IJCSE International Journal of Computer Sciences and Engineering Open Access
Survey Paper Vol.6, Special Issue.11, Dec 2018 E-ISSN: 2347-2693

Thyroid Disease Prediction by Machine Learning Technique From Healthcare Communities

M.Shyamala[1*], P.S.S. Akilashri [2]

[1,2]Department of Computer Science, National College, Trichy, India

[*]*Corresponding Author: akshayajana2000@gmail.com*

Available online at: www.ijcseonline.org

***Abstract*—** Because of the huge information in biomedical and healthcare communities, correct study of medical data benefits early disease detection, community services and patient care. The exactness of study is reduced when the value of medical data is incomplete. Moreover, various regions exhibit unique appearances of particular regional diseases, those results in weakening the prediction of disease outbreaks. In the proposed system, it provides machine learning algorithms for effective prediction of thyroid disease occurrences in disease-frequent societies. It experiment the changed models over real-life hospital data collected. To overcome the difficulty of incomplete data, it uses a latent factor model to rebuild the missing data. It experiment on a thyroid diseases using structured and unstructured data from hospital it use FR-Growth and Decision Tree algorithm. Compared to several typical estimate algorithms, the calculation exactness of our proposed FP Growth algorithm reaches 98.8% with a convergence speed which is faster than that of the decision tree algorithm on disease risk prediction on thyroid using Weka tool.

***Keywords*—** Data mining, Machine Learning, Decision Tree.

I. INTRODUCTION

A process in which the interesting patterns and the knowledge are extracted from the large dataset is called as data mining. Many techniques are used to discover this kind of knowledge, mostly extracted from the machine learning and statistics. The Highlighted part of these approaches is to find the accurate knowledge from the discover data. In the data mining the tasks performed is depends on what sort of knowledge someone needs to mine.

Recently, thyroid diseases spread more in today's world. In India, for example, one of eight women suffers from hypothyroidism, hyperthyroidism or thyroid. Various research studies estimate that about 30% of India is diagnosed with endemic goiter. Reasons that affect the thyroid function are: low-calorie diet, infection, trauma, toxins, stress, certain medication etc. It is to prevent such diseases rather than cure them, because the majority of treatments consist in long term medication or in chirurgical intervention. This paper will help to predict the thyroid diseases through the machine learning and decision tree algorithm.

II. LITERATURE SURVEY

In this paper [1] The phenotypes and treatment of patients represents an underused data source that has much greater research potential than is currently realized and explains by the Clinical data. Mining of electronic health records (EHRs) has the ability to establish a new patient-stratification principles and for knowing unknown disease correlations. Combining the EHR data with genetic data will also give a finer understanding of genotype-phenotype relationships. A broad range of ethical, legal and technical reasons currently hinder the systematic deposition of these data in EHRs and their mining. Here, the potential for furthering medical research and clinical care using EHR data and the challenges that must be overcome.

In this paper [2] the researchers present how artificial intelligence applied to medical field for the efficient diagnosis. For that purpose they use a k nearest neighbor's algorithm and they check the accuracy of the algorithm with the help of UCI machine learning repository datasets. They had to generate patient's input and test data for diagnosis. They use a real patient data. They add additional training sets allow more medical conditions to be classified with the minimal no of changes to the algorithm.

In this paper [3] distributed computing environment processing the large volume of a data is done based on Map Reduce. To find the accuracy of a patient data the classification is used. In this paper more focused on find out the nearest accuracy of a classifiers. The CART model and random forest is built for the data and accuracy of the classifier is found. By using the random forest algorithm they can found the more nearest accuracy of the prediction. The

prediction analysis helps to the doctors to identify the patient's admissions on to the hospital. Predictive model using scalable random forest classification which can accurately give the result rate of risk.

In this paper [4] the data mining and the big data in the healthcare sector is introduced. Machine learning algorithm has been used to study the healthcare data. The continuous increase of data in a healthcare. Several countries are spending a Lot of resources, scientist leads to fix the problem of storage and organization of data the data mining will help exploitation complexity of the data and find out the new result this paper is based on the use of data mining and big data in the healthcare sector.

In this paper[5] they applying a machine learning techniques by using EMC'S from outpatients department and the algorithm are based on a DNN AND DBDT, It can be achieve a high UAR for predicting the future stroke prediction. It provides a several advantages like high accuracy, fastest prediction, and consistency of results. DNN algorithm also requires a lesser amount of data. DNN algorithm can achieves optimal results by using a lesser amount of a patient data than compared to the GDBT algorithm.

In this paper [6] for heart disease prediction they use a Neavi Bayes and Decision tree algorithm. They used a PCA to reduce the no of attributes, after reducing the size of the datasets; SVM can outperform a Neavi Bayes and Decision tree. SVM can also be used for prediction of hearts disease. The main goal of this paper is to predict the diabetics disease. Using a WEKA data mining tools. Data mining is very useful techniques used by health care sector for classification of disease. The aim of this paper is to study supervised machine learning algorithm to predict the heart disease.

III. METHODOLOGY

A. FREQUENT PATTERN GROWTH ALGORITHM

FP Growth is another main frequent pattern mining technique, which generate frequent itemset without candidate generation. It uses tree based structure. The problem of Apriori algorithm was dealt with, by introducing a novel, compact data structure, called frequent pattern tree, or FP then based on this structure an FP pattern fragment growth method was developed. It constructs conditional frequent pattern tree and conditional pattern base from database which satisfy the minimum support.FP the set of concurrent items.
FP tree is constructed in two passes:

Pass 1:

- Scan data and count support for each item
- Discard infrequent items
- Sort frequent items in descending order based on their support

Pass 2:

- Reads one transaction at a time and maps it to the tree
- Fixed order is used so that path can be shared
- Pointers are maintained between nodes containing same items
- Frequent items are extracted from the list It suffers from certain disadvantages:
- Fp tree may not fit in main memory
- Execution time is large due to complex compact data structure.

B. Decision Trees

The decision tree approach is more powerful for classification problems. There are two steps in this techniques building a tree & applying the tree to the dataset. There are many popular decision tree algorithms C4.5. From these C4.5 algorithm is used for this system. C4.5 algorithm uses pruning method to build a tree. Pruning is a technique that reduces size of tree by removing over fitting data, which leads to poor accuracy in predications. The C4.5 algorithm recursively classifies data until it has been categorized as perfectly as possible. This technique gives maximum accuracy on training data. The overall concept is to build a tree that provides balance of flexibility & accuracy.

C. WEKA TOOL

Weka is a landmark system in the history of the data mining and machine learning research communities, because it is the only toolkit that has gained such widespread adoption and survived for an extended period of time. The Weka or woodhen (Gallirallus australis) is an endemic bird of New Zealand. It provides many different algorithms for data mining and machine learning. Weka is open source and freely available. It is also platform-independent.

Advantages

- As weka is fully implemented in java programming languages, it is platform independent & portable.
- It is freely available under GNU General Public License.
- Weka s/w contain very graphical user interface, so the system is very easy to access.
- There is very large collection of different data mining algorithms.

Disadvantages

- Lack of possibilities to interface with other software
- Performance is often sacrificed in favour of portability, design transparency, etc.
- Memory limitation, because the data has to be loaded into main memory completely

IV. RESULTS AND DISCUSSION

The experiment uses thyroid disease Analysis dataset obtained from UCI machine learning repository. The dataset

is extracted from the UC Irvine Machine Learning Repository. The Hypothyroid dataset are used for the research and Development department for experimental purposes. The dataset contains 3090 instances. In this 149 data comes under thyroid and 2941 data is negative cases. The attributes are shown in the table below.

A set of dataset are obtained by applying FP Growth & Decision Tree. The data giving different support and confidence values that are analyzed, we can obtain different number of rules. During analysis it found that Decision Tree is much faster for large number of transactions as compare to FP Growth. The time taken for generating disease prediction is very low. We work on thyroid disease. Analysis which contains 3090 transactions. The obtained results are collected from Pentium Dual core processor with 1. 73GHz speed and 1 - GB RAM.

Table:1 Thyroid

Attribute Name	*Value type*
age	*continuous,?.*
sex	*M,F,?.*
on_thyroxine	*f,t.*
query_on_thyroxine	*f,t.*
on_antithyroid_medication	*f,t.*
thyroid_surgery	*f,t.*
query_hypothyroid	*f,t.*
query_hyperthyroid	*f,t.*
pregnant	*f,t.*
sick	*f,t.*
tumor	*f,t.*
lithium	*f,t.*
goitre	*f,t.*
TSH_measured	*f,t.*
TSH	*continuous,?.*
T3_measured	*f,t.*
T3	*continuous,?.*
TT4_measured	*f,t.*
TT4	*continuous,?.*
T4U_measured	*f,t.*
T4U	*continuous,?.*
FTI_measured	*f,t.*
FTI	*continuous,?.*
TBG_measured	*f,t.*
TBG	*continuous,?.*

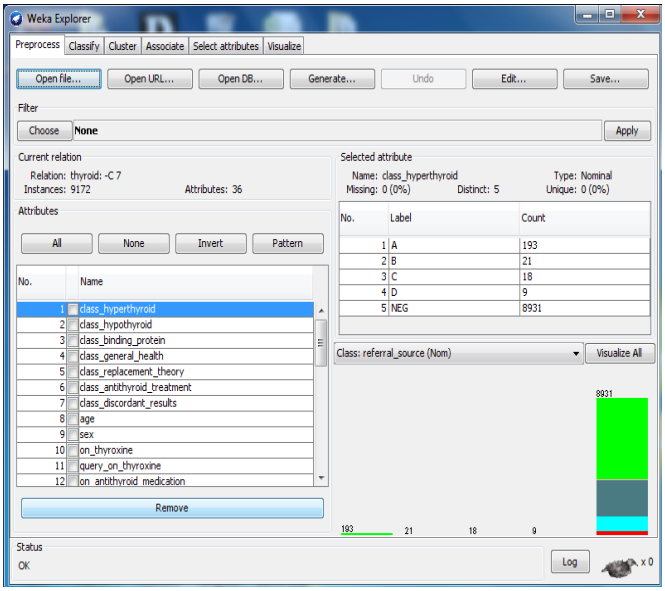


Fig: 4.1.1 Upload Dataset

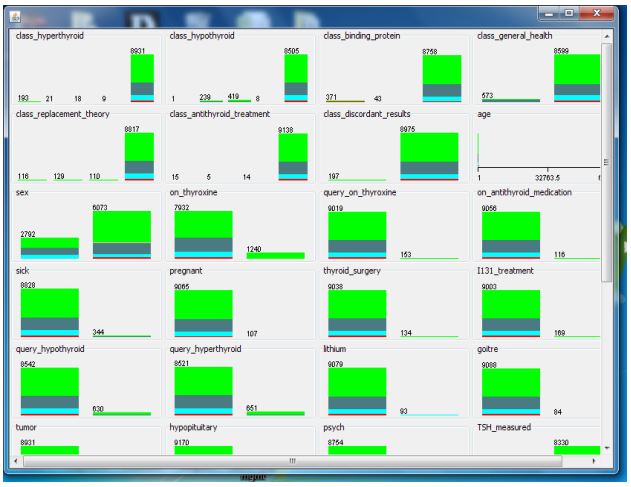


Fig : 4.1.2 Overall Chart

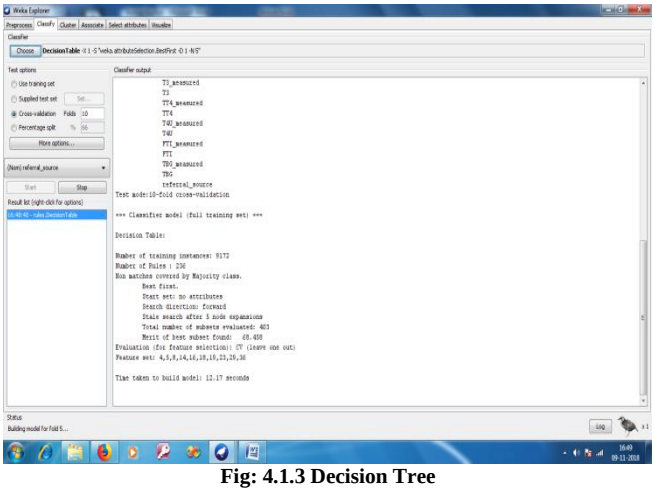


Fig: 4.1.3 Decision Tree

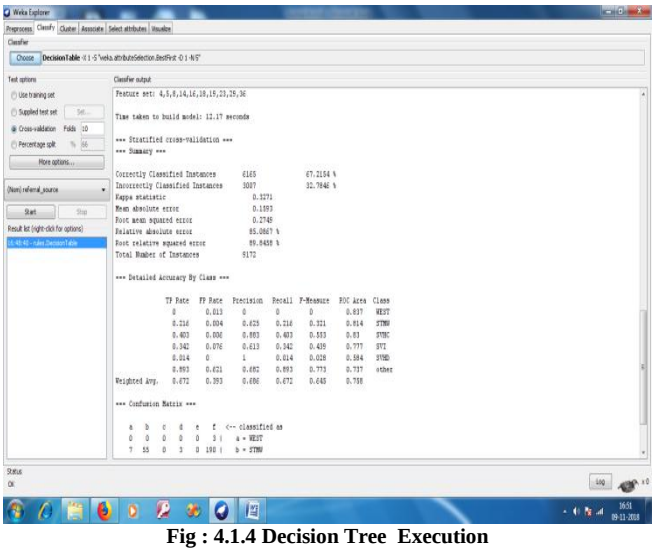


Fig : 4.1.4 Decision Tree Execution

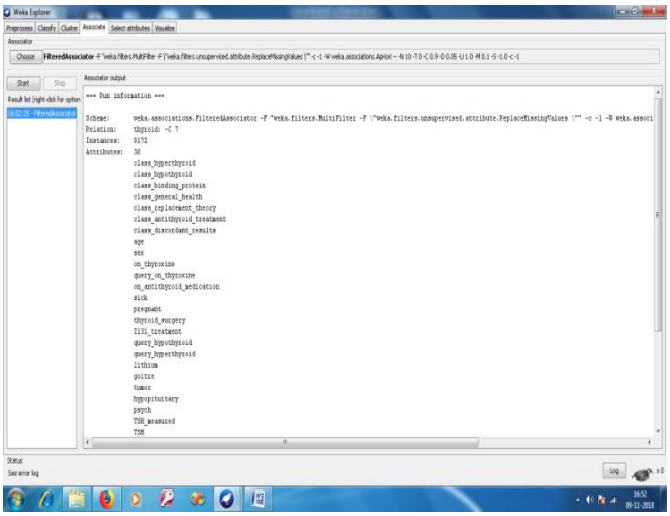


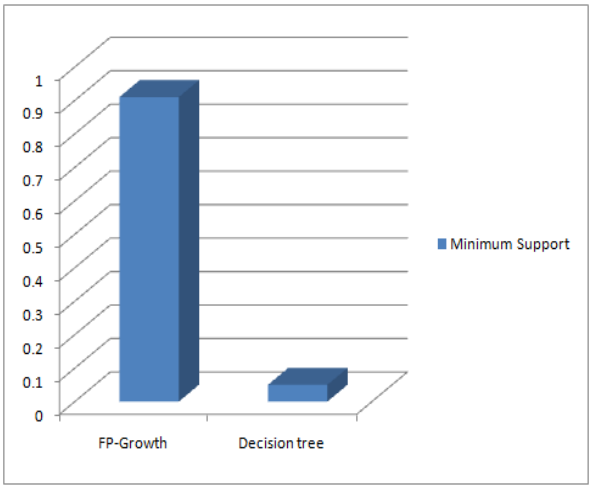
Fig: 4.1.5 Fp- Growth Dataset

MINIMUM SUPPPORT

TABLE 4.2.1 Showing Confidence for thyroid disease Dataset

Thyroid Disease Dataset	
Technique	**Minimum Support**
FP-Growth	0.91
Decision tree	0.05

CHART 4.2.1 Minimum Support in Dataset



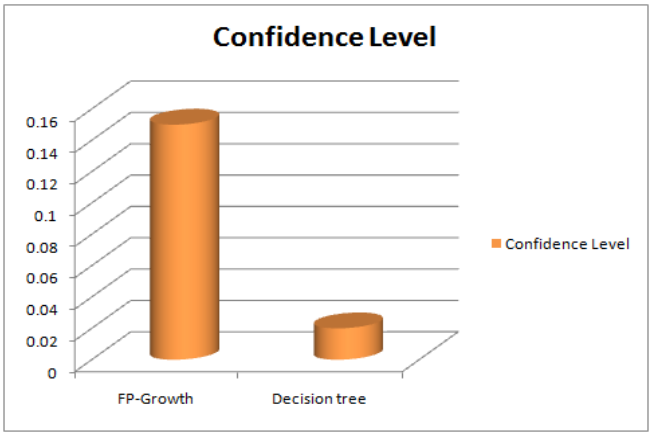
CONFIDENCE

Experiments are performed on the thyroid disease dataset. Machine with configuration of windows Vista 7 system and 2-GB of RAM is used. The results were compared to experiments with Weka Tool implementations of FP-Growth, Decision Tree techniques the run to ensure that the results are comparable for confidence level.

TABLE 4.2.2 Confidence in All Dataset

Thyroid Disease Dataset	
Technique	**Confidence Level**
FP-Growth	0.15
Decision tree	0.02

CHART 4.2.2 Confidence in All Dataset



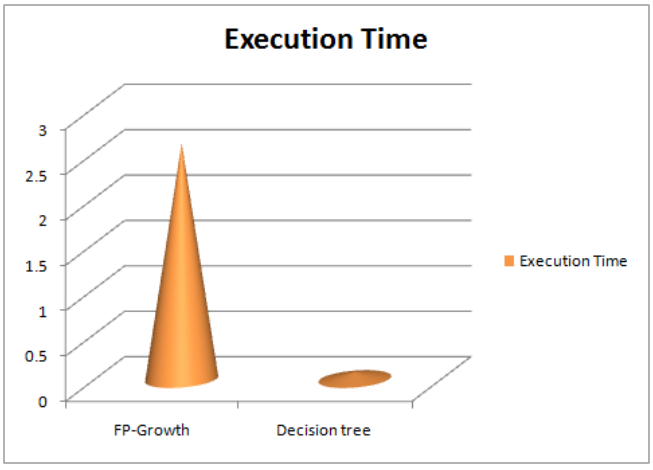
EXECUTION TIME SECOND

Experiments are performed on the datasets thyroid disease dataset. Machine with configuration of windows Vista 7 system and 2-GB of RAM is used. The results were compared to experiments with Weka Tool implementations of FP-Growth, Decision Tree the techniques run to ensure that the results are comparable for execution time mille second.

Table 4.2.3 Execution Time Second

Thyroid Disease Dataset	
Technique	**Execution Time**
FP-Growth	2.60
Decision tree	0.08

CHART 4.2.3 Execution Time in All Dataset



V. CONCLUSION

The thyroid gland is the primary and biggest gland in the endocrine system. The data mining technique is applied on the hypothyroid dataset to determine the positive and the negative cases from the entire dataset. The classification of dataset is used to give better treatment, decision making, diagnose disease. This thesis is a challenging Machine learning data mining problem for finding the thyroid prediction method. The explained method is very simple and efficient one. This is successfully tested for large data sets. The results given in this paper are accurate and appropriate. However, a more wide-ranging empirical valuation of the proposed method will be the objective for our future research. In this thesis, it is analyzed that the FP Growth algorithm takes more time to compute association rules then Decision tree algorithm by using the same number of data set. Decision tree is much faster than FP-Growth because it uses compact data structure, and it eliminates the repeated transaction scan.

REFERENCES

[1] P. B. Jensen, L. J. Jensen, and S. Brunak,"Mining electronic health records: towards better research applications and clinical care.

[2] hahab Tayeb*, Matin Pirouz*, Johann Sun1, Kaylee Hall1, Andrew Chang1, Jessica Li1, Connor Song1, Apoorva Chauhan2, Michael Ferra3, Theresa Sager3, Justin Zhan*, Shahram Latifi, Toward Predicting Med-ical Conditions Using k-Nearest Neighbours, 2017 IEEE International Conference on Big Data.

[3] reekanth Rallapalli Faculty of computing Botho University Gaborone, Botswana redicting the Risk of Diabetes in Big Data Electronic Health Records by using Scalable Random Forest Classification Algorithm, 2016 IEEE.

[4] oubida Alaoui Mdaghri, Mourad El Yadari, Abdelillah Benyoussef, Ab-dellah El Kenz Faculty of Science Rabat Morocco, Rabat, Study and analysis of Data Mining for Healthcare, 2016 IEEE.

[5] hen-Ying Hung, Wei-Chen Chen, Po-Tsun Lai, Ching-Heng Lin, and Chi-Chun Lee, Comparing Deep Neural Network and Other Machine Learning Algorithms for Stroke Prediction in a Large-Scale Population-Based Electronic Medical Claims Database, 2017 IEEE.

[6] rof. Dhomse Kanchan B. Assistant Professor of IT department METS BKC IOE, Nasik Nasik, India kdhomse@gmail.com , Mr. Mahale Kishor M. Technical Assistant of IT department METS BKC IOE, Nasik, India kishu2006.kishor@gmail.com, Study of Machine Learning Algorithms for Special Disease Prediction using Principal of Component Analy-sis,2016 IEEE.

[7] P.-N. Tan, M. Steinbach, and V. Kumar, "Introduction to Data Mining," Boston, U.S.A.: Pearson Education Inc., 2006, ch. 4, pp. 151-154.

[8] R. Polikar, "Ensemble Based Systems in Decision Making," IEEE Circuits and Systems Magazine, vol. 6, pp. 21-45, Third Quarter, 2006.

[9] T. K. Ho, "The Random Subspace Method for Constructing Decision Forests," IEEE Transaction on Pattern Analysis and Machine Intelligence, vol. 20, no.1, pp 832-844, August 1998

[10] Hossam M. Zawbaa, Maryam Hazman, Mona Abbass, Aboul Ella Hassanien, "Automatic fruit classification using random forest algorithm", 14th International Conference on Hybrid Intelligent Systems,pp. 164 – 168, 2014.

[11] Jiawei Hanl, Yanheng Liu, Xin Sun, "A Scalable Random Forest Algorithm Based on MapReduce", IEEE 4th International Conference on Software Engineering and Service Science, pp. 849 – 852, 2013.

[12] B.V.S Dheeraj Reddy, Mounika Booreddy, "Classification And Clustering Medical Datasets By Using Artificial Neural Network Models", Publications Of Problems & Application In Engineering Research – Paper, Vol 04, Special Issue 01, 2013.

[13] Dr. G. Rasitha Banu, M.Baviya, "Predicting Thyroid Disease Using Datamining Technique", International Journal of Modern Trends in Engineering and Research, 2014.

[14] S. Anto, Dr.S.Chandramathi, "Supervised Machine Learning Approaches for Medical Data Set Classifcation - A Review", InternatIonal Journal of Computer Science & Technology, Vol. 2, Issue 4, Oct. - Dec. 2011

[15] Sudesh Kumar, Nancy, "Efficient K-Mean Clustering Algorithm for Large Datasets using Data Mining Standard Score Normalization", International Journal on Recent and Innovation Trends in Computing and Communication, Volume: 2 Issue: 10, 2014.

[16] K.Saravana Kumar, Dr. R. Manicka Chezian, "Support Vector Machine And K- Nearest Neighbor Based Analysis For The Prediction Of Hypothyroid", International Journal of Pharma and Bio Sciences, pp. 447 – 453, 2014.

[17] Noor Azah Samsudin ; Aida Mustapha ; Mohd Helmy Abd Wahab, "Ensemble classification of cyber space users tendency in blog writing using random forest", Innovations in Information Technology (IIT), 2016 12th International Conference on 28-30 Nov. 2016

