Intelligent Healthcare Prognosis of Asthma and COPD in Social Media

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Abstract— The objective of current medical research is to continuously improve the investigative methods. Its aim also is to develop new medical parameter checking methods, which can be used as a long term monitoring cases. Social media like Facebook and discussion forums can open the opportunity for the health care sector in patient care, address cost reduction, medical prognosis, service and product optimization. The patient and company benefits from real-time feedback that can then be used to assess if there are any problems and rapidly address such problems. Patient affected by COPD and Asthma are monitored by means of medical protocol, based on periodical measurements related to the disease. Though apparatus cannot forecast about to happen health problem, and directs a red alert indication according to a medical procedure only when one or more physical parameters overcome pre-defined thresholds value. The proposed work focuses on negative and positive emotion, as well as the on the side effects of handling, in consumers' environment posts, and identifies user communities (modules) and influential users for the purpose of ascertaining user opinion of COPD and Asthma treatment. The proposed system uses PSO and SOM to analyze word frequency data derived from users' forum posts. According to the discussion on social media about diseases, doctors, medicines and tests the company can predict the future scope of the manufacturing companies, equipment's and doctors. The patient and company benefits from real-time feedback that can then be used to assess if there are any problems and rapidly address such problems. The experimental results shows that our technique offers improved solution in health care monitoring system. Our work predict the occurrence of Asthma and COPD in home in the absence of doctors and also monitor the health problem of patients and helps diagnosis.

Key words: Prognosis diagnosis, COPD, Asthma, SOM, PSO, Swarm Intelligence

I. INTRODUCTION

Social media like facebook can open the opportunity for the health care sector in patient care, address cost reduction, medical prognosis, service and product optimization. Medical diagnosis [1] is the art of determining a person's pathological status from an available set of findings. The objective of current medical research is to continuously improve the investigative methods. Its aim also is to develop new medical parameter checking methods, which can be used as a long term monitoring cases. The diagnosis is based on disease symptoms. It is also depend on medical instrument provides disease related parameters. The patient and company benefits from real-time feedback that can then be used to assess if there are any problems and rapidly address such problems. Differentiation of the diagnoses that share on overlapping range of symptoms is therefore inherently difficult. Presently medical development and research are mostly focused on proposing consistent medical techniques and components for rural area and elderly people. Patient affected by COPD[2] and Asthma[3] are monitored by means of medical protocol, based on periodical measurements related to the disease. Though apparatus cannot forecast about to happen health problem, and directs a red alert indication according to a medical procedure only when one or more physical parameters overcome pre-defined thresholds value. Asthma is initiated for frequent periods of breathless, chest stiffness, breath shortness, and coughing. Asthma is a lung syndrome that exacerbates and tightens the airways. With the help of medical diagnosis technologies various parameters can be observed in completely automated method. Data can be captured from wireless technology. These data can be used as input to various predefined procedures and extract the desired information from observed parameters. With this method conditions of patients can be calculated to test if it is critical or good.

The paper is organized as following sections. Section 2 provides background and literature survey related to proposed work. Section 3 represents proposed algorithm. Section 4 provides implementation and result of proposed work. Section 5 provides conclusion and possibilities of future work.

II. BACKGROUND AND LITERATURE SURVEY

Propose dual step examination framework for negative and positive sentiment of the customer. From users social media posts feedback the treatment of the cancer patients are performed. Self Organizing Map procedure is used to collect negative and positive sentiment of the users. Self Organizing map collects words from users posts are separate the negative and positive sentiment to cure the cancer disease. A network based approach is used first time to differentiate negative and positive sentiment of the user from social media posts. In subsequent stage analysis is performed using self organizing map to cluster association between social media posts and negative and positive opinion on the specific drug. The steps involved in data collection and search from users posts. The subsequent step is to preprocess the collected data and used text mining techniques. The next procedure is tagging and cataloging text data. Self Organizing Map applied for negative and positive sentiment. The next step is to use network analysis in forum posting. The subsequent step is to identify subgraph. The next step is to find user average opinion and module average opinion.

[5] proposed user sentiment to extract data on influenza. It uses Self Organizing Map to cluster data from users posts and advised on influenza related drugs. [6] proposed Self Organizing Map to cluster and negative and positive sentiment on technology stocks. Self Organizing Map and social media posts is also proposed in[7] to cluster and negative and positive sentiment on context and sentence structure. [8] proposed user sentiment to extract data from users posts to suggest on online shopping. Proposed Self Organizing Map to cluster and negative and positive

sentiment on multiple classifications [9], government health monitoring [10], specific terms relating to consumer satisfaction [11], polarity of newspaper articles [12], and assessment of user satisfaction from companies [13][14].

A swarm intelligence-based procedure to detect critical condition of a patient, affected by asthma and COPD is proposed. The system detect the condition of a patient in the absence of a doctor and report to the system. The most diffused approach is to state the prognostic problem in terms of a Meta – heuristic optimized search for the best solution. One of most promising approaches is swarm intelligence [15]. One of the first algorithms for automatic prognosis was presented in [16], created on conclusion tree classifiers, although, in [17], approaches based on conventional intellectual constructions, such as BBN Bayesian -Belief Networks, are initiate. Furthermore, in lasts years, different methods aimed at predicting imminent health hazard of a patient, in a trustworthy method have been projected [18]. Though, current revolutions have familiarized different procedures outperforming the classical methods and are more likely to be acknowledged in the medicinal communal. In individual, particle swarm optimization has gained increasing popularity owing to its ability to solve effectively a plethora of problems in science and engineering.

Beforehand, the univariate connection amongst measurable CT dealings and lung function in COPD is reported in a few studies. In these studies, correlation coefficient E/I-ration$_{MLD}$ and FEV_1 of 0.45 and 0.64 (pI<0.001) are reported, which is lower than what we found. Reported correlation coefficient with RV/TLC are between 0.54 and 0.71, which is also to some extent lesser than results. These variances may fine be owing to alterations in study populations was larger and equally covered all the stages of COPD. Further, $RVC_{-860\ to\ -950}$ has remained beforehand deliberate by [11] in a regiment of 3.6 COPD themes with GOLD stage 1 — 4. The originate relationship quantities of 0.8 and 0.7 between this C.T air deceiving quantity and FEV_1 and FEV_1/FVC, separately.

The first step in [19] is eature Extraction, spatial normalization is performed by coregistering the brain MRI data from each individual to a T1-weighted MRI template such that these images of the inspected topics will be in the identical measure planetary. Subsequent, with the assistances of separation and morphol-ogical measures, all MRI brain images are segmented into GM, WM, CSF, and ventricle's materials and silhouette descriptors. Here, volume in related and shape are related topographies are exploited for additional arrangement. The step of Feature Reduction is divided into two parts: (1) Mann-Whitney U examination is approved to strainer out the structures with little discriminative influence; (2) primary module analysis is functional to diminish the dimensions of feature space. Route I only uses U test; Route II is collective with U test and primary module analysis. At latter, a classifier, for instance, SVM, SOM, and SVM-PSO, is engaged to organize tested candy striper into three groupings: normal individuals, AD, and MCI patients. It is observed that the volume features and shape features can be integrated to increase classification accurateness with the little computational complication. Classification results similarly authenticate suggestion that the grouping of multi-modal topographies, as well as capacity and figure features, outpaces a single modality of topographies, maybe because unalike features are reciprocally complementary.

CHRONIOUS[20] is an Exposed, Universal and Adaptive Chronic Disease Administration Boards for Chronic Kidney Disease (CKD), Chronic Obstructive Pulmonary Disease(COPD) and Renal Insufficiency. It contains of numerous components: an ontology created nonfiction examination engine, a regulation founded conclusion support scheme, remote devices cooperating with existence interfaces and a machine learning module. All these modules interact each other to allow the monitoring of two kinds of chronic sicknesses and to benefit clinician in attractive conclusion for treatment purpose. how some machine learning algorithms and a rule based decision support system can be used in smart devices, to monitor chronic patient. Analyze how a set of machine learning algorithms can be used in smart devices to alert the clinician in case of a patient health condition worsening trend. This was the original idea behind the CHRONIOUS project.

III. PROPOSED ALGORITHM

Data acquisition: On the source of dissimilar clinical check numerous parameters are involved, as a result a specific set of parameters relating to the COPD and Asthma is determined. Data can be collected from various medical tests for COPD and Asthma. Values are then retrieved at regular intervals in order to achieve the set of rules. Depending on the various physiological parameters the data is stored for fuzzification. The attainment scheme is mainly based on several biomedical devices/ transducers, meant at acquiring the physiological quantities of the model.

Fuzzification: Doctors are interested in risk parameters of a disease. The risk is represented as a variable by means of fuzzy logic. In fuzzy collective data and form a amount of partial facts which combined extra into higher facts which in turn, when assured thresholds are surpassed, cause confident additional outcomes. The patients acquired data are fuzzified on the basis of suitable triangular and trapezoidal operators. If a patient is similar to to either a high, reasonable, or low risk state the next reading for a patient to be built easily.

Prediction of next state: On the basis of data acquisition the next step will be predicted. According to the time sequence of the most recent data the data will be low, moderate or high.

Applying self organizing map technique: An SOM comprises of modules called neurons or nodes. Every node has a groups of neighbors. When certain node successes a competition. The weight of winning node is adjusted and neighbors are also updated accordingly. This process is repeated and weights and neighbors are updated. The further the neighbor is found the winner, the slighter its weight adjust. Moreover, as training goes on, the new winner is found and the neighborhood gradually shrinks. After the finish of training process, the neighborhoods have contracted to zero size.

PSO based weights determination: The values of parameters are upgraded by optimizing trained weights from SOM by PSO based weight optimization. Each value is assessed according to SOM in order to find whether the patient is in critical condition or not. The PSO represents a good trade-off between complexity and reliability from the

point of views of implementation and quality of the found solution respectively.

Inferencing: Once the optimal weight parameters are found by means of PSO the decision is made by clinician depending on suitable weights. According to value clinician determines whether the patient is in critical condition and not. And also provides suitable suggestions for diagnosis.

Particle Swarm Optimization is used with Self-Organizing Maps to cluster test parameters. A PSO and SOM based procedure is proposed to detect critical condition of a patient affected by Asthma or COPD[8] at an early stage in the absence of doctor. The physiological parameter is already stored in the database. The monitored parameter is compared with the stored data to test the condition of a patient. If monitored data and stored data is within predetermined range then the condition of the patient is not critical otherwise proposed system will show that patient condition is in critical state. The proposed system automatically predicts the critical condition of patient according to parameters of Asthma and COPD and acquired data are sent to the clinician and take proper decision according to data received. The suggested technique is to be combined inside remote health monitoring organization where some physiological parameters related to Asthma and COPD are to be maintained. The system detect the critical condition at an initial phase in nonexistence of clinician. A particle swarm optimization and self organizing map algorithm is used to predict COPD and Asthma related symptoms. The health care organization can used our proposed system to predict the patient condition.

A. The Proposed algorithm

Randomize weight value
Set values for weight
Calculate winner and correct winner weight and neighbourhood
p= pbest[] - present[]
q= gbest[] - present[]
v[] = v[] + c1 * rand() * (p) + c2 * rand() * (q) ----- (I)
present[] = persent[] + v[] --- (II)
For every element
Initialize the value element
END
Do
and for each element calculate the suitable value
If the suitable value is improved than the optimum suaitable value (pBest) in the previous update the present optimized value and consider this value as the novel pBest
End
Select the particle with the best strength value of all the particles as the gBest
For every element
Calculate the element speed as per equation (I)
Update element place as per equation (II)
End whereas maximum repetitions or minimum quantity fault conditions is not achieved

Determine the weight value for initialization of the procedure. Set the initial value for the weight. Determine the value of the winner from the repeated steps. Correct the value of weight and neighborhood. Set the value of p from best value to present value. Set the value of q as global best.

Medical prognosis is a very complicated task. The objective of current medical research is to develop new medical parameter checking methods, which can be used as a long term monitoring cases. One of the most promising task is to monitor and investigate the patient without the physical presence of a caretaker or doctor. The parameters related to Asthma and COPD can be optimized and system can be used in remote health monitoring technique.

IV. IMPLEMENTATION AND RESULT ANALYSIS

Implementation is performed with the help of MATLAB, PSO and SOM toolbox. For simulation we have used PIV 3.0 GHz machine with 4GB RAM. The program is developed in MATLAB language.

Physiological parameters and data set from medical equipment's for COPD and Asthma. We have collected data from asthma and COPD forum discussions. We have also collected data from social site Facebook.

Forums Post
http://www.healthboards.com/boards/asthma/ 140
http://patient.info/forums/discuss/browse/asthma-18 550
www.facebook.com 110
http://www.asthmacommunitynetwork.org/interact/forum 850

Time	CRl	CRm	CRh	FEV1%	GOLD index
T1	0	1,543	0,988	44,4	III
T2	0	1,223	1,167	35,2	III
T3	0	1,459	0,987	40.8	III
T4	0	0,794	1,478	31,4	III

Table 1: Fuzzified value

Figure below represent the SOM neighbor connections. According to weighs the neighbors are connected to create a clustered data.

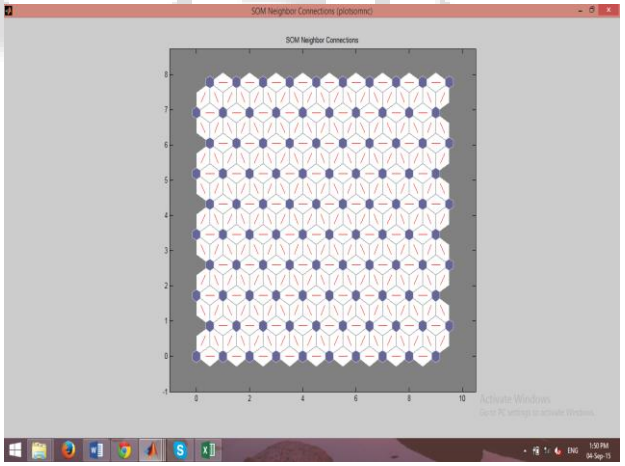

Fig. 1: SOM neighbor connection

V. CONCLUSION

A major challenge is providing judgment support to enhance the health care's evaluation of distantly acquired monitoring data and to hold medical decision-making for the organization of unrelieved and composite disease**.** Chronic obstructive pulmonary disease (COPD) and asthma are major health problems worldwide. Asthma is a lung syndrome that exacerbates and tightens the airways. Chronic obstructive pulmonary (PULL-mun-ary) disease which is a progressive disease that makes it tough to breathe. Our prognosis process involved data acquisition, prediction of

next state, applying self organizing map technique to data set, particle swarm optimization based weight determination, inferencing. A PSO and SOM based procedure is proposed to detect critical condition of a patient affected by Asthma or COPD at an early stage in the absence of doctor. The suggested technique is to be incorporated inside remote health care organization where some physiological parameters related to Asthma and COPD. Our method can predict the possibilities from likes of posts, comments and friendships. This solution can be envisioned on future medical devices that can serve as postmarketing feedback loop that consumers can use to express their satisfaction (or dissatisfaction) directly to the company. The proposed algorithm was validated by comparing its prognosis with GOLD criteria. The quality analysis of the predictions provided by the proposed algorithm was measured by means of statistical clinical tests. The results showed that the proposed approach is well suited for home care monitoring system. Social networking site exposed the door for the health monitoring segment in address service and product optimization and cost saving patient care. The medical research and development organization will be benefitted from patients, doctors and specialist. A direction of future investigation with decent probable is improving the quality of mining. The doctors benefits from real-time reaction that can then be used to evaluate if there are any problems and rapidly address such problems.

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