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MULTI-CLASSIFICATION APPROACH FOR DETECTING THYROID ATTACKS

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ABSTRACT

Thyroid is one of the crucial disease that affects people of all ages now a days. Diseases of the thyroid include conditions associated with excessive release of thyroid hormones (HyperThyroidism) and those associated with thyroid hormone deficiency (Hypothyroidism) . In this paper we consider the Thyroid data set with multi class and propose the classification for thyroidism in a separate layer. In this work, a multi-classification approach for detecting thyroid attacks is designed to achieve higher efficiency and to improve the detection and classification accuracy.This method finds that the method NNge provides higher efficiency to classify the thyroid attacks

KEYWORDS: **Bio-Data Mining, Classification, Layered Approach, Thyroid Detection System**

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INTRODUCTION

Thyroid detection system(TDS) provides an additional layered approach. The goal of the system is to collect information from various sources and then analyse for the signs of thyroidism. Iodine is a trace element that is naturally present in some foods and also available as a dietary supplement. Iodine is an important and essential component of the thyroid hormones thyroxine (T4) and triiodothyronine (T3). Thyroid hormones regulate biochemical reactions, which includes protein synthesis and enzymatic activity, and the determinants of metabolic activity [1,2].Thyroid function is primarily regulated by thyroid-stimulating hormone(TSH) which is also known as thyrotropin. TSH is secreted by the pituitary gland to control thyroid hormone production and secretion, which protects the body from hypothyroidism and hyperthyroidism [1]. TSH secretion increases thyroidal uptake of iodine and stimulates the synthesis and release of T3 and T4. Salt iodization programs, which is implemented in many countries, have dramatically reduced the prevalence of iodine deficiency worldwide [2,3].

The thyroid gland is one of the largest endocrine glands which is found in the neck. Triiodothyronine (T3) and Thyroxine which can sometimes be referred to as tetraiodothyronine (T4) are hormones which regulate the rate of metabolism and affect the growth and rate of function of many other systems in the body. Iodine deficiency has multiple adverse effects on the growth of the body. The body tightly controls thyroid hormone concentrations via TSH under the normal conditions of the body . If a person's iodine intake falls below approximately 10–20 mcg/day, hypothyroidism occurs [1], which is a cause of goiter. Goiter is usually the earliest clinical sign of iodine deficiency [2]. High intakes of iodine can cause some of the same symptoms as iodine deficiency—including goiter, variations in TSH levels, and hypothyroidism due to excessive level of iodine [2].

RELATED WORK

Classification is the most familiar and popular data mining technique. Prediction means classifying attribute value into one of the possible classes. Association mining and classification using web based approach is proposed by Phankokoruad.M[6]. In [7] author proposed PCA to project features and select the features based on genetic algorithm. In [8,9] author proposed layered approach. In [10] author proposes support vector decision function for feature selection. In [10] author evaluates the performance of Bayesian network and Classification And Regression Tree (CART). In [11] author proposed data dependent sensor fusion architecture to reduce the false positive rate and improves the detection rate. In [12] author proposes 3 levels of attack and focusing on normal and abnormal behaviours.

PROBLEM STATEMENT

Our system is a modular thyroid detection system that analyse thyroid data set using data mining techniques to classify the input data is normal or thyroid attack. This proposed system consists of two stages. The first stage is for detecting the attack and the second stage is for classification.

(i).The proposed layered approach for thyroid detection system First, our system classifies the records are either normal or attack. The second stage consists of two layers and identifies its attack type whether hypothyroidism or hyperthyroidism. The data is input in the first stage which identifies whether the record is thyroid attack or not .If the data is identified as an attack the module raise a flag and passes the input to the second stage which consists of 2 layers hyper and hypo. Each layer is responsible for identifying the attack and its type. In stage 1 the entire data set is taken as training dataset but in stage 2 only the attacks dataset we are using for training. We implement the layered approach to improve the system performance . Our system reveals that NNge achieves high efficiency and improves the detection and classification with high rate of accuracy as well as provides more association rules.

EXPERIMENTAL ANALYSIS AND RESULTS

The data set we are using here is thyroid gland data set which is collected from UCI data

repository. The Thyroid data sets are applied using weka tool.

(i).Dataset description

This thyroid dataset consists of 215 instances and 5 attributes. Thyroid attacks fall into 2 main categories

- Hyperthyroidism
- Hypothyroidism

The description of the attributes are given in the following table 1.

Table 1
Attribute Description

Attribute name	Description
T3-resin	T3-resin uptake test
Serum thyroxin	Total Serum thyroxin as measured by the isotopic displacement method.
serum triiodothyronine	Total serum triiodothyronine as measured by radioimmunoassay.
TSH	basal thyroid-stimulating hormone (TSH) as measured by radioimmunoassay.
thyrotropin	thyrotropin releasing hormone

(ii).Performance evaluation

During the analysis of thyroid attack we need to pre-process the data, so the necessary step is to select the attributes at various layers. Second, the attacks are classified.

Attribute selection

Attribute selection using WekatoolEvaluator:weka.attributeSelection.CfsSubsetEval and Weka attribute selection BestFirst-D1 –N5. The selected attributes at each layer are given in the following table2.

Table 2
Attribute Selection

Layer no	Layer	No.of attributes selected	Selected attributes
1	Hyper	4	1,2,4,5
2	Hypo	4	1,2,4,5

(iii).Classification with stages

First stage results

At stage one ,the system identifies whether the record is normal or attack. The results at this stage are given in the following table 3

Table 3
First Stage Classification

Method	Correctly Classified Instances	InCorrectly Classified Instances	Time taken in secs	No.of Association Rules
Conjuctive Rule	77.6744 %	22.3256 %	0	1
Decision Table-X1-S	91.6279 %	8.3721 %	0.02	21
DTNB -X 1	94.4186 %	5.5814 %	0.04	1
JRip	92.5581 %	7.4419 %	0.01	5
NNge	95.814 %	4.186 %	0.01	17
One-R	92.093 %	7.907 %	0	3
PART	93.9535 %	6.0465 %	0.01	4
Ridor	92.5581 %	7.4419 %	0.01	3
ZeroR	69.7674 %	30.2326 %	0	1

Second stage results

At second stage records which are classified as attack in the first stage are introduced. Stage 2 consists of 2 layers, a layer for each class.

Table 4
Second Stage Classification Hyper Layer

Method	Correctly Classified Instances	InCorrectly classified Instances	Time taken in secs	No.of Association Rules
Conjuctive Rule	76.7442 %	23.2558 %	0	1
Decision Table-X1-S	92.093 %	7.907 %	0.02	18
DTNB -X 1	91.6279 %	8.3721 %	0.02	1
JRip	93.4884 %	6.5116 %	0.01	5
NNge	96.7442 %	3.2558 %	0.01	17
One-R	92.093 %	7.907 %	0	1
PART	93.9535 %	6.0465 %	0.01	6
Ridor	91.6279 %	8.3721 %	0.01	3
ZeroR	69.7674 %	30.2326 %	0.0	1

Table 5
Second Stage Classification Hypo Layer

Method	Correctly Classified Instances	Incorrectly Classified Instances	Time taken in secs	No.of Association Rules
Conjuctive Rule	76.7442 %	23.2558 %	0.0	1
Decision Table-X1-S	91.6279 %	8.3721 %	0.01	9
DTNB -X 1	91.6279 %	8.3721 %	0.03	4
JRip	93.0233 %	6.9767 %	0.01	4
NNge	97.2093%	2.7907%	0.01	17
One-R	92.093 %	7.907 %	0.0	3
PART	92.093 %	7.907 %	0.01	5
Ridor	92.5581 %	7.4419 %	0.0	3
ZeroR	69.7674 %	30.2326 %	0.0	1

We compare this layered approach with the non layered approach. We observe that layered approach with feature selection is more efficient and more accurate in detecting thyroid attacks.

PERFORMANCE COMPARISON

We can compare the performance of our approach with the direct non layered approach which is shown in the following table 6.

Table 6
Classification : Direct Approach

Method	Correctly Classified Instances	Incorrectly Classified Instances	Time taken in secs	No.of Association Rules
Conjuctive Rule	77.6744 %	22.3256 %	0.05	1
Decision Table-X1-S	91.6279 %	8.3721 %	0.06	21
DTNB -X 1	94.4186 %	5.5814 %	0.05	1
JRip	92.5581 %	7.4419 %	0.03	5
NNge	95.814 %	4.186 %	0.02	17
One-R	92.093 %	7.907 %	0	3
PART	93.9535 %	6.0465 %	0.04	4
Ridor	92.5581 %	7.4419 %	0.01	3
ZeroR	69.7674 %	30.2326 %	0	1

NNge has the highest accuracy with the direct approach.

Table 7
Classification : Layered Approach

Method NNge	Layered Approach Hyper	Hypo	Non Layered Approach
accuracy	96.7442 %	97.2093%	95.814 %
Time taken	0.01 secs	0.01 secs	0.02 secs
No.of Associaion Rules generated	17	17	17

From the above table we can understand clearly the accuracy of layered approach is higher than the non layered approach in predicting the thyroid attacks which can also be shown in the following figure 1.

Accuracy of a graph

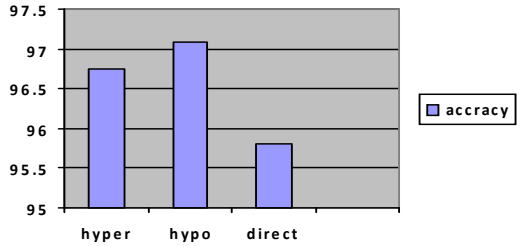

Figure 1
Performance comparison of layered approach with direct approach

The above graph shows that the layered approach leads to the accuracy of 97.2093% in hypo layer and 96.7442% in hyper layer which is better than the accuracy of the direct approach which is 95.814%.

CONCLUSION

A multi-layer thyroid detection system has been developed to get the higher efficiency. The proposed system consists of 2 stages for attacked detection and classification. Experimental results shows that the proposed layer model can result in better prediction. In this paper the 3 class dataset 'Thyroid' is considered for comparing the multiclass layered processing with original direct processing. The evaluation strategy shows that the method NNge provides higher accuracy and efficiency.

REFERENCES

1. National Research Council, Committee to Assess the Health Implications of Perchlorate Ingestion. Health Implications of Perchlorate Ingestion. Washington, DC: the National Academies Press, 2005.
2. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. Washington, DC: National Academy Press, 2001.
3. United Nations Children's Fund, International Council for the Control of Iodine Deficiency Disorders," Assessment of iodine deficiency disorders and monitoring their elimination". 3rd ed. Geneva, Switzerland: WHO, 2007.

4. International Council for the Control of Iodine Deficiency Disorders, Iodine-Health Professional Fact Sheet, Accessed 9/13/2010.
5. Pennington JA. A review of iodine toxicity reports. J Am Diet Assoc. 1990 Nov;90(11):1571-1581.
6. M Phankokkruad ," Association rules for data mining in classification algorithm : Web Service approach",IEEE Xplore Digital Library ,DICTAP,May 2012, pages463-468.
7. I Ahmed, A B Abdulah, A S Alghamdi, K Alnfajan, M Hussain, "Feature subset selection for network intrusion mechanism using genetic eigen vectors", Proc. Of CSIT Volume 5(2011),Int Conference on Telecommunication Technology and Applications
8. Kapil Kumar Gupta, BaikunthNath, Ramamohanarookotagiri, "A layered approach using conditional random fields for intrusive detection" , IEEE Tranc. On Dependence and secure computing, Volume.7, Issue 1 (2010).
9. Neelam Sharma,Saurabh Mukherjee, "Layered Approach for Intrusion Detection using Naïve Bayes Classifier",ICACCI'12,August 3-5,2012,Chennai,T.Nadu,India.
10. S Zaman, F Karray "Features selection for intrusion detection systems based on support vector machines" CCNC'09,Proceedings of the 6th IEEE Conference on consumer communications and networking conferences 2009.
11. S Chebrolu, A Abraham, J.P Thomas Feature detection and ensemble design of intrusion detection systems, Computers & Security, Volume24, Issue4, June2005, Pages 295-307
12. Ciza Thomas a and N. Balakrishnan "Improvement in minority attack in detection with skewness in network traffic". Data mining, Intrusion detection, Information Assurance and Data networks Security 2008, edited by Belur V. Darasarathy, Proc. Of SPIE Vol.6973,n 69730N, (2008) ,Volume 6973.
13. Suneel.B , J.N.Naidu And Aparna.R.R," Mineral Metabolism In Hyper Thyroidism", IJPBS, Vol 3,Issue 2,April – June 2012.