Detection Using Machine learning

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***Abstract*: -** In vertebrates, the thyroid, sometimes known as the thyroid gland, is an endocrine gland. It is located in the neck of humans and has two linked lobes. The thyroid isthmus, a narrow strip of tissue, connects the lower two thirds of the lobes. Below the Adam's apple in the front of the neck is where the thyroid is situated. The spherical thyroid follicle, which is bordered with follicular cells (thyrocytes) and sporadic parafollicular cells and surrounds a lumen containing colloid, is the thyroid gland's functional unit under the microscope. Triiodothyronine (T3), thyroxine (T4), and the peptide hormone calcitonin are the three hormones secreted by the thyroid gland. Thyroid hormones affect growth and development in children as well as protein synthesis and metabolic rate. Calcium homeostasis is influenced by calciumtonin. [1] Thyroid-stimulating hormone (TSH), which is released by the anterior pituitary gland, controls the secretion of the two thyroid hormones. Thyrotropin-releasing hormone (TRH), which is created by the hypothalamus, controls TSH. [2]

At 3–4 weeks of pregnancy, the thyroid gland begins to form at the base of the tongue in the floor of the pharynx. From there, it descends in front of the pharyngeal gut and eventually migrates to the base of the neck over the following few weeks. The thyroglossal duct, a tiny canal that connects the thyroid to the tongue during migration, remains in place. The thyroglossal duct degenerates around the end of the fifth week, and the detached thyroid migrates to its final position over the next two weeks.

***Keywords*—** ‘CNN ‘Image segmentation’, ‘ image Classification’, ‘Feature Extraction’.

I. INTRODUCTION

The system named as Hypothyroidism Detection uses the Machine Learning Technology for predict the occurrence of the thyroid in every part of the neck. It uses MRI scans, CT scans as input, CNN (algo) and Image Processing for the detection.

II. LITERATURE SURVEY

Numerous sizable population-based studies conducted over the past ten years have added fresh knowledge about the frequency of thyroid disease. The field of endocrinology offers extensive instruction in the endocrine system, which contain multiple glands and organs like the thyroid that secrete hormones.

In his study, H.S. Hota[1] analyses different data mining methods in order to create an ensemble model for the classification of breast cancer-related healthcare data. The effectiveness of the ensemble model is demonstrated by model testing accuracy. Models are evaluated based on their sensitivity and specificity as well. Models are evaluated on these data sets using feature subsets that were created using a ranking-based feature selection technique.

F. Seiti, M. Teshnehlab, M. R. Nazari Kousarrizi, They suggested a two-stage procedure. In the first stage, feature selection methods such as sequential forward selection (SFS), sequential backward selection (SBS), and genetic algorithms are utilised as a preprocessing step. SVM is used to classify thyroid data in the second stage.

For the categorization of thyroid disease diagnosis, Satish

fuzzy hyperline segment clustering neural network (MFHLSCNN). The MFHLSCNN technique is appropriate for classification and clustering.

In this research, a classifier is developed for the diagnosis and classification of hypothyroidism using a variety of data mining techniques, including Bayes net, multilayer perceptron, RBF network, C4.5, CART, REP tree, and decision stump. For the experimental purpose, a data set with 29 features is downloaded from the UCI repository site. WEKA open source software is utilised throughout the work, which is completed in a Windows 7 environment. With each method, K-fold validation is also carried out.

III. FRONT END SYSTEM FLOW

This application will have simple captured image of Thyroid and upload that image into the database server. users will take image of infected part of an Thyroid using this detection and upload it. In server, the image will be measure based on visual and textural properties using different image processing algorithms and the system will find the infected organ which will be send to the patients.

Methodlogy : Analyzing blood test results is necessary to analyse and forecast thyroid disease. The analysis of the thyroid blood test data set will be done utilising a variety of supervised machine learning classifier approaches. To retrieve the result, the optimum accuracy algorithm will be selected based on the accuracy of several algorithms.

Input Image: To categorise the benign and malignant nodules, we employed 7 benign and 2 DICOM-formatted pictures of distinct patients, each representing a single benign and malignant nodule. These pictures are a collection of B-mode photos taken with a Philips HD11XE at a 3-12MHz frequency.

Pre processing: We're going to resize the input image in this. One of the easier methods of image resizing is nearest-neighbor interpolation. When using nearest-neighbor interpolation, the final image is larger than the original and retains all of the original detail if we replace every pixel with multiple pixels of the same hues. The original photograph provided from the HCG cancer centre, Kalaburgi, will be reduced in size by numerous radiologist labels these images.

Segmentation of thyroid nodule: The technique of segmentation involves dividing an input image into several segments with the aim of improving the representation of an image and making it simpler to analyse. A group of segments that collectively span the complete image are produced as a result of image segmentation. Each pixel inside a region is similar in terms of a characteristic or calculated attribute, such as colour, intensity, or texture.

Feature Extraction: In the context of image processing, feature extraction refers to extracting information from the input image that is pertinent to completing a computational task. Low level extraction involves the detection of characteristics like edges, corners, and so on. Even though we could use thresholding and template matching to extract shape-based features, we're going to toextract the elliptical and circular forms. The thyroid nodules are often elliptical in shape, as illustrated in figure 3, and since the nodules' pixels differ from the surrounding normal thyroid region, thresholding can be used. Following characteristics, such as homogeneity feature, cluster shade, contrast, entropy, energy, and correlation, are found in texture-based extraction and are different between normal thyroid and thyroid nodules.

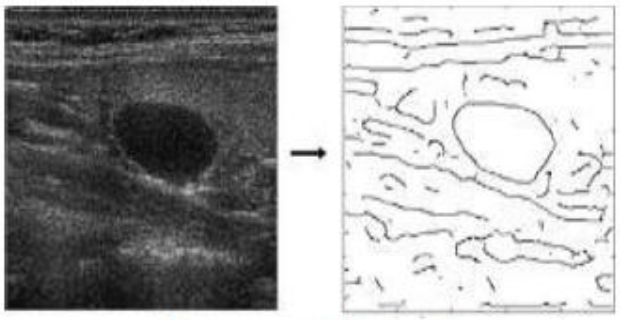
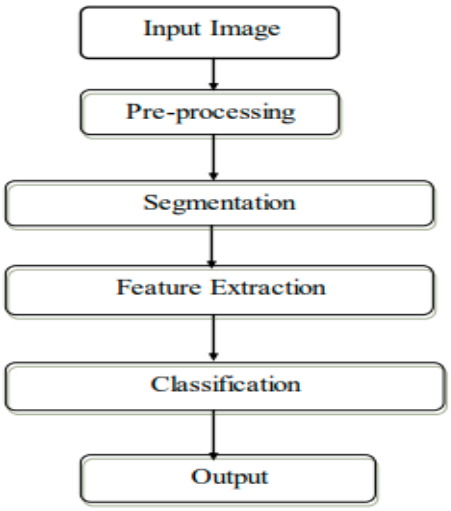
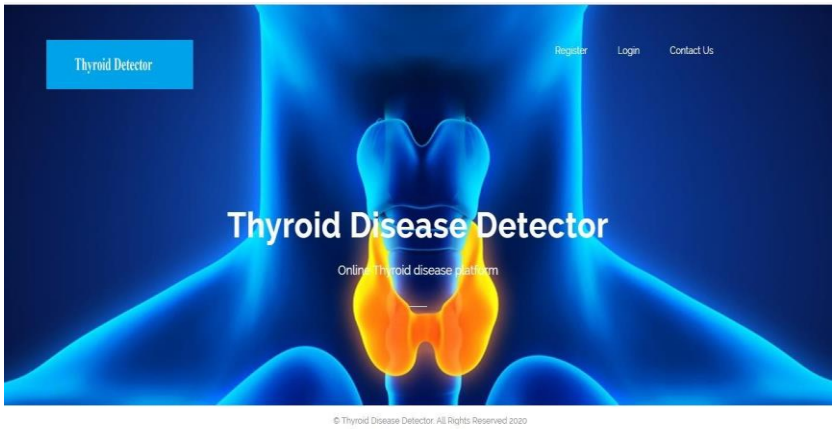


Fig.2: segmented thyroid image


Input Image
Pre-processing
Segmentation
Feature Extraction
Classification
Output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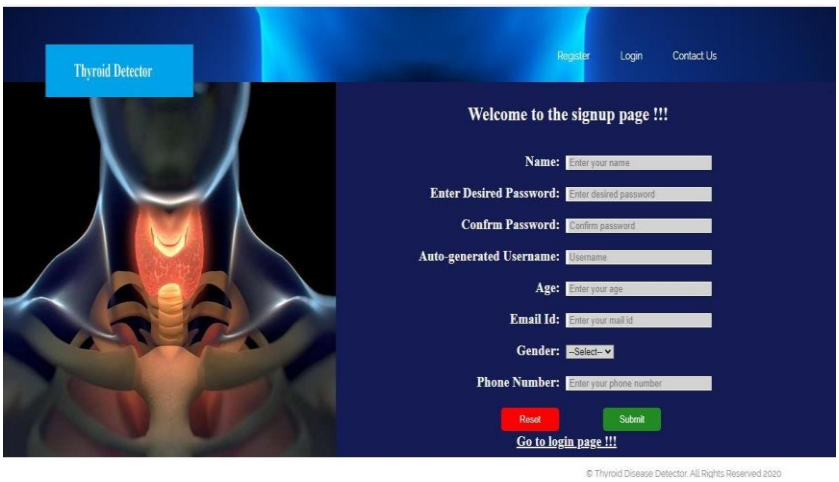
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Enter desired password
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Enter your age
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Enter your mail id
Gender:
-Select-
Phone Number:
Enter your phone number
Reset
Submit
Go to login page !!!
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contains 3772 records in total. All the records are categorised as being either negative, compensated for hypothyroidism, main hypothyroidism, or secondary hypothyroidism. In our experiment, each classifier is given data one at a time, and a list of detailed accuracies is acquired for each classifier, as shown in table 2. The table's rows each show the classifier's specific accuracy in detail. It is evident from this table that REP tree and C4.5 are outperforming the competition. Confusion matrix for the C 4.5 technique for six fold cross validation is shown in Table 3. Table 4 shows the specific accuracy for various k-folds for the C4.5 method.

V. Table 1: Hypothyroid Data Set

Attribute	Value
Age	Integer
Sex	Male(M),Female(F)
On thyroxine	False(f),true(t)
Query on thyroxine	False(f),true(t)
On antythyroid	False(f),true(t)

Table 2 shows the detailed accuracy for each class for each classifier.

Algorithm	Accuracy	Precision	Recall	F-Measure	ROC-Area	TP-rate	FP-rate
Mutlilayer perceptron	94.035	0.937	0.94	0.938	0.891	0.94	0.398
RBF Network	95.228	0.945	0.952	0.946	0.898	0.952	0.407
Bayes net	98.59	0.986	0.986	0.986	0.997	0.986	0.08
C4.5	99.57	0.995	0.996	0.995	0.993	0.996	0.019
CART	99.54	0.995	0.995	0.995	0.993	0.995	0.007
Decision stump	95.38	0.95	0.954	0.948	0.981	0.954	0.009
REP tree	99.57	0.995	0.996	0.996	0.993	0.996	0.007

Table 3. The C4.5 algorithm's confusion matrix for the k=6 fold (Best performance among all classifiers)

Target class	Negative	Compensated hypothyroid	Primary hypothyroid	Secondary hypothyroid
Negative	**3476**	**2**	**3**	**0**
Compensated hypothyroid	**1**	**192**	**1**	**0**
Primary hypothyroid	**3**	**3**	**89**	**0**
Secondary hypothyroid	**2**	**0**	**0**	**0**

Table 4. Accuracy for various k-folds in detail using the C4.5 algorithm

K=n	Accuracy	TP-rate	FP-rate	Precision	Recall	ROC area
K=2	99.469	0.995	0.01	0.994	0.995	0.996
K=4	99.57	0.996	0.013	0.995	0.996	0.994
K=6	99.60	0.996	0.019	0.995	0.996	0.994
K=8	99.54	0.995	0.019	0.995	0.995	0.993
K=10	99.575	0.996	0.019	0.995	0.996	0.993

VI. CONCLUSION

Through the use of a variety of digital image processing techniques, automated software to screenand diagnose DR has been created. For the detection of DR from fundus pictures, this software produces good accuracy. It can be used as an alternate method for DR screening, particularly in rural or distant areas where there aren't any eye doctors or where they have a lot of work to do. The software does a decent job of classifying this disease's severity, though. This study aids in the early detection of thyroid disease; prompt treatment of this condition will avert permanent harm. We have covered author experiments for thyroid detection in this publication. For technical people, this jobcan be quite valuable. researchers that require access to the current studies in this field.

VII. ACKNOWLEGEMENT

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VIII. REFERENCES

[1]Ankita Tyagi and Ritika Mehra. (2018).“Interactive Thyroid Disease Prediction System using Machine Learning Techniques” published on ResearchGate.

[2] YongFeng Wang,(2020). “Comparison Study of Radiomics and Deep-Learning Based Methods for Thyroid Nodules Classification using Ultrasound Images” published on IEEEAccess.

[3] Sunila Godara,(2018). “Prediction of Thyroid Disease Using Machine Learning Techniques” published on IJEE.

[4] Hitesh Garg,(2013). “Segmentation of Thyroid Gland in Ultrasound image using Neural Network” published on IEEE.

[5] L. Ozyılmaz and T. Yıldırım,(2002). “Diagnosis of thyroid disease using artificial neural network methods,” in: Proceedings of ICONIP’02 9th international conference on neural information processing (Singapore: Orchid Country Club, pp. 2033–2036)