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THYROID DISEASE DETECTION USING CNN ALGORITHM

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ABSTRACT



Thyroid diseases are common worldwide. In India too, there is a significant burden of thyroid diseases. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases.

In this project we will be training the algorithm to identify the thyroid and non thyroid patients by taking their physical images and thereby concluding them with the disease as either positive or negative.

The algorithm is based on deep learning which is a subset of machine learning and it uses a popular Convolutional Neural Networks algorithms.

INTRODUCTION



The advancement of computational biology is used in the healthcare industry. It allowed collecting the stored patient data for the medical disease prediction.

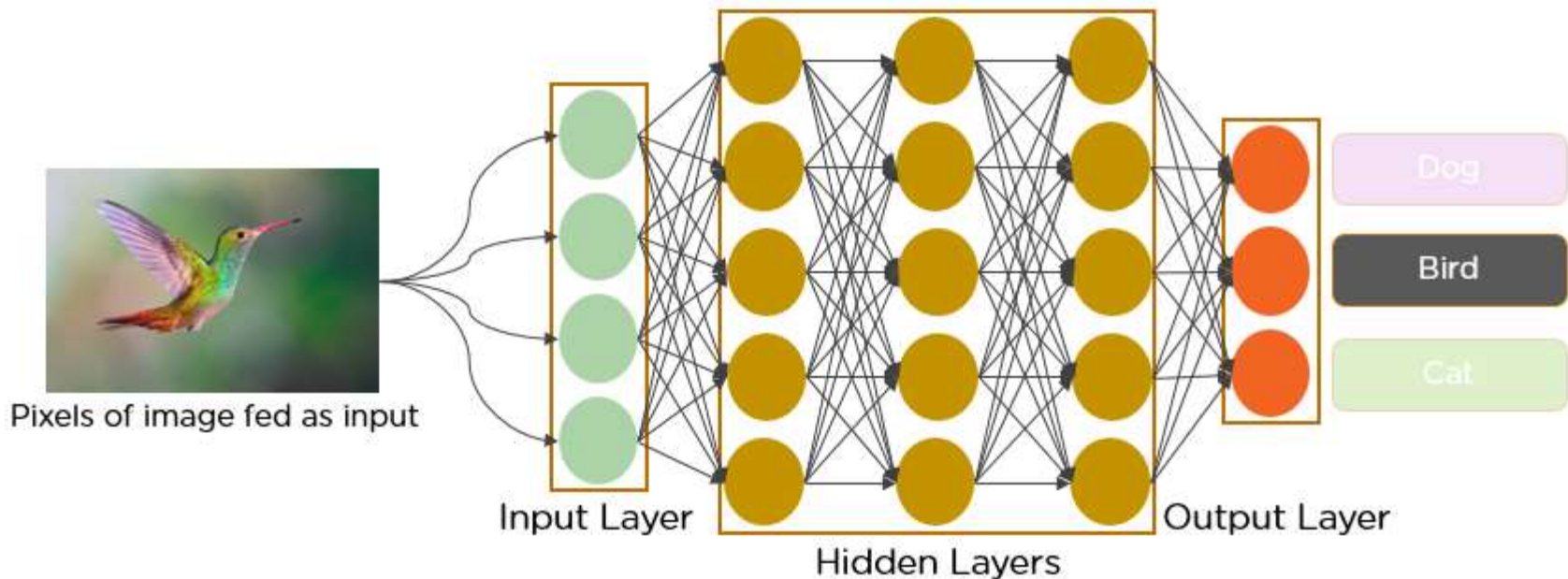
The thyroid gland is an endocrine gland in the neck. It erects in the lessened part of the human neck, beneath the Adam's apple which aids in the secretion of thyroid hormones and that basically influences the rate of metabolism and protein synthesis. To control the metabolism in the body, thyroid hormones are useful in many ways, counting how briskly the heart beats and how quickly the calories are burnt. The composition of thyroid hormones by the thyroid gland helps in the domination of the body's metabolism. The thyroid glands are composed of two active thyroid hormones, levothyroxine (T4) and triiodothyronine (T3). To regulate the temperature of the body these hormones are imperative in the fabrication and also in the comprehensive construction and supervision. Specifically, thyroxine (T4) and triiodothyronine (T3) are the two types of active hormones that are customarily composed by the thyroid glands.

The pituitary gland releases the thyroxine stimulating hormone (TSH) which makes the thyroid gland to release the thyroxine (T4) and triiodothyronine (T3).

There are two types of thyroid related diseases namely HYPOTHYROIDISM and HYPERTHYROIDISM

CONVOLUTIONAL NEURAL NETWORK

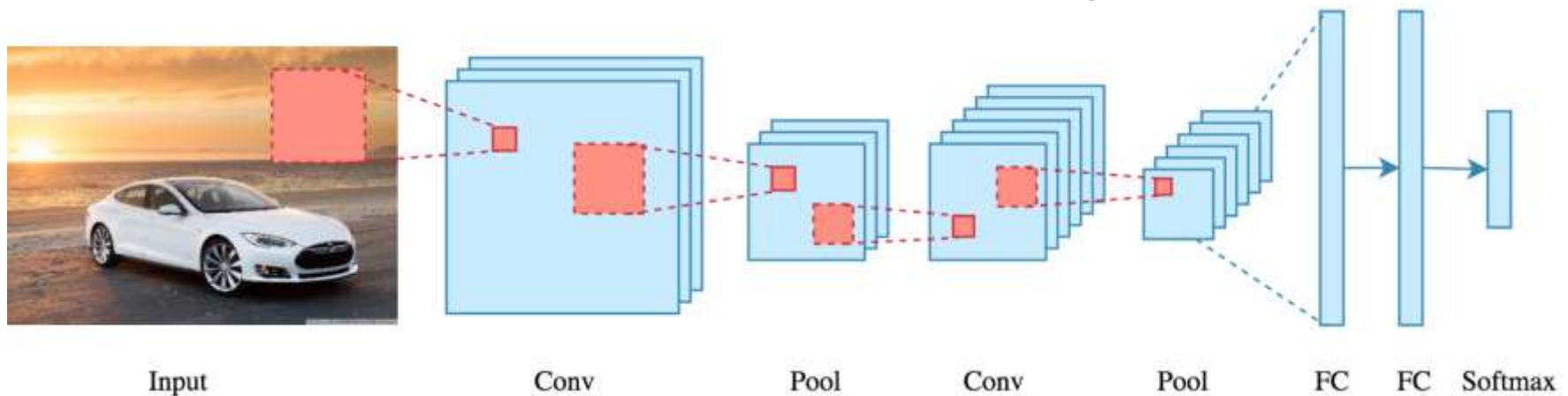
In the past few decades, Deep Learning has proved to be a very powerful tool because of its ability to handle large amounts of data. The interest to use hidden layers has surpassed traditional techniques, especially in pattern recognition. One of the most popular deep neural networks is **Convolutional Neural Networks**.



CONVOLUTIONAL NEURAL NETWORK

CNN's were initially developed and used in 1980's. These were used in postal sectors to read zipcodes and pincodes.

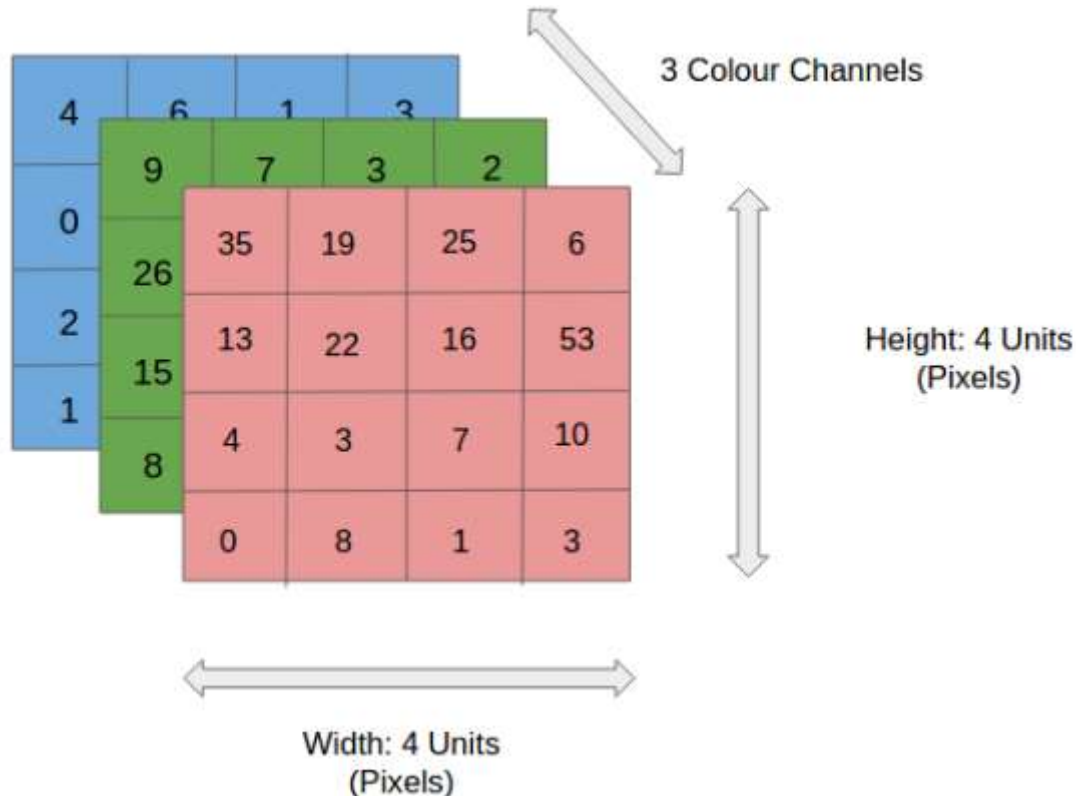
At that time it is only used to recognise handwritten digits. Later, it has failed to enter the field of machine learning.



In 2012 Alex Krizhevsky realized that it was time to bring back the branch of deep learning that uses multi-layered neural networks. The availability of large sets of data, to be more specific ImageNet datasets with millions of labeled images and an abundance of computing resources enabled researchers to revive CNNs.

CONVOLUTIONAL NEURAL NETWORK

An RGB image is nothing but a matrix of pixel values having three planes whereas a grayscale image is the same but it has a single plane.



EXISTING SYSTEM



- As Playing a crucial role as one of the human body's largest endocrine organs, the thyroid gland is responsible for regulating daily metabolism.
- Timely identification of thyroid disease plays a vital role in decreasing mortality rates.
- Typically, the diagnosis of thyroid disease heavily relies on the expertise and experience of radiologists and pathologists.

Disadvantages :

- Costliest Process
- Heavy Infrastructure

PROPOSED SYSTEM



- This study demonstrates the effectiveness of deep learning techniques in reducing human false-positive diagnostic rates by automatically detecting thyroid diseases.
- By employing two pre-operative medical image modalities, namely, normal, thyroiditis, cystic, multi-nodular goiter, adenoma, and cancer, this pioneering research provides clinicians with valuable assistance in making diagnostic decisions.

Advantages :

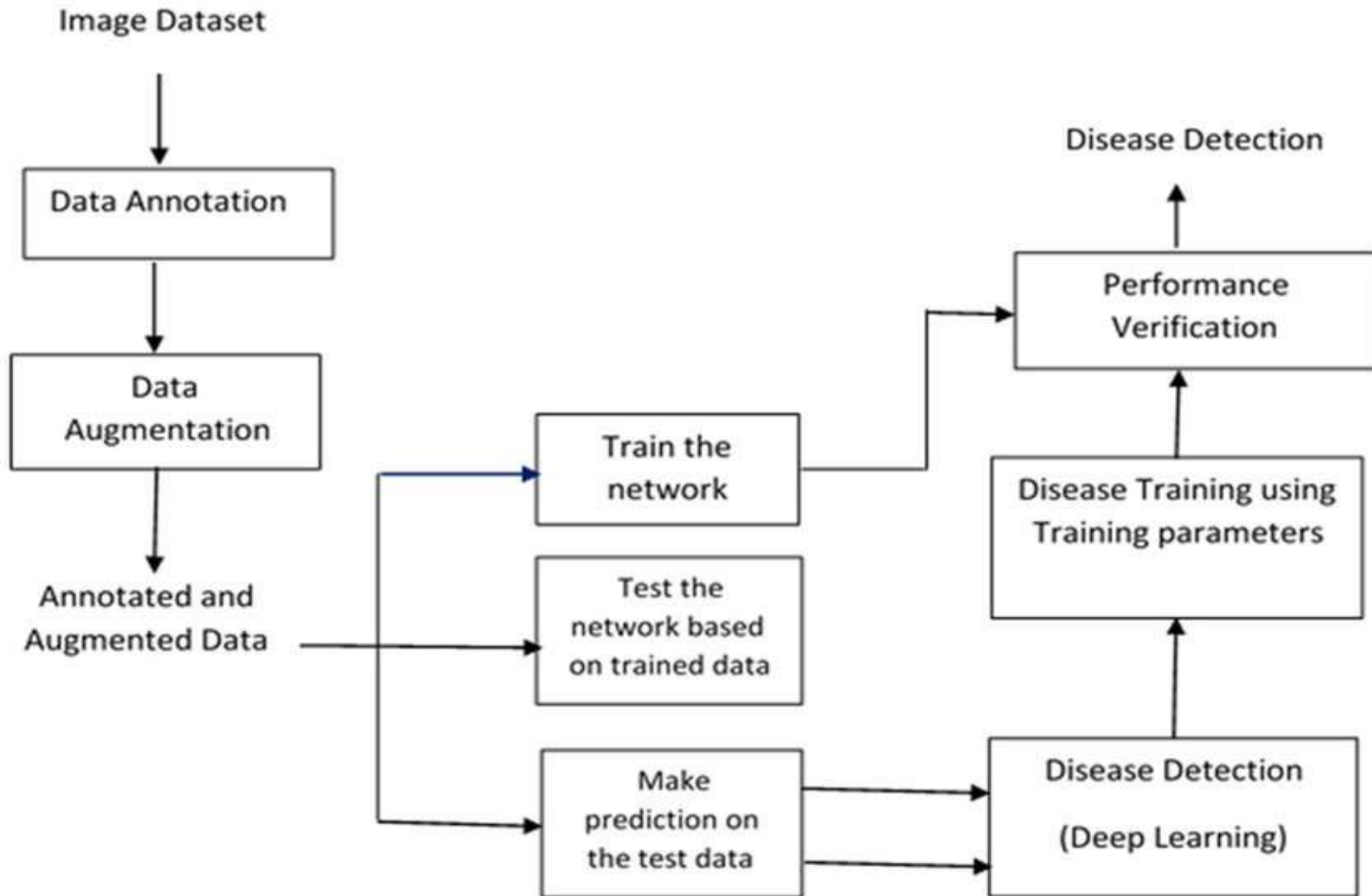
- The model performed exceptionally well on both medical image sets, achieving an accuracy of 97.2%.

LITERATURE SURVEY



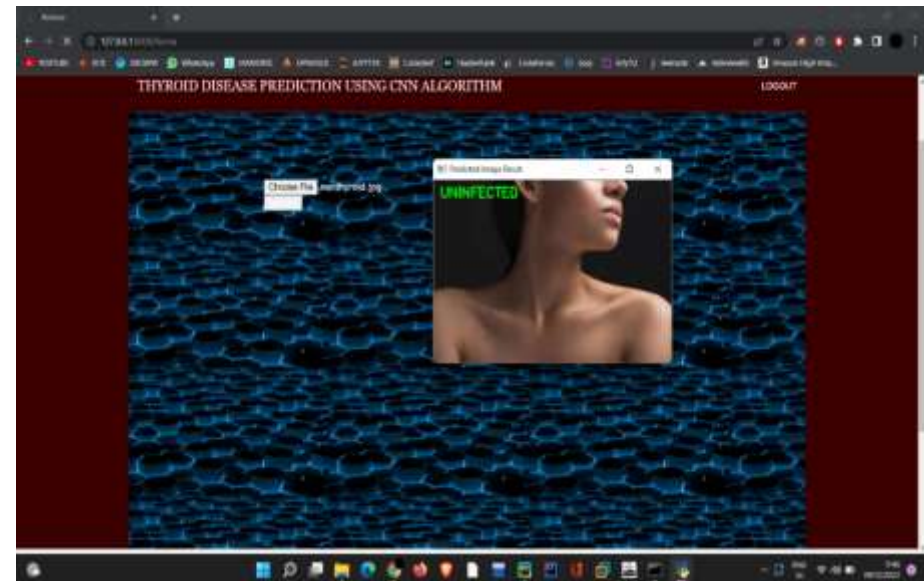
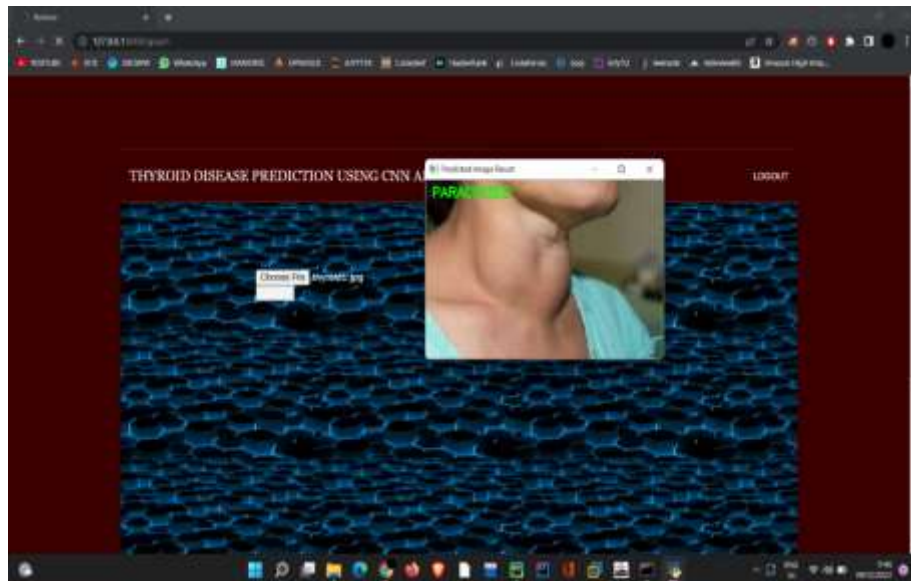
- **D. Shen, G. Wu, and H.-I. Suk** it says "Covers computer-assisted image analysis in the realm of medical imaging,". New machine learning techniques, especially deep learning, are helping to identify, classify, and measure patterns in medical images. The capacity to use hierarchical feature representations acquired only from data, rather than features manually developed based on domain-specific knowledge, lies at the heart of these advancements. Deep learning has led to significant improvements in the performance of a wide variety of medical applications.
- **J. Chen, L. Yang, Y. Zhang, M. Alber and D. Z. Chen** states that “3D image segmentation is a major challenge in biomedical image analysis. Deep learning (DL) methods have been used to improve segmentation performance. However, existing DL segmentation methods are not well-suited for 3D biomedical images due to their anisotropic dimensions. In this paper, we propose a new DL framework for 3D image segmentation that explicitly takes advantage of 3D image anisotropy.

METHODOLOGY



RESULTS

- The training dataset contains various thyroid positive and thyroid negative images and some are taken from the internet sources and are uploaded to model to be given as sample inputs.
- Dataset is split into 2 folders : **0** (Thyroid Positive) & **1** (Thyroid Negative).



CONCLUSION & FUTURE SCOPE



CONCLUSION :

This study presents a diagnostic model for thyroid disease using the latest deep convolutional neural network (CNN) architecture to distinguish between different types of diseases. The results demonstrate impressive performance in both computed tomography (CT) scans and ultrasound images, achieving accuracies of 0.972 and 0.942, respectively. The experimental findings highlight the adaptability of the chosen CNN to various visual modalities, confirming the effectiveness of the deep learning model and its potential clinical applications.

FUTURE SCOPE OF STUDY :

Future Enhancement is being planned to further analyse and enhance the protocol towards mankind and helps create a system which guarantees that no individual is getting effected with traditional methods of testing and late reports of advanced stages of the disease. Thus securing, maintaining and updating with newer technologies can make the system more effective and precise.

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THANK YOU