A Review of Knowledge Based System in Healthcare Using Text Mining

[1]Ashwini Brahme, [2]Dr. S. D. Mundhe

[1]Asst. Professor, [2]Director

Sinhgad Institute of Management and Computer Application (SIMCA),

Pune, Savitribai Phule Pune University, Pune,

Maharashtra, India

Abstract: Text mining is an inspiring research area which is useful to discover knowledge from unstructured data is important for knowledge management applications ; there are many applications of text mining such as telecommunication, bank, IT, media, insurance, political analysis, pharmaceutical, health care, bioinformatics, national security etc. Today there is need to mine unstructured or semi-structured data/ information where as extracting meaning full information and generating knowledge is critical process and to deal with the same text mining is used for effective knowledge discovery.

This research paper talks about the text mining and issues of textual data for effective knowledge discovery. It is also intended towards the application and benefits of text mining in healthcare. This paper is focus on the text mining techniques useful for knowledge discovery and its implication in healthcare domain.

I. INTRODUCTION

The advances in health informatics as electronic health record (HER) make healthcare organizations overwhelmed with the data. Healthcare systems stores massive data with diverse kinds like patient records, admission information, administrative data, etc which is consequently handled by a variety of professionals. Many healthcare organizations and leaders are in the process of finding the solution to manage huge mounds of data for proper and effective treatment. Healthcare organizations are having various challenges in terms of correlating demographics of patients with critical illness, developing better insights on symptoms and their causes, learning how to provide proper treatment. The major applications of Knowledge Discovery and Data Mining in healthcare falls into four categories as Clinical Medicine, Public Health, Healthcare Text mining, Healthcare Policy and Planning.

The large dataset of health related diseases have many variables interacting with one another in very subtle ways. Knowledge discovery can help to find the hidden relationships and patterns from massive databases and it has many applications in healthcare such as patient diagnosis, patient treatment, management of chronic diseases, prediction of patients at risk for specific diseases, and in public health because of the complexity of healthcare environment. [4]

There is need to concentrate on prediction of diseases; because several infectious diseases are increased nowadays and expanded into geographic areas the reason behind this is increasing population, international travels, import and export of goods, infections, viral spread etc and its consequences has more impact on health.

II. REVIEW OF LITERATURE

The related literature review carried out for this proposed research is as:

Mining of electronic health records (EHRs) has the potential for establishing new patient-stratification principles and for revealing unknown disease correlations. Integrating EHR data will gives fine relationships between the diseases. However, a broad range of ethical, legal and technical reasons currently hinder the systematic deposition of these data in EHRs and their mining, is explain by Peter B. Jensen, Lars J. Jensen &Søren Brunak in his research paper entitled **"Mining electronic health records: towards better research applications and clinical care".** [2]

A researcher Shaker H. El-Sappagh, Samir El-Masri, A. M. Riad, Mohammed Elmogy, point out in his paper entitled "**Data Mining and Knowledge Discovery: Applications, Techniques, Challenges and Process Models in Healthcare**" , that Integration of KDD tools with HER(electronic health record) could reduce medical errors, enhance patient safety, and decrease unwanted practice variation, and improve patient outcome. The power of KDD is that it will search the dataset for all relationships, including those that may not have occurred to the analyst. With large datasets,

there may be many variables interacting with one another in very subtle ways. KDD can help to find the hidden relationships and patterns within data. This paper also talks about the applications of Knowledge discovery, text mining, data mining in healthcare by comparing and contrasting causes, symptoms, and courses of treatments, to deliver an analysis of which courses of action to prove effective such as predict optimum medication dosage. [1]

Bijan Raheemi, describes in his paper entitled "**Data Mining and Knowledge Discovery in Healthcare and Medicine**", about the Major applications of Knowledge Discovery and Data Mining in healthcare which are falls into four categories as: (a) Clinical Medicine: Modern hospitals and clinical centers surpassed their traditional role as a place for diseases diagnosis and treatment and now acting as a mass database and a source of complex clinical, laboratory, equipment use, and drug management data which can be analyzed for disease diagnosis and decision making; (b) Public Health: including early outbreak detection, healthcare and syndromic surveillance; (c) Healthcare Text mining: including mining medical literature, as well as mining clinical data such as patients' clinical records; and (d) Healthcare Policy and Planning: including detecting expensive clinical profiles among patients diagnosed with a specific chronic illness which has a high disease's burden such as diabetes. Data mining also helps health planners to solve resource allocation problems and capacity issues. [3]

A researcher Xuezhong Zhou, Yonghong Peng, , Baoyan Liu described in his research paper entitled "**Text mining for traditional Chinese medical knowledge discovery: A survey**", that text mining in biomedical research has great promise for closing the gap between the availability of large data and difficulty in obtaining knowledge from medical filed. Also this paper talks about the importance of understanding the health related diseases. [4]

A researcher Sophia Ananiadou in her presentation tilted "**Text Mining for Health Care and Medicine**" give details such as Text mining integrates knowledge from many sources and enhances decision making in healthcare. Text mining can support medical research to mine the data, information extraction and generate knowledge. Text mining in healthcare is applied for diseases and inferring relationship among the diseases. The author focus on text mining is an enabling technology for knowledge discovery in healthcare. [5]

A research paper "**Extract association rules to Minimize the effects of dengue By using a text mining technique**" of Atif Amin, Ramzan Talib, Salman Razahas given the information about the use of XML for information retrieval and suggests architectural model of text mining system for text processing, mining association rule and visualization. Researcher has designed GRAW Algorithm (generating association rules from based on weighting scheme)focused to only XML files to extract the association rules for minimizing the effects of Dengue. [6]

III.   FUTUER RESEARCH & DIRECTIONS

Although the literature presents the research already conducted in variety of areas and applications of knowledge based system in healthcare. The proposed research will primarily focus analysis of solving the diseases information mining problems and designing knowledge based system to support the diseases pattern discovery for proper treatment and prediction of diseases and its geographical location for decision support. Healthcare is a general domain into which a great deal of effort in terms of knowledge management placed and text mining can be especially beneficial in the healthcare field where manual analysis and generating effective knowledge discovery from useful information is not possible because of huge availability of information on website. In further studies this research focuses on data mining and knowledge discovery problems in healthcare domain. Also is will be extended towards the text mining techniques and issues for effective knowledge discovery and better decision making.

IV.   CONCLUSION

Text mining provides techniques that discover knowledge from unstructured information and is helpful to user to find accurate information or knowledge from text documents. Text mining is an increasing field in the research where one can easily deal with web information to perform different operations on it. With a large amount of information generated by using data and text mining approaches, how effectively use and update this information to discover knowledge is still an open research issue. Healthcare is one of the important filed here text mining is beneficial for better and faster decision making for health related diseases.

REFERENCES

[1]   Shaker H. El-Sappagh, Samir El-Masri, A. M. Riad, Mohammed Elmogy, "Data Mining and Knowledge Discovery: Applications, Techniques, Challenges and Process Models in Healthcare", International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 3, Issue 3, May-Jun 2013, pp.900-906

[2]   Peter B. Jensen, Lars J. Jensen & Soren Brunak, "Mining electronic health records: towards better research applications and clinical care", Nature Reviews Genetics13, 395-405 (June 2012) http://www.nature.com/nrg/journal/v13/n6/full/nrg3208.html

[3]   Bijan Raheemi, "Data Mining and Knowledge Discovery in Healthcare and Medicine", April 30, 2014http://www.ieeeottawa.ca/aicn/data-mining-and-knowledge-discovery-in-healthcare-and-medicine/

[4]   Xuezhong Zhou, Yonghong Peng, Baoyan Liu, "Text mining for traditional Chinese medical knowledge discovery: A survey", Journal of Biomedical Informatics, Volume 43, Issue 4, August 2010, Pages 650–660

[5] Sophia Ananiadou, Text Mining for Health Care and Medicine, www.nactem.ac.uk

[6] Atif Amin, Ramzan Talib, Salman Raza , "Extract association rules to Minimize the effects of dengue By using a text mining technique" International Journal of Computer Science and Mobile Computing, ISSN 2320–088X Vol.3 Issue.4, April- 2014, pg. 394-400 ,www.ijcsmc.com

[7] http://www.activereportsserver.com/business-intelligence-news/text-mining-a-bi-tool-that-can-help-interpret-mass-amounts-of-information

[8] Online Tutorial: Business Intelligence, Predictive Analytics, and Data Mining Content (http://wps.pearsoned.co.uk/ema_ge_turban_elec_comm_2012/217/55592/14231612.cw/index.html)

[9] E-book: Introduction to Data Mining and Knowledge Discovery Third Edition By Two Crows Corporation, ISBN: 1-892095-02-5