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MACHINE LEARNING APPROACHES ON POLYCYSTIC OVARY SYNDROME

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Abstract: polycystic ovary syndrome (PCOS) is a common endocrine disorder affecting reproductive-aged women worldwide. It is characterized by a complex interplay of hormonal imbalances, metabolic dysfunction, and ovarian abnormalities. Early detection and diagnosis of PCOS are crucial for timely intervention and management of the condition. This abstract presents an overview of various approaches and advancements in PCOS detection, highlighting both traditional and emerging methods. The traditional diagnostic criteria for PCOS include the Rotterdam criteria, which require the presence of at least two out of three features: irregular menstrual cycles, clinical or biochemical signs of hyperandrogenism, and polycystic ovaries observed on ultrasound. However, these criteria have limitations, and newer diagnostic strategies are being explored.
Keywords:

Keywords - **Predictive modeling, Model Training, Diagnosis, Machine Learning.**

I. INTRODUCTION

The purpose of this Software Requirement Specification (SRS) document is to provide a comprehensive overview of the requirements, functionalities, and specifications for the development of software designed for the detection and early diagnosis of Polycystic Ovary Syndrome (PCOS). This software aims to improve the accuracy, accessibility, and efficiency of PCOS detection, ultimately enhancing the quality of healthcare services for individuals affected by this condition.

II. MOTIVATION

PCOS is often under-diagnosed or diagnosed late, leading to delayed treatment and potential health complications. Developing an accurate and reliable method for early detection can help identify PCOS at its early stages, allowing for timely intervention and management.PCOS detection project aims to improve the quality of life for women with PCOS by enabling early diagnosis, personalized treatment, and comprehensive support. It has the potential to positively impact reproductive health, mental well-being, and long-term outcomes for individuals affected by this syndrome.

III. OBJECTIVE

PCOS detection projects contribute to education and awareness, both among healthcare providers and the general public. They enhance understanding of PCOS symptoms, diagnostic criteria, and management strategies, leading to improved access to healthcare services and support for affected individuals.

Develop or use diagnostic tools and methods that provide accurate and reliable diagnoses of PCOS. This may involve theintegration of medical imaging, hormonal assessments, and clinical criteria.

IV. SCHEDULE OF PROJECT WORK

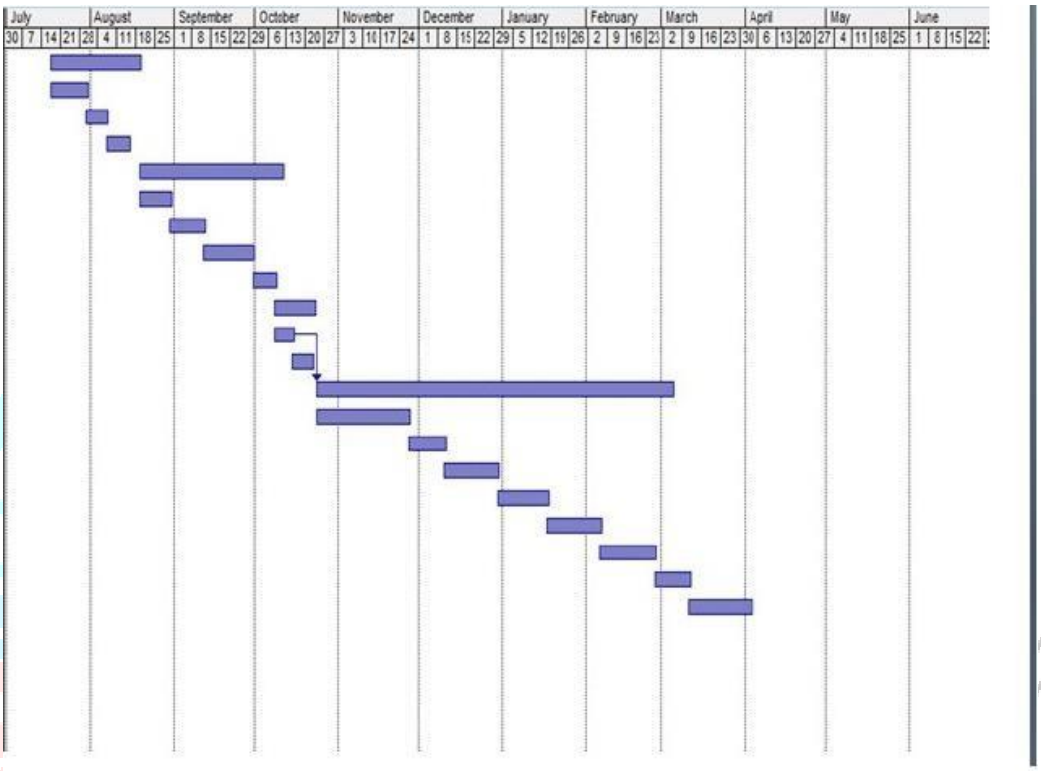

Fig. Schedule of project Work

V. SYSTEM DESIGN

I. Data Flow Diargams

In Data Flow Diagram,we Show that flow of data in our system in DFD0 we show that base DFD in which rectangle present input as well as output and circle show our system,In DFD1 we show actual input and actual output of system input of our system is text or image and output is rumor detected like wise in DFD 2 we present operation of user as well as admin.

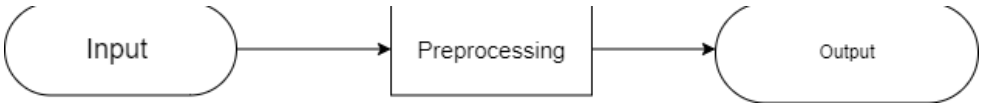

Fig. Data Flow diagram level 0

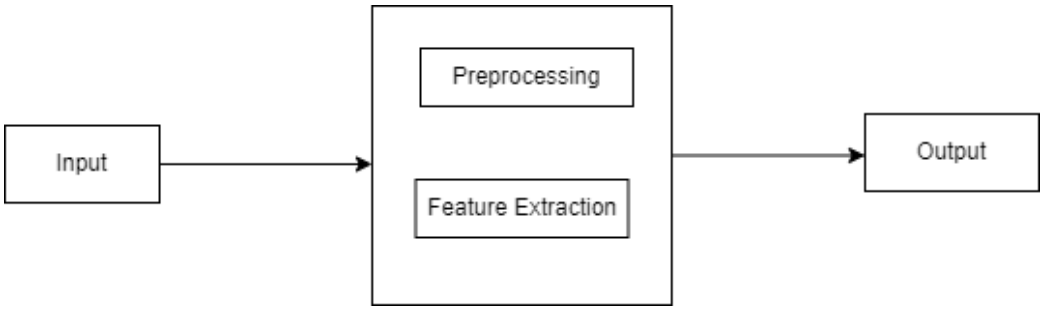

Fig. Data Flow diagram level 1

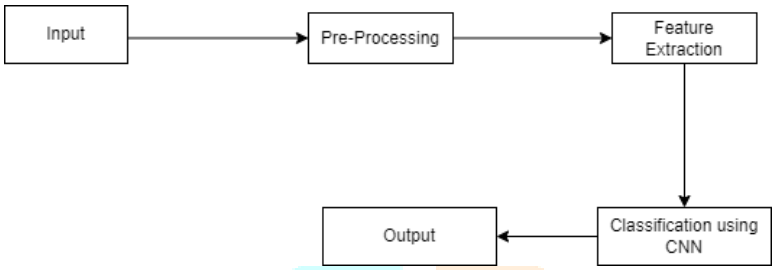

Fig. Data Flow diagram level 2

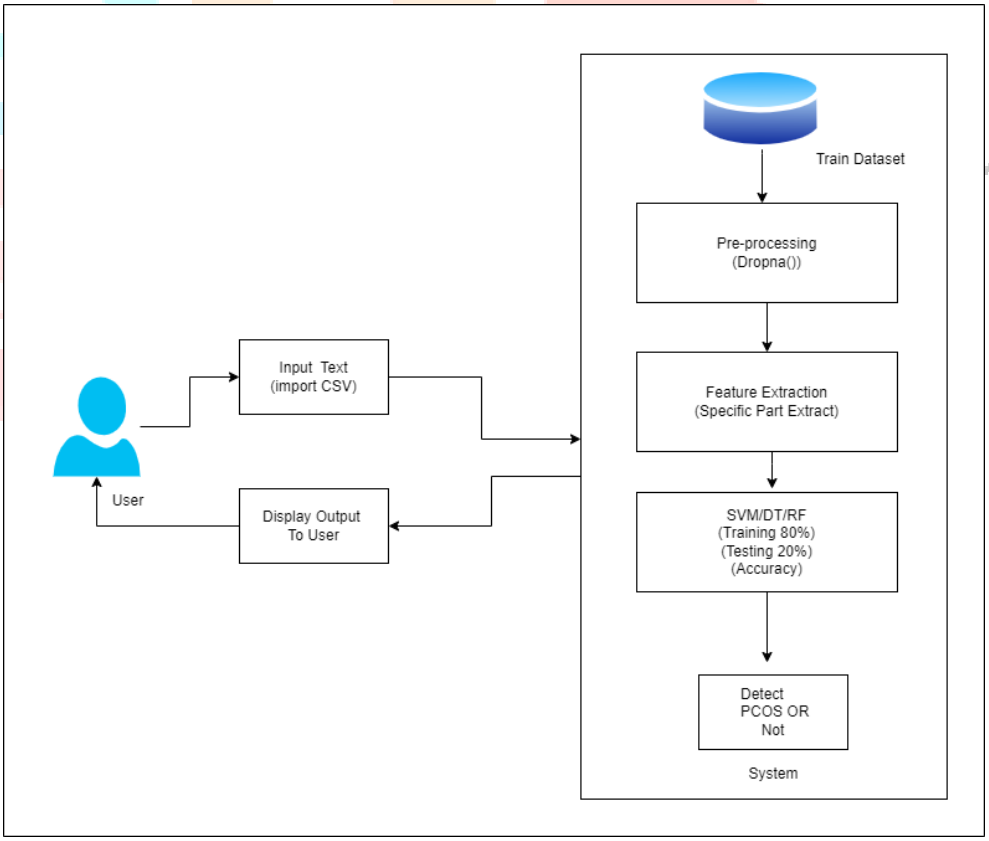

Fig. System Architecture

VI. LITERATURE SURVEY

SR. NO	Author	Title	Abstract
1.	Muhammad Sakib Khan Inan	Automated Detection of Polycystic Ovary Syndrome from Ultrasound Images	Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder which seriously impacts women's health. The disorder is characterized by the formation of many follicular cysts in the ovary. Nowadays the diagnosis performed by doctors is to manually count the number of follicular cysts, which may lead to problems of the variability, reproducibility and low efficiency. To overcome these problems, an automated scheme is proposed to detect the PCOS. Firstly the input ovary ultrasound image is filtered by an adaptive morphological filter. Then a modified labeled watershed algorithm is used to extract contours of targets. Finally a clustering method is applied to identify expected follicular cysts. The experimental application verifies
			the effectivity of this proposed scheme, whichachieves the accuracy rate of 84.
2.	Muhammad Sakib Khan Inan	Improved Sampling and Feature Selection to Support Extreme Gradient Boosting For PCOS Diagnosis	This paper focuses on the data-driven diagnosis of polycystic ovary syndrome (PCOS) in women. For this, machine learning algorithms are applied to a dataset freely available in Kaggle repository. This dataset has 43 attributes of 541 women, among which 177 are patients of PCOS disease. Firstly, univariate feature selection algorithm is applied to find the best features that can predict PCOS.
3.	Subrato Bharati	Diagnosis of Polycystic Ovary Syndrome Using Machine Learning Algorithms	PolyCystic Ovary Syndrome (PCOS) is one of the most common causes of female infertility, affecting a large number of women of reproductive age, even continuing far beyond the childbearing years. This hormonal disorder may further lead to the risk of other long-term complications. Considering the powerful recognition abilities of the probabilistic nature of ensemble-based gradient boosting algorithms, particularly in the field of the medical domain, we propose the use of Extreme Gradient Boosting, XGBoost, for early detection of PCOS.

4.	Aroni Saha Prapty and Tanzim Tamanna Shitu	An Efficient Decision Tree Establishment and Performance Analysis with Different Machine Learning Approaches on Polycystic Ovary Syndrome	Polycystic Ovary Syndrome (PCOS) is an exceedingly serious disease for which a woman has to pay a lot of lifelong damages. A woman does much suffering either not knowing that she is affected by it or that it is not caught at a very early stage. This is a treatable cause of infertility and affects a woman's health in many ways like metabolic syndrome, sleep apnea, depression even endometrial cancer. But if she notices it at the beginning all these can be avoided under careful supervision. By applying different methods of machine learning and an efficient decision tree is established based on the best performer.
5.	M. Kalaiyarasi	Automated Polycystic Ovarian Syndrome Identification with Follicle Recognition	The use of ultrasound, also known as sonography, has assisted in the identification and care of infertile patients. Ultrasound imaging of the ovary's follicles provides crucial details about the ovary, such as the type of cyst, the large range of follicles, and the size of the follicles reaction to hormonal imbalance. Image Segmentation provides additional details about the region of interest in an image and accurately identifies the object and its background from the image.
6.	Asma Amirah Nazarudin	An implementation of Otsu thresholding and the Chan–Vese method on the PCO segmentation of ultrasound images	Medical practitioners have been using ultrasound images to diagnose and monitor polycystic ovarian syndrome (PCOS) manually. However, manual segmentation is laborious and time-consuming due to the disturbance of speckle noise in ultrasound images. In addition, manual segmentation could produce errors. Thus, researchers have been implementing image processing for a fast and accurate diagnosis of PCOS. Image processing consists of steps, amongst which the most crucial is image segmentation. Before segmentation, the median filter is applied for preprocessing.
7.	Timothy Anglea1 (IEEE Member)	Decentralized Heading Control with Rate Constraints using Pulse-	Decentralized heading control is crucial for robotic network operations such as surveillance,
		Coupled Oscillators	exploration, and cooperative construction. However, few results consider decentralized heading control when the speed of heading adjustment is restricted. In this paper, we propose a simple hybrid-dynamical model based on pulse-coupled oscillators for decentralized heading control in mobile

			robots while accounting for the constraint on the rate of heading change.

VII. CONCLUSION

The choice of methodology depends on the type of data available, the complexity of the problem, and the interpretabilitof the model. SVM, RF, and DT are classical machine learning models suitable for structured data, while CNNs excel in handling unstructured data like images. The performance of these models should be evaluated based on metrics such as accuracy, precision, recall, and F1 score. Ensemble methods like RF can often provide robustness and improved generalization. Interpretability is crucial, especially in medical applications, where understanding the decision-making process is important for gaining trust from healthcare professionals.Detecting Polycystic Ovary Syndrome (PCOS) can be approached through various machine learning and deep learning techniques. Support Vector Machines (SVM), Random Forests (RF), Decision Trees (DT), and Convolutional Neural Networks (CNN) are different methodologies that can be applied.

VIII. ACKNOWLEDGEMENT

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