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Optimizing the Health Needs of Users by Moulding up an E-Hospital

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Abstract: Information technology transform the ways of healthcare services by converting the olden method of consulting a doctor to patients seeking online health information. Many healthcare services has been brought into action . These include Heath Tap, HaoDF ,WebMD etc. They provide faster and trusted answers for the questions asked by the patients. This paper consist of two components: mining and learning. A personal health record, or PHR, is a health record where health data and information related to the care of a patient is maintained by the patient. This stands in contrast to the more widely used electronic medical record, which is operated by institutions (such as hospitals) and contains data entered by clinicians or billing data to support insurance claims. The intention of a PHR is to provide a complete and accurate summary of an individual's medical history which is accessible online.

Keywords: local mining, global learning, PHR-personal health record, query.

I. INTRODUCTION

In this new era, technology is spreading everywhere and has become an integral part of everyone's life. Everything is possible with the help of a computer and a network. The whole world has turned to a technological sphere. Moreover, Information Retrieval plays an important role especially in medical field. It is useful for storing the information as well as its retrieval from the database. Most of the previous work simply utilizes the external medical dictionary to code the medical records rather than considering the corpus-aware terminologies. In Existing Web Applications the Questions posted by the users are answered by the Other User which might result in redundancy and user unreliability especially for medical related doubts, clarifications and questions. They are found to be effective for both professionals and common users.

This project aims at eliminating the vocabulary gap between patients and the medical experts .The users provide their queries in simple language to the system and the system in turn maps the medical terminologies provided by the doctors into natural language which can be understood by all users. This is done by the combined use of techniques namely- local mining and global learning. local mining maps the medical terms into simple terms but they may suffer from information loss and lower precision due to missing key medical concepts and the presence of irrelevant facts. Global learning fills up the space of missing terminologies and removes the irregularities. A corpus-aware terminology vocabulary is created as a byproduct which is used as terminology space for global learning.

II. RELATED WORKS

Nowadays, the use of Information retrieval systems in biomedical field has been increased rapidly, but still problems related to indexing, retrieval, and evaluation exists. SAPPHIRE (Semantic and Probabilistic Heuristic Information Retrieval Environment) was introduced by Hersh and David in1995 which used simple lexical approach which automatically assigned UMLS terminologies to medical documents. This was used as an optimal approach to overcome problems of indexing, retrieval, and evaluation of IR resources in the biomedical domain. Moreover it provides solutions to the problems of inconsistent human indexing, difficulties of medical practitioners with controlled vocabulary and synonymy of medical language. Like many of the researches, SAPPHIRE too provided solutions to many problems but it has unrevealed many new facts. The disadvantages of system are less benefits of concept mapping, Substitution of synonyms. The introduction of realistic databases made to overcome this problem to an extend.

In 2003 Y.Rong, H.Er and J.Rong developed an algorithm for video retrieval that fuses the decision of multiple retrieval agent in both image and text. Here the negative pseudo feedback is applied for the improve image retrieval performance, but the result was far from the exception, it made a promising inventions for multimedia retrieval in very noisy data. While many of works related to the Informedia is made but they are focused only on the interactive tools and searching of the correct video clip from a large video library but here deals with the automated processing and retrieval implementation in the Informedia is done.

Here it was done fusing the retrieval results of multimedia agents for retrieving. The entire system comprises of many agents including a text oriented retrieval agent, a video information oriented agent and a basic nearest neighbor image matching agent which can be combined with classification based Pseudo-relevance feedback. The various agents produce retrieval results ranked in their own output scoring metrics.

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Here two kinds of low-level features are used for finding similar images: color feature and texture features. While in the color feature, the cumulative color histograms for each separate color channel, where this three colour channel was find out from HSV colour space. First of all compute a histogram for each filter and generate their central and second order moments as the texture features and every image is considered as a long feature derived from the concatenation of the feature and use the nearest neighbor technique for image matching and in a preprocessing step, using the covariance of its dimension, each element of the feature vectors is scaled.

Here for the system splits the audio track from the MPEG-1 encoded video files and decodes the audio and down samples it to 16Hz and then passed to speech recognizer. Using OKPAI formula here we can retrieve the text. The formula for this

$$\text{Sim}(Q,D)=\sum_{qw \in Q} \frac{tf(qw,D)\log(\frac{N-df(qw+0.5}{df(qw)+0.5})}{0.5+1.5\frac{|D|}{avg\_dl}+tf(qw,D)}$$

where tf (qw,D) means the term frequency of word qw in document D,df(qw) is the document frequency of all word qw and avg_dl is the average length of document in the collection.

Here the four different combination of the retrieval agents is done, including the combination of text agents (text), movie agents (Movie).nearest neighbor on color (color),nearest neighbor on texture (Texture), and classification based PRF(classification) and the results shows a significant increase in the quality.

Later in 2007 K .Crammer, M.Dredze, S.Carroll, K.Ganchev, P.PTalukdarbrought a new technique of coding large amount of health records which should be maintained in modern hospitals. This method has proved to be helpful in data mining, information extraction, relation extraction etc. This approach was performed by initially explaining the task and difficulties. Later describing three automated approaches and combining them into a single system. Finally evaluate the system based on human performance and the best score is preferred. One of the systems is ICD-9-CMICD-9-CM (International classification of Diseases, Ninth Revision, and Clinical Modification) and is used for classification of a symptom, disease, procedure, injury or information from the health records. The codes are organized hierarchically where the top level represents general information such as respiratory diseases and bottom level represents specific information such as brain tumor. The coding systems learning systems and their main aspects is the representation of the problem and requires taking the linear combination of all the outputs. In the rule-based system uses a short description of ICD-9-CM codes and their types. Each description is considered as a group of words. If all the words in a code description is found in a sentence, a flag is set corresponding to that code. If the code is a disease consider it as a negation and the flag is removed. In the automatic coding policies, two related sets of codes are selected to target with a rule-based system and the reports related to a disease which is common in dataset is chosen and they are handled using a single policy to get maximum accurate outputs. For the combination of the three systems first of all it is needed to cascade the automatic policy and rule based system and the prediction made by the system are made as the application of learning system. The systems in the combined state are found to be more effective and promise to yield a better performance. As a whole this system reduced the costs, work of coders and even standardized the hospital data collection but it left behind many shortcomings since it cannot be tested when there are limited number of codes and the hierarchy is removed. Also the number of codes in each document has wider range varying between 1 and 15 codes.

In the same year 2007, Dozier, R. Kondadadi, K. Al-Kofahi, M. Chaudhary, and X .The main aim was to provide a Question-Answer scheme to meet the objective of the users. It uses NLP (Natural Language Processing) to process the questions posed by the users and thereby the proper meaning can be revealed. NLP consists of many stages of which POST (Parts Of Speech Tagging) results in phrase and nouns extraction and later performs stemming in which the stop words are removed and even removes the keywords for base word. The proper meaning of the terms will be checked with the help of an English dictionary and the medical terms are normalized based on domain specific knowledge. Medical terms are collected and grouped so that checking with the synonyms of keywords could result in normalization. The normalized words are checked for contradiction with the medical terms and the related answers will be queried from local mining database.

The importance of search technologies are very high for rapid and effective retrieval of information about patients from free-text medical records the retrieval of medical records using a query is challenging but using medical search for relevant documents are very specific which may sometime leads to granularity mismatch.

To overcome this, a symbolic reasoning called subsumption (or ‘is-a’) relationship between parent and child is used to tackle granularity mismatch. Here parent-child relationship is defined as’ one concept is a subset of other concept’ so it is important to add subsumed concepts in the retrieval function. Simply, free-text documents to concepts defined in medical terminologies (SNOMED CT) ontology has taken place.

In this paper, the traditional ’bag-of-words’ is replaced by ’bag-of-concepts’ to represent the documents. Here the terms are converted to concepts using an NLP tool called Metamap and the concepts are derived from SNOMED CT ontology. Depending on the weight of query concepts in a document and weight of concepts in a document that have been subsumed by query concepts, scoring of the documents are done.

This system use subsumption for concept- based, medical-based retrieval. There has been a potential increase in the retrieval performance while considering the matching document and subsumed concept.

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In 2011, G.Leroy and H. Chen brought a new tool named Medical Concept Mapper which enabled people to search their personal queries by providing appropriate medical terms. This system helped the common people who had inadequate medical knowledge and also the medical experts to acknowledge outside their expertise field. The necessity is that sources to be searched should be in standard medical vocabulary. The construction of this system is challenging and the performance varies from different corpus. Instead of converting the corpus data to terminology, users are provided with medical terminology for their queries.

III. PROPOSED SYSTEM

The system consists of four different levels of users: Search users, Patients, Doctors and Agents. Search users can search for their queries in their own narrative language for which the medical experts provide answers. Patients can enter their personal and health details and submit to the system and later they are given permission to view the health records. Doctors are the core part that provides expert advice and clarifies the doubts of patients as well as search users. They can access a patient's PHR provided they give permission and thus securing the system. Agents representing respective hospitals help in handling the emergency situation .They can search for the details of any registered patients for the hospital. These details are protected from any kind of attack by providing security with the help of hardware tokens.

IV. CONCLUSION

The drawbacks of the previous works have overcome to some extend in the proposed system. This paper provides an efficient way to store and retrieve Personal Health Record. It also helps to handle emergency situation smoothly. Here an agent is introduced who can view and download the PHR if the patient is unable to reveal his/her details to the corresponding hospital. The PHR details are kept secure using security algorithm. In future the health seekers can have a video chat with the health experts. This work can be introduced to the villages by storing their details and to solve their health problems.

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