GENERAL MANAGEMENT

INTEGRATING THE PROCESS OF DETERMINING MIZAJ (TEMPRAMENT) IN A HOSPITAL DRQSZMANAGEMENT SYSTEM"

SAEED AFROUGH
DEPT OF COMPUTER,
TIRAN BRANCH,
ISLAMIC AZAD UNIVERSITY,
TIRAN, IRAN

PROF. MURTAZA M. JUNAID FAROOQUE
ASSOCIATE PROFESSOR,
AIMS, PUNE

INTRODUCTION

Hospital Management Systems (HMS) are expected to improve the quality and management of clinical care and health care management [3]. Managing the key processes efficiently is critical to the success of the hospital for effective healthcare. HMS is a comprehensive, integrated information system designed to manage the medical, administrative, financial and legal activities and related services of a hospital. Electronic health record will be the part of any such system.

These systems are to provide Internet-based access, help to the hospital authorities in developing comprehensive health care policies, enhances information integrity, reduces transcription errors, and reduces duplication [6, 7,8]. A look into the literature and software development world over shows that there are many HMS available, some even freely downloadable. However none of these seem to be incorporating temperament determination and integrating the temperament in further diagnosis and medical care, hence they cannot be used Unani hospitals. At best the doctors can determine the Mizaj (Temperatment) using manual processing.

Comparison between Unani _HMS and other HMS's :The main difference between Unani_HMS and other HMS's is that, patient's normal Mizaj needs to be stored as reference first. When the patient reports for treatment with medical complaints his current Mizaj is obtained. If the current Mizaj is different from his normal Mizaj, health problem is indicated and different measures are adopted as the treatment to bring the normal Mizaj

back to get rid of the disease.

According to Unani medicine, the basic tenet of treatment is "Ilaj bil zid" (Principle of opposition), which explains that 'a certain disease entity with certain degree of abnormal quality and quantity of akhlat (humour) begets drug of corresponding degree and opposite quality and quantity to counteract a disease'.We have tried to develop a HMS with incorporation of temperament determining using data mining support.

2.0 DECISION TREE BASED IDENTIFICATION OF THE TEMPERAMENT

Different experts have suggested different means for identification of temperament with the variables ranging from ten to fifty. We have summarized few of the methods in Table 1. For this application we have used the method proposed in [9]. The details of the data used, Nature of data used, decision tree generated and adopted are described in Section 4.

TABLE 1: LIST OF TEMPERAMENT DETERMINATION METHOD PROPOSED BY DIFFERENT SCHOLARS [10, 11, 12, 13]

Sr. No.	Method used	No of parameter used	Reference
1.	Physical observation of the subject reasoning and perceptions and sometimes observation of excreta	3, 4 or 5	[14,15,16,17,18]
2.	Physical observation of the subject + responsiveness of organ , sleep and wakefulness, excreta and psychic reactions	10 parameters	[19]
3.	Questionnaire with 55 parameter based on 10 parameters of Avicenna	55 parameter	[11]
4.	Questionnaire with scores using Avicenna 's 10 parameter	10 parameters	[12]
5.	A questionnaire based on physical appearance and psychological reaction	18 MCQ with 4 option each	[13]
6.	A Website A List of 51 question with yes No answer	51 parameter	[20]
7.	A website with test consists of 32 descriptors. For each user must indicate whether or not it applies to him	32 parameter	[21,22]

3.0 PILOT SURVEY ON SELECTED SAMPLE FOR DETERMINATION OF DECISION TREE

A quick survey conducted at AIMS [9] was taken as the basis for the Mizaj determination process. A data of 67 subjects was collected using a questionnaire. Mizaj was determined independently in [9]. The following distribution was found in the sample.

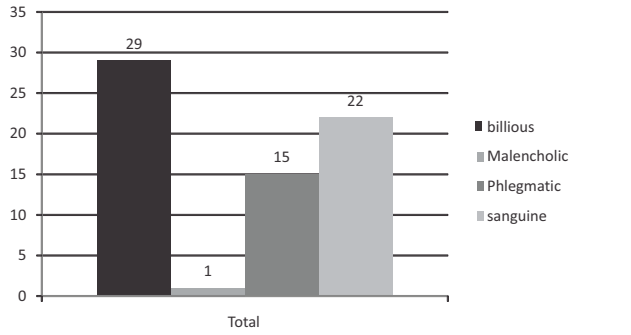

Figure 1: Distribution of the sample as per mizaj

It can be seen that frequency of Melancholic (safrawi) subjects is only 1 in the above sample, which is significantly lower compared to other three temperaments. The reason for this could be that people with this temperament are rare.

A data mining exercise using WEKA was applied to the data. ID3 Algorithms (J48 in WEKA) was used to generate the decision tree, by the authors of [9]. Same was used for further analysis in this work. The model was validated using 10 fold validation for reduced error pruning. While validating the model (decision tree), the confusion matrix generated by Weka was as given in Table 2.

TABLE 2 : CONFUSION MATRIX OF THE CLASSIFICATION

Actaul Temprament ↓ Classified as →	Bilious (balgami)	(Phlegmatic Safrawi)	(Sanguine Damawi)	(Malencholic Saudawi)
Bilious (balgami)	25	0	4	0
Phlegmatic (Safrawi)	3	10	2	0
Sanguine (Damawi)	2	3	17	0
Malencholic (Saudawi)	0	1	0	0

Pruned tree given in above paper [9] was generated with confidence 0.25, the depth of tree was 6 with 11 leaves and 16 nodes. However when unprune option was selected depth increased to 7 with 26 leaves and 40 nodes. There was no significant difference in the performance of pruned and unpruned models and the number of mis-classifications was same. Hence the pruned tree was used for inclusion.

A view of the tree is given in Fig 2. Hence the pruned tree was used for development of the information system.

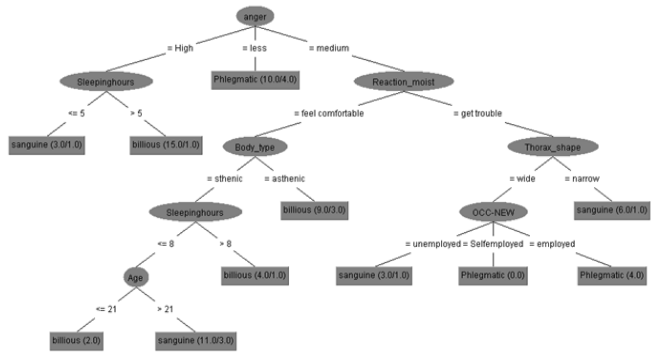

Figure 2: Decision tree generated using WEKA (J48 Algorithm).

The error statistics is given in Table 3.

TABLE 3 : SUMMARY OF ERROR STATISTICS

Correctly Classified Instances	52 (77.6119 %)
Incorrectly Classified Instances	15 (22.3881 %)
Kappa statistic	0.6538
Mean absolute error	0.1662
Root mean squared error	0.2883
Relative absolute error	50.3757 %
Root relative squared error	71.2505 %
Total Number of Instances	67

INCORPORATION OF DECISION TREE IN HMS

The output of the generated decision tree was available as a text file named Weka-Tree.txt Which needs to be read by the Unani_HMS before it can be interpreted for identification of the Mizaj of the particular patient. The identified MIZaj now needs to be entered into the patient database for further clinical decision making.

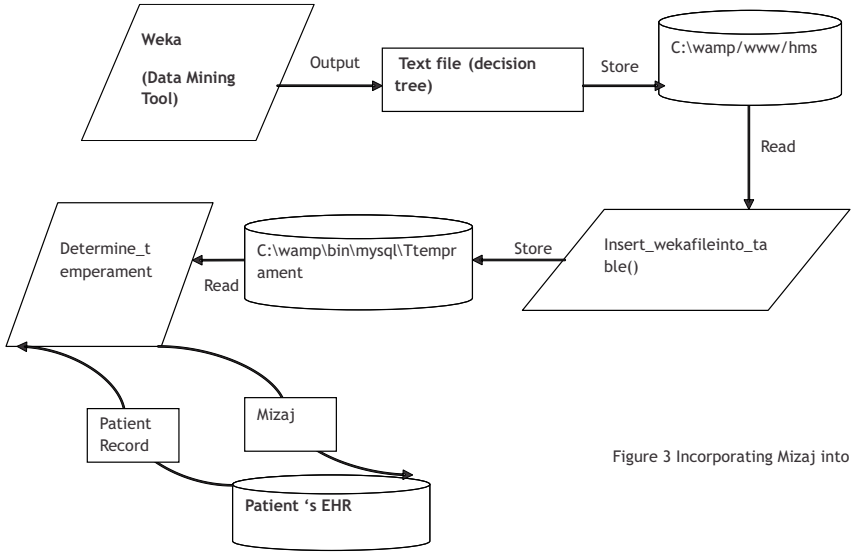

Figure 3 Incorporating Mizaj into patient's EHR

The Unani_HMS was developed in PHP and database used was Mysql. The application is saved at the path: C\wamp\www\HMS on a WAMP server. All files relating to MySQL are saved at the C:\wamp \bin\MySQL.A Module named Insert_WekaFile_into_Table() to read the decision tree (weka-tree.txt text file) was written in file named ReadMezajFile.php and incorporated in the system [Figure 4]. This file is located on C:\wamp\www\HMS. When the text file (weka-tree.txt) is generated by weka it has to be copied to the path : C:\wamp\www\HMS\Weka-Tree.txt. The program can be extended to detect the TXT file automatically or user can browse into in to the disk and select the desired txt file. The output exported as a text file; each line in this file in fact presents a node in the tree. The module Insert_WekaFile_into_Table() is responsible to read this file, parse and convert it into a readable format, this is done by reading file line by line and convert each line to a set of tokens where each saved into the data base, each node has some properties like name, value, child ID (if available) parent ID (if available) and etc. Child ID and parent ID are used for further accessing.

The Algorithm to read the text file created by Weka is as follows :

Figure 4 : Algorithm for reading the text file

Figure 5: Representation of the decision tree in PHP

1. DETERMINATION OF TEMPERAMENT

Each record in the data base is representing a node of the decision tree. For reading the decision tree each record from the data base is fetched and depends on its child ID and parent ID will take place in its appropriate level of the tree. The Algorithm is given below :

Figure 6: Algorithm for parsing the decision tree and determining the temperament

7. INTEGRATION OF TEMPERAMENT DETERMINATION IN UNANI_HMS

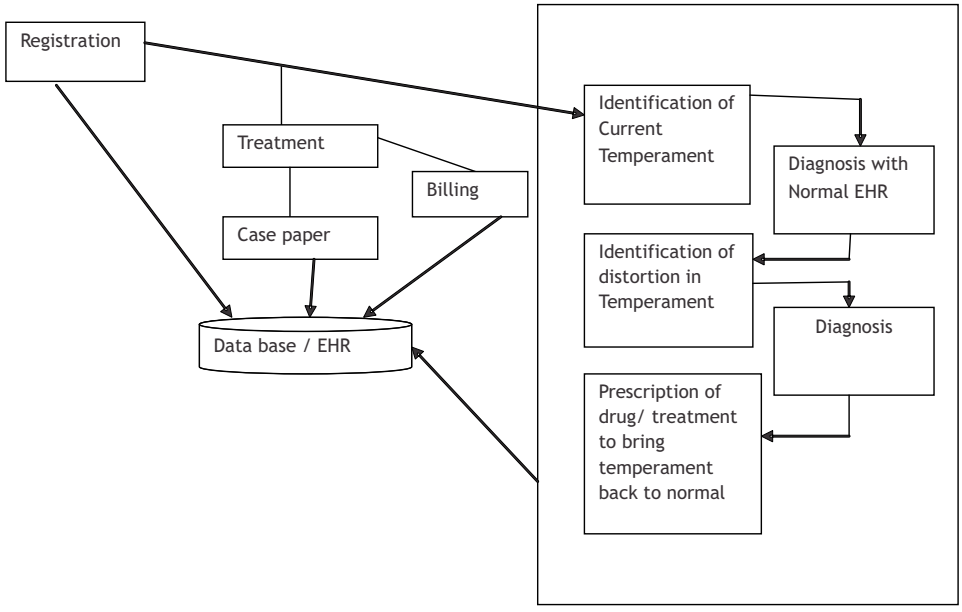

Figure 7A system diagram of HMS

When a patient visits the hospital, he will go through registration module. While his registration details are being stored in the data base, a copy of patient's details which are needed to determination of Temperament are sent to Determination Of Temperament() function as parameters to determine the Temperament. The function gets the parameters and begins to start parsing the decision tree by using relevant records in the data base. At the end of the function a value is returned to the program as patient's Temperament for saving in the patient's record in the data base. Now the Determined temperament can be used by all authorized doctors.

However In the real hospitals the generated tree after sometimes must be upgraded because this system works upon on the data and definitely after some times the amount of data will increase so the rule base may get change and the precision of result will go up.

1. LIMITATION

The limitation of this system is that, Although other module of HMS are working, module for temperament determination is developed on the basis of a research papers which has used only one algorithm (J48) that too with limited number of records (67). There is need to verify the reliability and accuracy of the model (decision tree).

9. REFERENCES

1. Clinical information systems definition in biohealthmatics.com, a US based career networking portal for biotechnology and healthcare informatics". Biohealthmatics.com. 2006-08-10.Retrieved 2012-04-15.

2. Healthcare information systems definition in Centre for Development of Advanced Computing, an Indian research centre for health informatics". Cdac.in. 2011-09-22. Retrieved 2012-04-15.

3. The critical issues affecting the introduction of Health Management Information Systems in developing countries In Africa Nicole Archangel (October 2007),

4. http://www.himss.org/content/files/HIMSS_HISTORY.

5. http://en.wikipedia.org/wiki/Hospital_information_system

6. Hospital information systems definition given by US based". Emrconsultant.com. Retrieved 2012-04-15.

7. Healthcare information systems definition in Centre for Development of Advanced Computing, an Indian research centre for health informatics". Cdac.in. 2011-09-22. Retrieved 2012-04-15.

8. Hospital information systems definition given by US based". Emrconsultant.com. Retrieved 2012-04-15.

9. Murtaza M. Junaid Farooque, sayyed abidurrahman, Farhana Sarkhawas Identification of Mizaj (Temperament) based on Tibbi Fundamentals using Classification as Tool (Proceedings of national conference on data mining 2011)

10. F.S. Sherani, Forooq Ahmed Dar, Khalid zaidi , Unimed Kulliyat(March 2007) vol 2 Issue II

11. Hakim sayed Istiaq Ahmed,(1980) Introduction to Al-umur Al Tabiyah (Principles of human physiology in Tibb)

12. Prof. Jamil Ahmed, Hakim Ashraf Qadeer (1998)Unani The science of greeco-Arabic medicine, Lustre Press Pvt. Ltd

13. Randy Rolfy, The Four Temperaments - A Rediscovery of the Ancient Way of Understanding Health and Character. Avalon Books - Marlowe & Co. 2002.

14. David Lester(1999) Galen 's Four temperament and four theories of personality, DOI, 2, 10,& 40

15. Majoosi Ali ibne Abbas (1889) “kamelus sana” urdu transalation by Ghulam Hussain kantori Matab Munshi Naval kishore lucknow pg, 24-25

16. Razi Abu bakar Mohammed bin zakaria (1991) “ Kitabul Mansoori” Translated in urdu by CCRUM, New Delhi, pg 59,62

17. A Qader, “Matab aur shakshi mizaj Shahanasi”, “Jahan-e-Tibb”, (2001), CCRUM New Delhi April-June

18. A Abdurrehmanov (1976) new information about the Arabic translation of the “conica of Appolonius of perga(Russian), Taskent, Gos university

19. Ibne-sina Abu Ali Hasan bin Abdullah “ Al Qanoon fil Tib” Book 1, English Tranlation by the critical Arabic test , Jamia Hamdard New Delhi.

20. http://www.openjs.com/scripts/tempfind.php

21. http://personality-testing.info/tests/4T.php

22. Martin, R. A., Puhlik-Doris, P., Larsen, G., Gray, J., & Weir, K. (2003). Individual differences in uses of humor and their relation to psychological well-being: Development of the Humor Styles Questionnaire. Journal of Research in Personality, 37, 48-75.