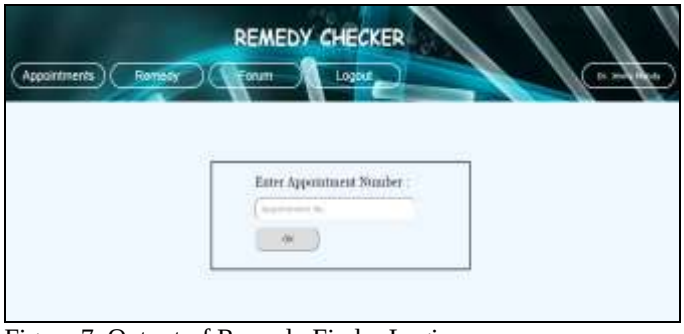

Figure 7. Output of Remedy Finder Login

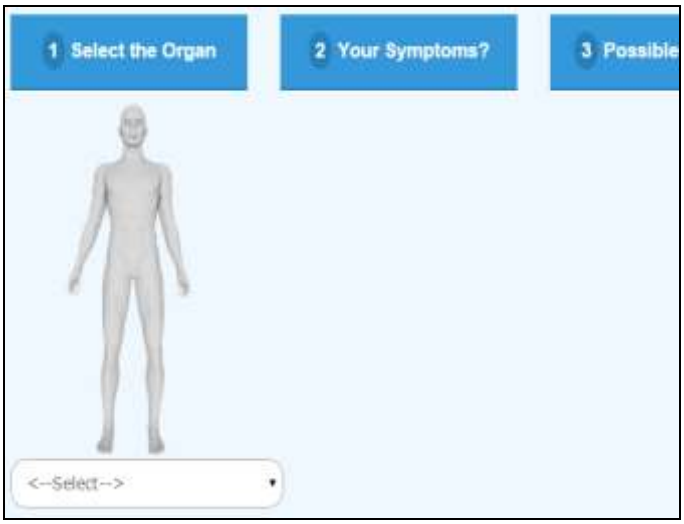

Figure 8. Sample output before selecting the affected organ

4.1 Implementation of the Remedy Finder to Find the Symptoms

To begin with the Remedy Finder System, the doctor has to select the affected organ. Once this is selected, all the symptoms related to this organ are retrieved from the database. These symptoms are then classified based on the age and gender of the patient. Various other factors, such as the physical conditions of the patient, past diseases and allergies are also used to classify the symptoms. Once classified, 'support' is assigned to the symptoms based on all these parameters. The symptom along with its support is called an 'itemset'.

The minimum support for this system is 1. All the itemsets having support equal to or more than the minimum itemset are known as the 'frequent itemsets'. The symptoms in the first frequent itemset are then combined with each other to form further pairs. The frequent itemset is found again for these new pairs. This step is repeated thrice and the symptoms that are a part of the third itemset are the list of symptoms to be displayed.

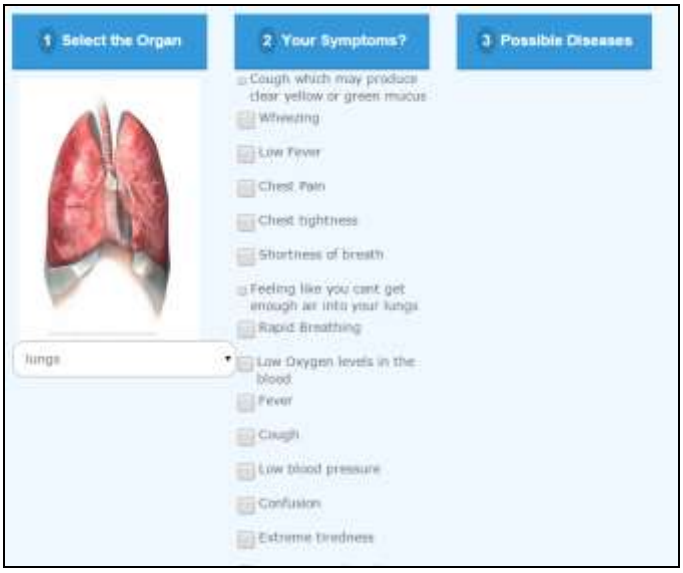

Figure 9. Sample output of the first step of Remedy Finder

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4.2 Implementation of the Remedy Finder to Find the Diseases

From the displayed symptoms, the doctor has to select the symptoms that the patient is exhibiting. The selected symptoms are used to retrieve the diseases that contain these symptoms. These diseases are then classified based on the age and gender of the patient and various other factors, such as the physical conditions of the patient, past diseases and allergies. Like with the symptoms, 'support' is assigned to the diseases based on all these parameters.

The minimum support for this system is 2. The diseases in the first frequent itemset are then combined with each other to form further pairs. The frequent itemset is found again for these new pairs. This step is repeated thrice and the diseases that are a part of the third itemset are the list of diseases to be displayed. The displayed diseases are those diseases that can display the selected symptoms as well as they are diseases that can affect patients of that age and gender that the patient is of.

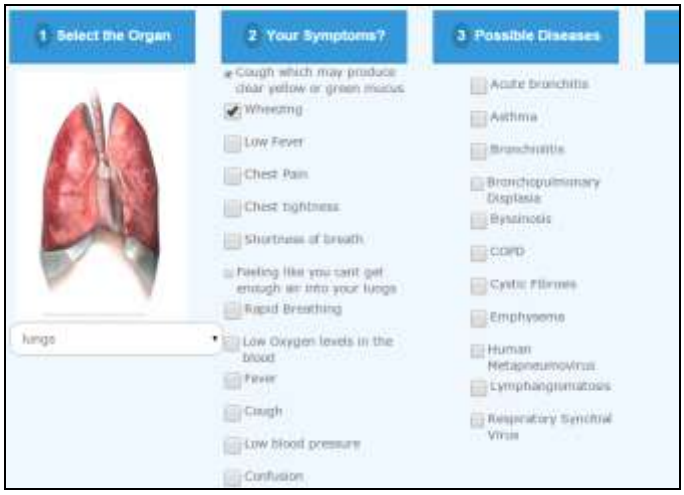

Figure 10. Sample output of the second step of Remedy Finder

4.3 Implementation of the Remedy Finder to Find the Remedies

From the displayed diseases, the doctor has to select the disease or diseases that the doctor thinks the patient is suffering from. The selected diseases are used to retrieve the remedies that can cure these diseases. These remedies are then classified based on the age and gender of the patient and various other factors, such as the physical conditions of the patient, past diseases and allergies. Like with the symptoms and diseases, 'support' is assigned to the remedies based on all these parameters.

The minimum support for this system is 2. The remedies in the first frequent itemset are then combined with each other to form further pairs. The frequent itemset is found again for these new pairs. This step is repeated thrice and the remedies that are a part of the third itemset are the list of remedies to be displayed. The remedies displayed are only those remedies that will cure the selected diseases. Also, these remedies are appropriate for the age and gender entered by the patient. The system will also take care that the remedies displayed will not adversely affect the patient by further aggravating any of his allergies or interfering with any of the homeopathic medicines he might be taking for some other disease he suffers from.

Figure 11. Sample output of the third step of Remedy Finder

4.4 Implementation of the E-Prescription Feature

On selecting the appropriate remedies that can cure the diseases the patient is suffering from, the View Prescription page shows the diseases with a provision to enter the dosage that the patient needs to consume. The prescription page can be saved as a pdf and mailed to the patient if necessary.

Figure 12. Sample output of the e-prescription

IV. COMPARISON BETWEEN SYSTEMS

Given below is the comparison between this system, WebMD and ABCHomeopathy. The comparison is given below in both table and graph format. The systems have been graded according to their functionalities. The grading system is given below :

- Below 3 : Bad/Less/No Such Feature
- 3 to 5 : OK/Better Than Others But Not So Good
- 5 to 7 : Good/Medium
- 7 to 10 : Very Good/Feature Is Present

	ORF	WebMD	ABCHomeopathy
User Interface	7	7	2
Ease of Use	9	7	3
Ease of understanding	8	9	5
Appointment Feature	9	3	3
Forum	7	5	3

Table 1 : Comparison Between Our System, WebMD and ABCHomeopathy

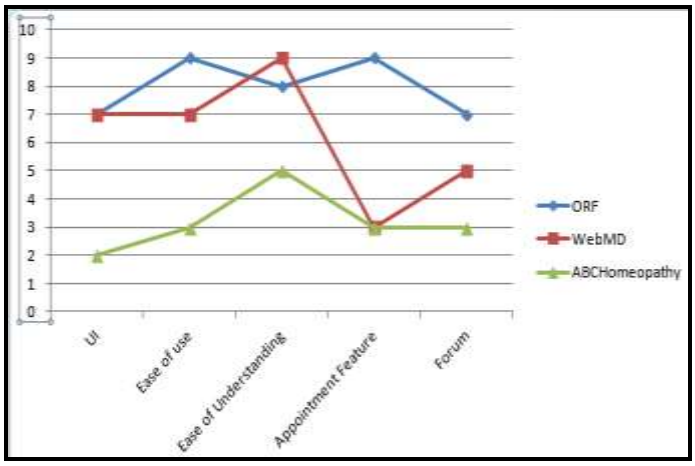

Figure 13. Comparison between our system, WebMD and ABCHomeopathy

V. CONCLUSION

The paper proposes the use of web technology to assist the homeopathy doctors in diagnosing the patients. It also helps the patients to contact the doctors with minimum hassle. Taking appointments is as easy as the click of a few buttons. The results of the remedy finder i.e. the medicines, diseases and symptoms are saved in the database thereby allowing the doctor to keep track of the patient's history. In future work we will be focusing on improving on adding filters to the Remedy Finder thereby optimizing the system. Currently, the system works only for lungs. More data has to be added to the database to make the system more efficient. This will be done in the future.

ACKNOWLEDGMENT

We wish to express our sincere gratitude to our project guide Mrs. Sana Shaikh for her guidance and all the help rendered. We would also like to sincerely thank Dr Amiya Kumar Tripathy for his support and encouragement in carrying the project work.

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