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VI SEMESTER INTERDISCIPLINARY PROJECT

DEEPSIGHT: LEVERAGING CONVOLUTIONAL NEURAL NETWORKS FOR COMPREHENSIVE RETINAL DISEASE CLASSIFICATION FROM OCT IMAGE

Mitesh Murthy | Manas Sakthivel| Chirag S Reddy| Rakshitha B R | Gagan Gowda

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Abstract

DeepSight introduces a novel hybrid deep learning model combining CNNs and LSTMs to classify retinal diseases from OCT scans. By integrating Biotechnology and AI, it bridges clinical insight with computational power for expert-level diagnosis. The model achieved 94.82% accuracy on 24,000 images, showcasing strong performance. This interdisciplinary approach highlights the potential of AI-powered tools in advancing retinal diagnostics.

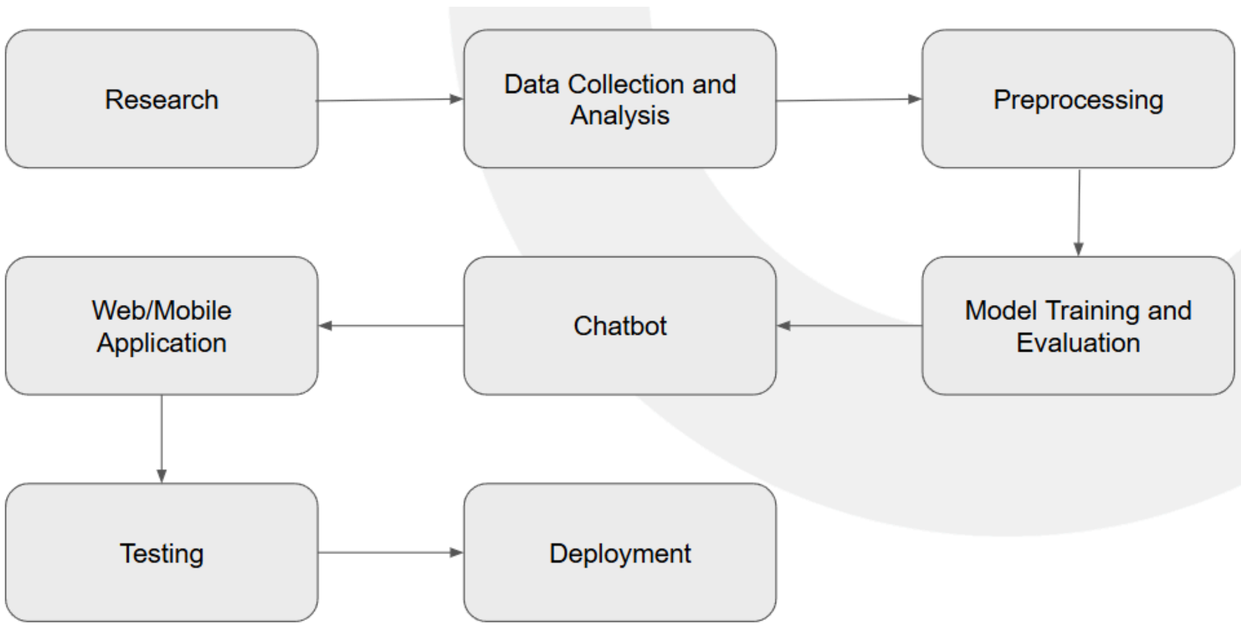
Problem Statement

- Slow, subjective diagnoses of retinal diseases delay treatment.
- Human variability impacts early detection, critical for conditions like Diabetic Retinopathy.
- Our prototype uses deep learning to automate OCT image classification.
- This reduces diagnostic time and minimizes human error.
- The result is improved accuracy, consistency, and accessible advanced diagnostics.

Objectives

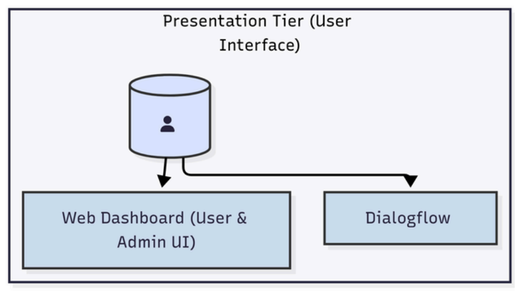
- Apply deep learning (CNN + LSTM) to classify OCT images with both spatial and contextual understanding.
- Design a hybrid model architecture that mimics the clinical diagnostic process.
- Automate detection of common retinal conditions such as AMD, CNV, Drusen, and Macular Edema.
- Validate model performance using clinical insights and metrics like accuracy, precision, and F1-score.
- Demonstrate interdisciplinary impact, showing how AI can enhance healthcare diagnostics when guided by domain expertise.

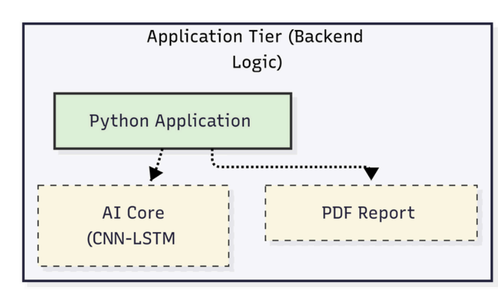
Methodology



Overall Methodology

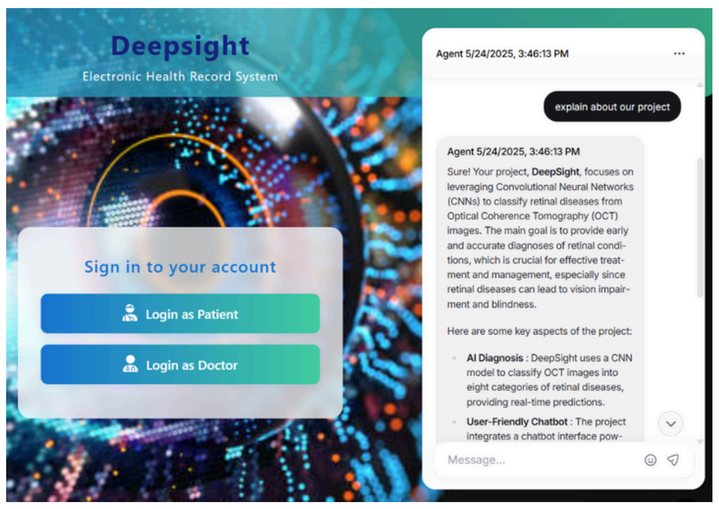
Experimentation/Hardware/simulation /Software model

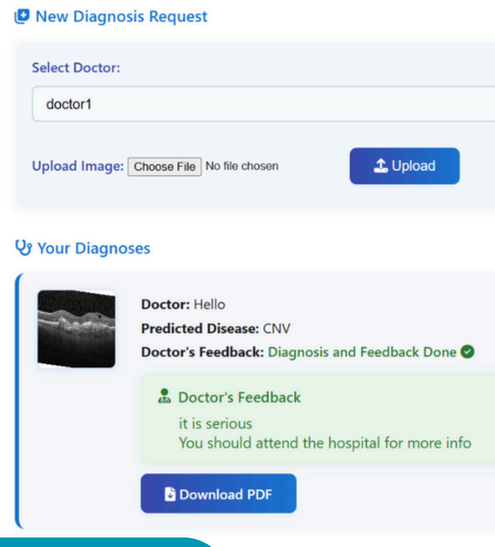




3 Layer Architecture

Results





Outcome

- Achieved high-accuracy classification of retinal diseases (e.g., AMD, CNV, DME) using OCT images.
- Enabled real-time predictions with a user-friendly interface for doctors and patients.
- Integrated doctor feedback and report-sharing features to support expert validation.
- Provided complete patient record management for clinical and telemedicine use.
- Demonstrated strong potential for real-world application in AI-assisted ophthalmology.

References

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Signature
Dr. M Rajeswari
Assistant Professor, Department of BT.