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A Prognostic COPD Clinical Support System

Bharati S Pochal, Divya D Kulkarni

Asst. Professor, Dept. of Computer Application, Visvesvaraya Technological University, Post Graduate Centre, Kalaburagi, Karnataka, India

MCA Student, Visvesvaraya Technological University, Post Graduate Centre, Kalaburagi, Karnataka, India

ABSTRACT: The care indicator is a main characteristic feature of Hospital readmission. It imitates objection in nature of in-patient consideration and the trouble of coordination of consideration after they move again into the group. It is a powerful money related stress particularly identified to Medicare and Medicaid money for present and future. In 2020, the COPD is the main sources of incapacity and destruction around the world, also relied upon to wind up third reason for death and fifth reason for handicap balanced life. So it is a essential , price and statistically important to create prognostic clinical support system to handle the patients in better way with their situation in order to enhance the nature of consideration while controlling expenses through keeping away from avertable readmission of patient with COPD at the same time.

KEYWORDS: Chronic Obstructive Pulmonary Disease COPD, Clinical records, Healthcare, Readmission, Support system, Structured and Unstructured data.

I. INTRODUCTION

At the time of first clinical test, the hospital re-entry prices are assumed to be a valuable mark and care of status, so that there might be a follow up plans of charge and also managing low price of patient among association. In the United States of America, there is extensive data on readmissions and their costs. For example in the year 2009, over a period of 30days, approximately 20% of patients who are released and again took readmission in the same hospital and their cost for treatment are paid by Medicare. The results were even more pronounced over a longer duration with 34.0% being readmitted in 90days and over 56 % in a year. Also Medicare Payment Advisory Commission (Med PAC) established that approximately 19 % of patients readmitted in 30days of discharge. 11.3% in 15days and 62% in 7days. According to Med PAC the readmission of patients within 30days cost Medicare $15 billion. Given the magnitude of the expenses for the system we focus on the one of most expensive diseases that the third largest cause of death worldwide and are one of the top five triggers of the disabilities. This disease called COPD which is abbreviated as Chronic Obstructive Pulmonary Disease is a lung based attack and occurs all around the world. The point of our study is on which is one of the well-known agents of infirmity and fatality around the world, and is expected to be, the 3rd reason for death and 5th reason for injury in 2020. So to find ways to reduce the cost of such a chronic disease will help not only the individual patients and their families but also the societies that they are in.

II. RELATED WORK

In [1] article of our organization presents the determination of smoking status for patients. By recognizing the reports produced by doctors, the level of smoking status of patients is easily accessible by our organization. Our system's detection of text is constructed on the architecture which is able to use again (UIMA). The code which is able to use again has decreased the construction work indicated to smoking. In the present world, the language of medical is flexible and converted to a information services. Some drawbacks are applied to the use case and negative detection. The challenge of automatic discovery of patients smoking status can be categorized with 5 categories: Smoker (S), Current Smoker (C), Past Smoker (P), Non-Smoker (N) and Unknown Smoker (U) based on medical records of patient. According to patients smoking status in every record we assigned a sentence, which will be available in one of these categories to the patient's document. All others will be defined as unknown Smoker (U). In [2] Direct contact between health care doctors and basic doctors occupied rarely (3-20%). The possibility of a releasing process at the initial post

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discharge was approximately less than 40% and still remaining less which is appropriately 80% at 5 weeks, moving exactly 35% for initial care. Released process often needed main information like diagnosis test results approximately 33 to 63%, treatments (7-22%), released medication (2-40%), test results pending nearly 70%, and family member or patient approximately 95% and results from 2 to 40%. Used pattern zed formats to focus the most related facts, revised the noticed feature of documents. In [3] the re-entry ratio of clinics has been projected as a main sign of effect estimated from normal demography. Though, most regularly used part rise theoretical arguments. We desired to calculate the value of the programmed algorithm for describing unnecessary re-mission on the basis of minimal tendency, original validness and evaluation accuracy. A entry of 131,809 medical care sick persons released awake from49 clinics were used to observe the prognostic achievement of risk adaptation procedures subdivision of a arbitrary model of 570 medical notes of released couples in 12 hospitals were inspected to evaluate the portending rate of the protecting of conceivably preventable readmission.

- **Existing System**

The main aim of healthcare transfer and settlement restore is to reduce the readmission which has the adverse effect on nature of patient's life and heavy stress on system of healthcare. Therefore this is scientific, commercial necessary to enhance the problem of patient readmission. Simultaneously, there are increasing industrial capacity to construct predicting logical results in a various fields considering healthcare. To get good communication between professional techniques and client reactions industries have taken advantage of ordered and unordered information. These ideas and technologies that make it profitable to enhance the problem of readmission.

Disadvantages:

- Huge stress on healthcare system for the reduction of readmission of patients.
- Cost efficiency.
- Clinical and Commercial problem of patient.
- Misuse of structured and unstructured data by industries.

- **Proposed System**

In present system, a design is constructed to lower readmissions and there price of patients who are in need. According to patient hospital records and released concise, this project decides the sketch of patient readmission and who are suffering from the disease. Appropriate interruption equitable gives a good feature and care that avail to prohibit re-missions. We are implementing two main factors which specify particular part of a body where the disease occurs (lungs) and particular disease and its symptoms (cough). It consists of five layers those are the pre established directories.

Advantages:

- Reduction of readmission of patients in hospitals.
- The profile of patients suffering from COPD is decided by analyzing the patient clinical records.
- Both patient and doctor can save the time by avoiding queues.
- Patient records can be in the form of plain text.

III. MODULES DESCRIPTION

1. *Document Pre-processor Layer:*
   Document preprocessor layer is the initial step of the clinical support system. This module converts CDA reports to user readable form, also generates some tokens. The date mentions, numerical notations and fraction mentions are extracted by these layers which are used for obtaining patient details.

2. *Lexical Analyzer Layer:*
   Lexical Analyzer considers the parts of speeches and produces keys in the form of tokens and which further becomes a key element in surmising re-mission.

3. *Assertion Layer:*
   Assertion layer will determine that present user is considered as Patient or Family Member.

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4. *COPD Layer:*
COPD Layer fetches all information about disorders, particular part of the body where the disease has attacked and there problems by already given dictionaries. And also extracts drug mentions and its date of start and end, dosages and effects caused because of disorder combinations or medications. There are 2 dictionaries included in this layer: Anatomical sites and disease specific. Example-COPD term spotter is a pipeline or continuous process of clinical note which specifies the treatment and diagnosis. Classifying every record is the main feature of COPD.

5. *Readmission Analyzer Layer:*
Readmission Analyzer Layer contains 3 categories – Low, Medium and High Probabilities which are based on the patient's admission and readmission into the hospital.

IV. ARCHITECTURE

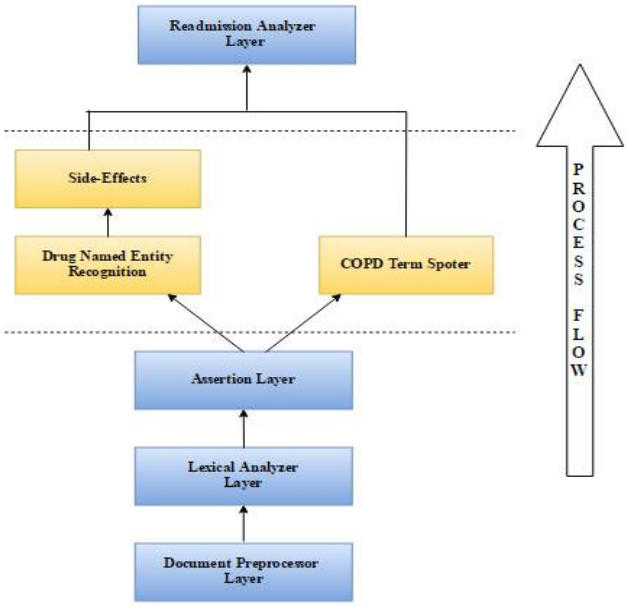

Fig 1: Architecture of Support System

This System is located on predicting analysis of ordered and disordered data of patient to construct a profile of risk for a discharged patient who has taken first step of COPD treatment. The whole design of disordered element of system is given in this system. The five steps of COPD clinical support system.
Step 1: Document Pre-processor Layer will create sections and tokens when the CDA (Clinical Document architecture) documents are converted into plain text form.
Step 2: Lexical Analyzer Layer determines all tags and tokens according to matching parts of speeches.
Step 3: Assertion Layer will determine that the considered user is Family Member or Patient.
Step 4: COPD Layer will consists of two types Drug named entity recognition and COPD term spotter.
Step 5: Readmission Analyzer Layer determines the probability of a patient.

V. SIMULATION RESULTS

Our proposed work is implemented using JAVA platform, JSP (JAVA SERVER PAGE) as a technology, Net Beans as a Front tool, MYSQL 5.1.44 as a Backend tool, and Apache tomcat 6.0 used as a server. Java may be a general-purpose, item situated customizing dialect formed toward sun Microsystems for USA 1991. Java server Pages (JSP) will be a sun Microsystems detail for joining together java for html to furnish progressive substance to Web pages.

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Home Page

Fig 2: Home Page of Clinical support System

Home Page consists of three users – Patient, Doctor and Admin. Patient can do registration or if has registered previously then directly he can login and do admission. Doctor can register here and he can check the admissions and readmissions of the patient. Admin is the main person of this support system. Admin will send the information from patient to doctor and vice versa. Admin consists of a module called COPD predictive analysis – it contains five layers which show the flow of support system for COPD treatment.

COPD Predictive Analysis

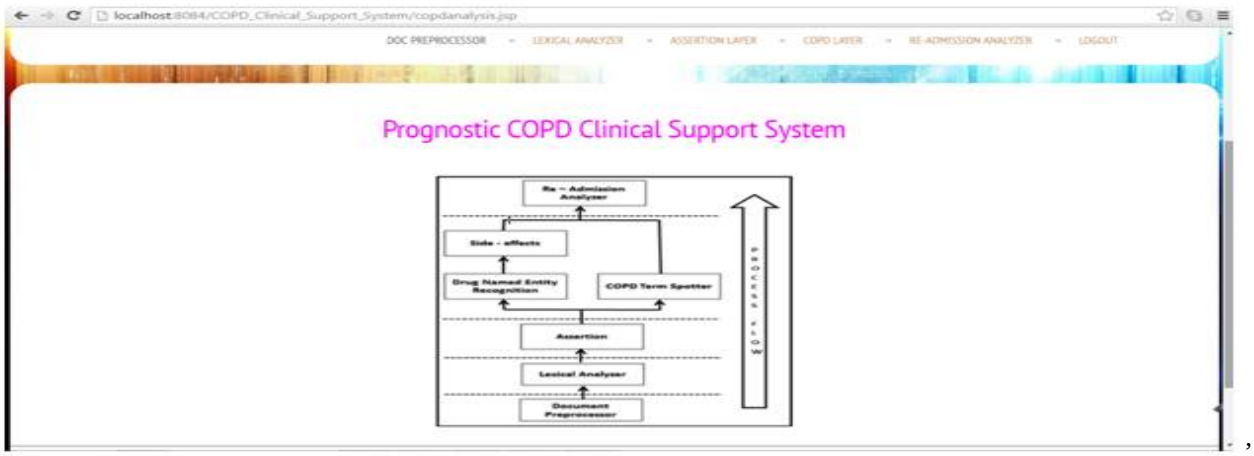

Fig 3: COPD Predictive Analysis

In proposed system we have constructed Clinical Support System which is in COPD Predictive Analysis. This five layers explain the flow or process of the COPD treatment.

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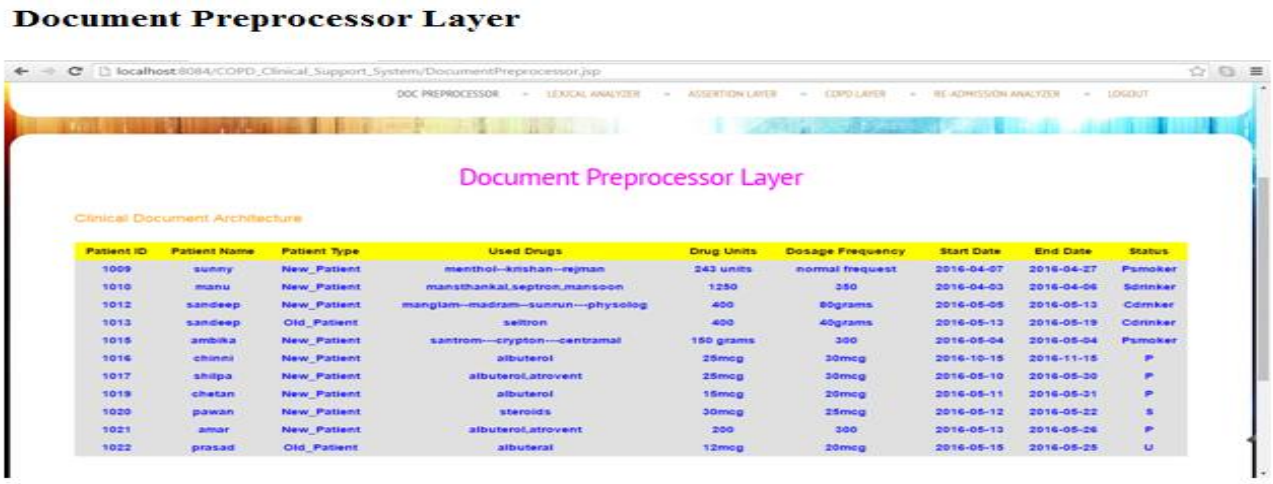

Fig 4: Document Pre-processor Layer

Document Pre-processor layer is the first layer of the Predictive analysis which contains information about drugs and dosages and also CDA documents. The CDA documents can be downloaded by the patient which will be in user readable form. This layer will generate a particular token for the patient which will be further used as key factor.

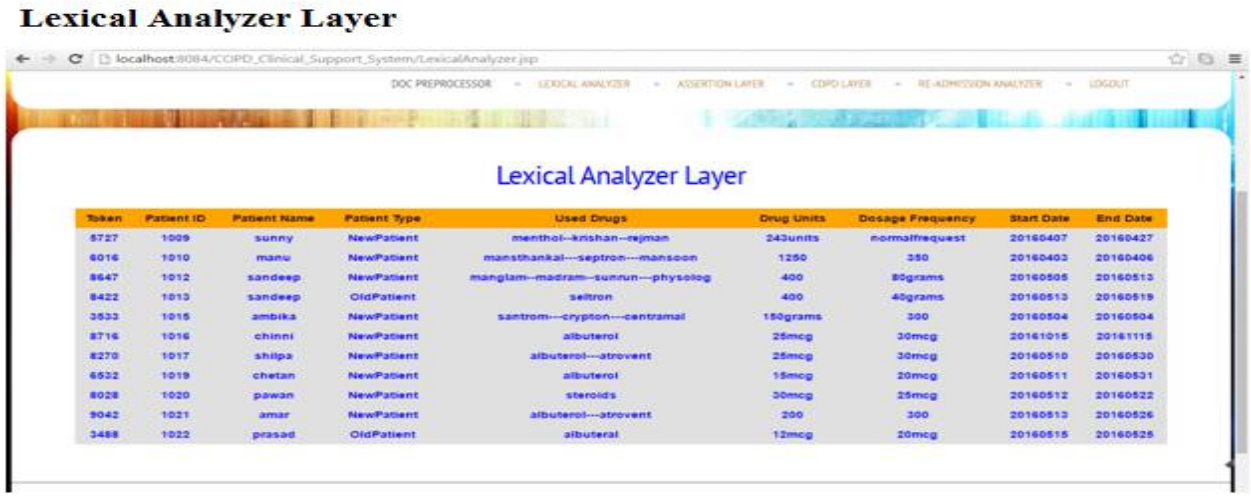

Fig 5: Lexical Analyzer Layer

Lexical Analyzer Layer is second most layer of the predictive analysis which contains drug units and dosage frequency. Token generated from document pre-processor layer is used as lexical variant. From this the patient information can displayed.

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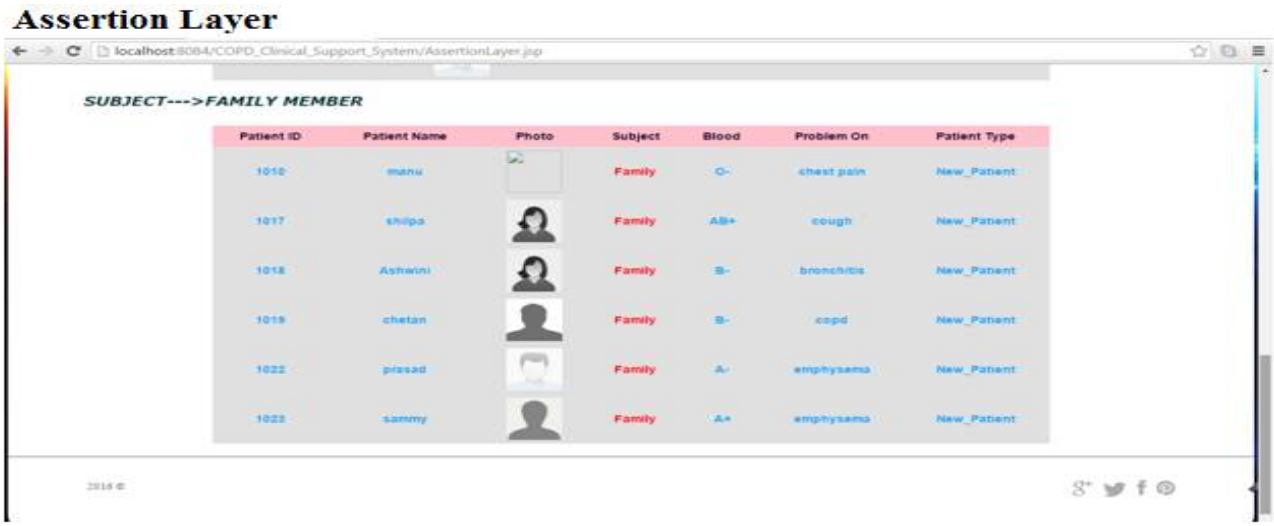

Fig 6: Assertion Layer

Assertion layer which gives information about the subject of patient that the patient belongs to family member or others.

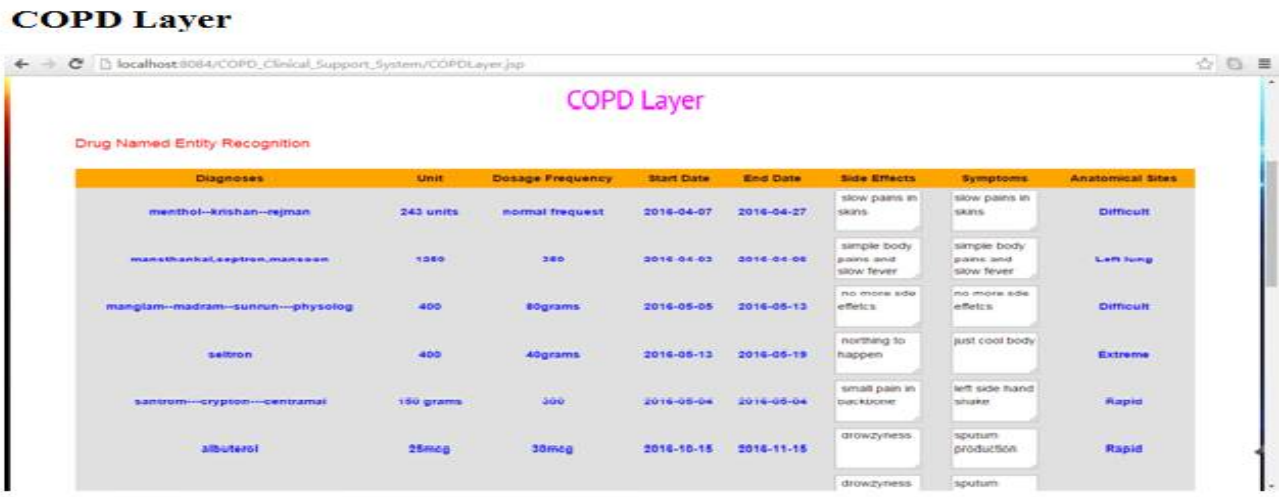

Fig 7: COPD Layer-Drug Named Entity Recognition

COPD Layer is the main layer which consists of drug named entity recognition. Drug named entity recognition contains the side effects and symptoms of the patient. According to the inbuilt dictionaries the analogical sites can be given.

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Fig 8: COPD Layer- Term Spotter

COPD term spotter is a part of COPD layer. COPD term spotter is a pipeline process in which the diagnosis and treatment of patient is given according to the disease specific and analogical sites selected by the patient from the two inbuilt dictionaries.

Readmission Analyzer Layer

Fig 9: Readmission Analyzer Layer

Readmission Analyzer Layer consists of three probabilities according to patient admission and readmission. They are:

1. Low Probability
2. Medium Probability
3. High Probability

VI. CONCLUSION AND FUTURE WORK

In present system of construction, the system is able to recognize the specific disease with specific condition. It is constructed with orderly feedback from doctor to clarify the principles of medicinal. Conventional reports are presently utilized to judge efficiency of dictionaries constructed. System predicts that the flow is tested then continued to check more results of patient records. Unstructured data is examined containing with drug information and smoking status. It

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will also recognize the drugs mentioned like dosage frequency, route and text from plain text for or CDA document form. It will also supply the information that which drugs in the list gives which drugs mentioned. Future enhancement of this project gives information about additional clinical records of the patient like diagnosis reports and particular clinical reports. Analysing the text engine the unordered information is recognized and the clinical reports are utilized to construct particular formula's. Using larger data set, the predictive positive value and meaningful classification is tested.

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