PRADARSHANA - 2025
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RAMAIAH Institute of Technology

PROJECT POSTER PRESENTATION

Smart PCOS Detection and Care Platform

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INTRODUCTION

PCOS affects ~10% of women and leads to infertility, hormonal imbalance, and metabolic issues. Diagnosis is often delayed due to subjective interpretation of hormone reports or ultrasound scans.**Smart PCOS Care** offers an AI-based solution by combining **ultrasound imaging** and **hormonal data** using **machine learning**, enabling faster and more accurate diagnosis through a **web-based platform**.

OBJECTIVES

The primary objectives of this project are to:

- To design and implement a multimodal AI-based diagnostic system for PCOS using both ultrasound imaging and hormonal profile data.
- To develop three comparative models:
  - A custom CNN integrated with dense layers for hormone features.
  - A VGG16 transfer learning model with co-attention fusion.
  - A late-fusion approach combining independent CNN and XGBoost models.
- To evaluate each model based on accuracy, ROC-AUC, and computational efficiency.
- To develop an intuitive Streamlit-based user interface for clinicians and patients to upload data and view predictions and diagnostic reports in real-time.
- To demonstrate the improvement of multimodal approaches over unimodal systems in clinical diagnostics.

METHODOLOGY

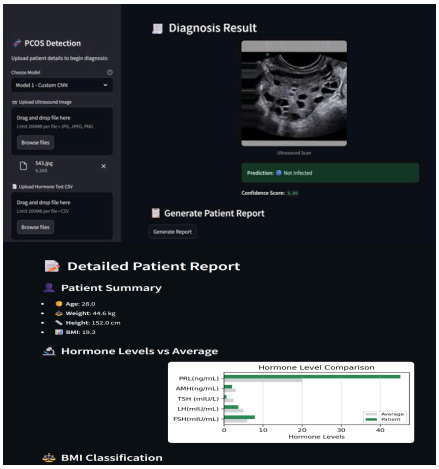
Smart PCOS Care follows a **multimodal AI-based diagnostic approach** that processes both ultrasound images and hormone test data. Three predictive pipelines were developed:

- **Model 1:** A Custom CNN extracts image features, while dense layers process hormone data, fused mid-network for joint learning.
- **Model 2:** A VGG16-based architecture integrates a Co-Attention mechanism to emphasize interactions between visual and clinical features.
- **Model 3:** A late fusion model combines outputs from a CNN (image) and XGBoost (tabular) via weighted averaging.

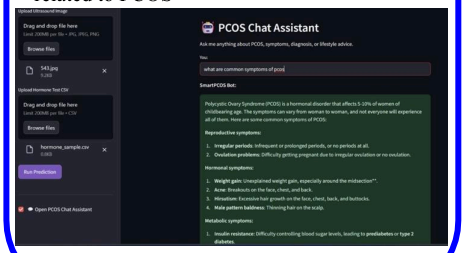
All models were trained and evaluated on paired datasets and integrated into a **Streamlit-based web app** for real-time, user-friendly predictions.

RESULTS

Model generating the prediction based on the provided image and csv file, either infected or not infected, along with the confidence score of the model and patient report.



PCOS chatbot to answer general questions related to PCOS



Conclusion

Smart PCOS Care demonstrates the effectiveness of a multimodal AI-driven approach for diagnosing Polycystic Ovary Syndrome. By combining clinical hormone test results with ultrasound image analysis, the system achieves higher accuracy and reliability compared to traditional single-modality methods. Among the three models implemented, the VGG16-based co-attention model with **90%** accuracy and the CNN+XGBoost late fusion model with **93%** accuracy delivered superior performance, with notable improvements in prediction stability and diagnostic confidence. The final solution is integrated into a Streamlit web application that allows users and clinicians to upload data, receive instant predictions, and visualize detailed diagnostic insights. This work not only supports faster and more objective PCOS screening but also emphasizes the potential of AI to assist in women's health, especially in areas with limited clinical expertise.