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PCOS DETECTION USING DEEP LEARNING

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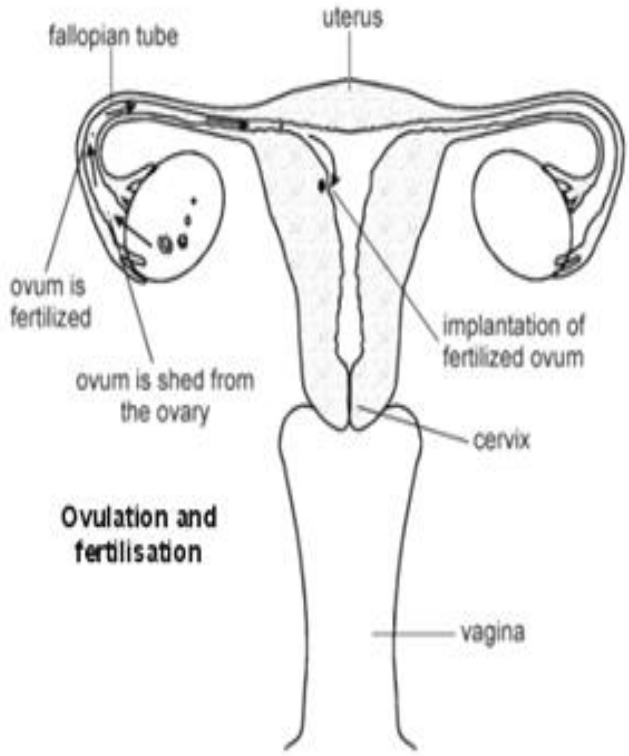
Abstract- Prediction High levels of androgens in women cause polycystic ovary syndrome (PCOS), a collection of symptoms. PCOS is caused by a combination of genes and environment variables that are common conditions commonly associated with atherosclerosis, hypertrichosis, acne and hyperandrogenism, and persistent infertility. According to a recent study, about 18% of Indian women suffer from this disease. Doctors manually examined an ultrasound scan to determine which ovary was damaged, but could not determine if it was a benign cyst, PCOS, or a malignant cyst. This study proposes a DCNN-based algorithm, where the PCOS classification is coded in Python programming and filled with blood or fluid using ultrasound images. To classify the PCOS in the dataset, this study uses DCNN-based image processing feature extraction. That is, the study is done using a trained dataset of the same PCOS-related disorders. Finally, use the test dataset to perform a feature extraction and evaluate the accuracy against the performance parameters. PCOS (Polycystic Ovary Syndrome) is an endocrine disorder that affects many women in the childbearing age group and is associated with infertility, diabetes, and cardiovascular disease. Most imaging functions are used to diagnose illness. Ultrasound diagnostic imaging has become an important tool in diagnosing PCOS. The typical appearance of an image is follicle overlap, equipment inherent noise, and primarily empirical operation, which is increasingly difficult due to the lack of understanding of the operator due to the time-consuming diagnostic process. The above situation affects the accuracy of cyst detection. Early and accurate detection of female reproductive system abnormalities is essential to avoid infertility prior to the treatment process. To achieve maximum accuracy in cyst identification in a short period of time, this task reviews the various approaches proposed so far for speckle noise removal, segmentation extraction of areas of interest, and image classification.

1.INTRODUCTION

Deep learning is a rapidly evolving technology that helps solve problems in many areas. Deep learning helps healthcare professionals and researchers identify opportunities hidden in data and enable healthcare departments to function more effectively. It also helps doctors accurately analyze all types of illnesses and treat patients more appropriately, improving medical decisions. Diseases such as polycystic ovary syndrome (PCOS) lack reliable diagnostic and therapeutic options. This is a common endocrine disorder that results in the formation of ovarian cysts in women of childbearing potential and can lead to infertility.

The reproductive system is one of the most important organs for women. The uterus, which forms the vagina that houses the uterine fluid and the developing fetus and transfers male sperm to the Faropius canal, and the ovary, which produces female eggs, are two major components of the female reproductive system. During the reproductive process, the egg sends out some of the molecules needed to induce sperm. This allows the surface of the egg to attach to the surface of the sperm, allowing the egg to receive the sperm and initiate fertilization. Fertilization usually takes place in the fallopian tubes, but it can also occur in the uterus. Polycystic ovary syndrome (PCOS) is an important medical research topic. Polycystic ovary is characterized by the abundance of intact cysts less than 1 cm in diameter. Menstrual problems PCOS is characterized by many symptoms.

Irregular cycle, incapacity, face, chest, weight gain, thinning hair, hair loss



2.Literature Survey

[1] "Otsu Threshold Processing for PCO Segmentation of Ultrasound Images and Implementation of Chan-Vese Method
"

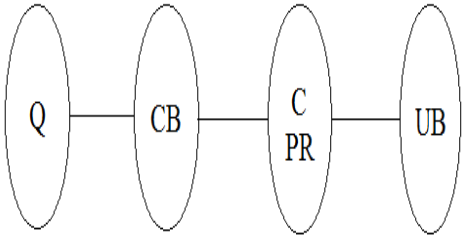
Authors: Asma Amirah Nazarudi, Noraishikin Zulkarnain, Siti Salasiah Mokri1, Wan Mimi
Dayana Wan Zaki, Aini Hussain
The study proposes a combination of Otsu's method and Chan-Vese method
[2] "Diagnosis of Polycystic Ovary Syndrome Using Machine Learning Algorithms"

Authors: Subrato Bharati, Prajoy Podder, M. Rubaiyat Hossain Mondal.

Many classifiers such as gradient boosting, random forest, logistic regression, hybrid random forest and logistic regression (RFLR) are applied to the dataset.
[3] iHOPE: Detection and prediction system for polycystic ovary syndrome (PCOS) using machine learning techniques

Authors: Amsy Denny; Anita Raj, Ashi Ashok, C. Maneesh Ram, Remya George
This paper proposes a system that uses machine learning to detect and predict PCOS early, based on optimal and minimal but promising clinical and metabolic parameters.

Mathematical modeling



where
Q = read dataset
4CB = preprocess
C = apply DCNN algorithm
PR = preprocess query evaluation
UB = predict result

set theory
1) S system, input image
S = {In, P, Op, Φ}
2) Identifies the input In as
In = {Q}
. Here we identify
Q = user input image (data set)
process P as
P = {CB, C. , PR}
where
CB = pre-processing
C = apply deep learning algorithm
PR = pre-processing requirement evaluation
4) Identify the output operation as
Op = {UB}
. Now
UB = predict the result
Φ = error and success condition.

Error:
A huge database may require more time to retrieve the information.
Hardware error.
Software error.
Success:
Find the information you need in the available records.
Users can get results that meet their needs very quickly.

Space Complexity: The complexity of the
space depends on the representation and visualization of the detected pattern. The more storage you have for your data, the more complex your space will be.
Time Complexity: Check the number of patterns available in the
dataset = n If
(n> 1), it may take some time to get the information. Therefore, the time complexity of this algorithm is O (n ^ n).
The above mathematical model is NP Complete.

3.Methodology

This section outlines the studies used to predict PCOS using machine learning classifiers. A dataset with 43 attributes from 541 women was retrieved from the Kaggle repository. Of the 541 outbreaks, 364 affect healthy people and the remaining 177 PCOS patients are affected. The Python programming language is used as a machine learning tool in research. Python comes with Anaconda distribution packages, Scikit-learn libraries, Jupiter notebooks, Spyder, Orange, and other tools.
i. To avoid manual
errors and reduce diagnostic time, we have developed an automated system to detect cysts
from ovarian ultrasound images.
ii. Evaluate the performance of various
filtering techniques and apply the most efficient techniques to eliminate
speckle noise.
iii. To improve the contrast of the denoised image, use the appropriate
image enhancement technique.
iv. To accurately segment the cyst from the background of the ultrasound image, evaluate several segmentation techniques 4504 and apply the appropriate segmentation techniques.
BC To optimize the characteristics of the segmented regions required for the
classification of the ovary
vi. To classify the ovaries based on the number of
cysts and fluids filled in the follicles, compare the performance of
different classifiers and use the most accurate classifier.
VII. To verify the performance of the proposed system, compares the results with existing methods.

4.Existing Systems and Disadvantages

This document presents an integrated model that uses deep learning algorithms to predict PCOS disease early using available data. The existing system is implemented and tested using machine learning algorithms and the results are displayed. This system used SVM and ML models to predict PCOS. This system helps to predict the details of previous PCOS data based on the analysis of basic parameters and PCOS details.

5.Proposed system and benefits

Proposed system data acquisition where ovarian ultrasound images are collected in this task. Next is preprocessing. Ultrasound images are mainly affected by speckle noise, so it is necessary to remove speckle noise. After pretreatment, the area is interesting. That is H. The PCOS part is segmented using the CNN algorithm. Once the PCOS is segmented, the features required for the classification process are extracted. Using the extracted features, the CNN model is trained using training ultrasound images. To validate the model, apply test images to classify PCOS.

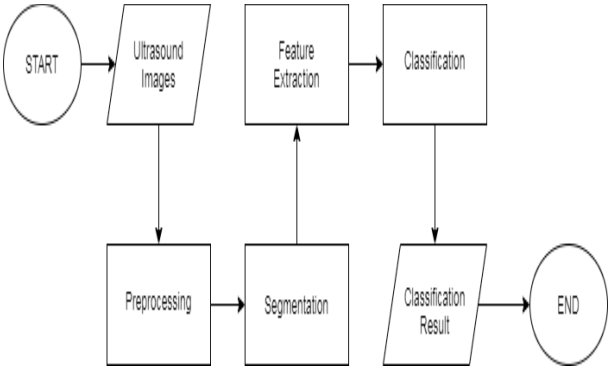


Figure: Extended System Architecture

Image Preprocessing:

Image Preprocessing is an important step in preparing a PCO ultrasound image before applying a clustering algorithm. In this paper, we used trimming, denoising, and contrast enhancement in the pretreatment steps.

• Crop

The PCO ultrasound image used in this article consists of two ovaries with different probe depths and must be cropped to the left and right ovaries. The cropping process can also reduce non-essential image areas.

• Noise Reduction

Common noises that affect digital images are Gaussian noise, Poisson noise, and salt and pepper noise, but a new type of noise called speckle noise appears in ultrasonic images. Speckle noise is the
multiplicative noise that is difficult to remove. Speckle noise worsens the edges of the image. In this article, we will use the wavelet threshold to reduce speckle noise.

• Contrast Enhancement

Contrast enhancement makes dark areas of the image sharper and contrasts higher in areas with low local contrast. This paper uses histogram equalization for contrast enhancement. This is achieved by effectively spreading.

Diagnostic Ultrasound Image:

This wave penetrates the tissue, hits the target, reflects part of the wave, and emphasizes features such as tissue boundaries. The reflected signal is picked up by the receiver, which converts it into a radio frequency signal. Since the amplitude of the acoustic pulse wave is attenuated as it passes through the tissue, it also amplifies the perceived signal as a function of the time and depth it takes for the signal to return. The analog-to-digital converter adjusts the gain over time and then samples the RF signal at high speed.

Feature selection:

This section describes the feature selection process.
Feature selection is the process of selecting some useful and important features from a large number of options. This can lead to more accurate pattern characterization for many classes. Taking into account irrelevant features in the data can reduce the accuracy of the classification model.

6. CONCLUSIONS

The proposed approach offers a basis for the automated quality evaluation of PCOS data using a Deep Convolutional Neural Network. Image processing advancements may aid medical practitioners in obtaining an early diagnosis of PCOS and, as a result, providing early therapy and treatment to patients. PCOS has a longterm impact on not just physical but also mental health disorders if detected late. This study demonstrates how several segmentation strategies can be combined to create a better follicle segmentation method. We want to utilise a machine learning technique by utilising a Logistic Regression classifier to classify all extracted follicular features. The proposed approach offers a basis for the automated quality evaluation of PCOS data using a Deep Convolutional Neural Network. Image processing advancements may aid medical practitioners in obtaining an early diagnosis of PCOS and, as a result, providing early therapy and treatment to patients. PCOS has a longterm impact on not just physical but also mental health disorders if detected late. This study demonstrates how several segmentation strategies can be combined to create a better follicle segmentation method. We want to utilise a machine learning technique by utilising a Logistic Regression classifier to classify all extracted follicular features. This allows the system to automatically identify the follicle. Improved sampling techniques that include both oversampling and undersampling approaches to enhance a small number of samples while removing outliers from the data to overcome the problem of class imbalances in medical data sets. Proposed to incorporate. We then selected statistically significant and discriminating features that best reflected the state of PCOS and fed them into the Extreme Gradient Boosting model. Extensive testing of benchmark datasets shows great potential for integrated solutions. I would like to add CNN with the optimal version to improve the model in the future. In addition, we plan to further optimize the hyperparameters of machine learning algorithms and improve function selection to improve performance.

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