20XD68

DEEP LEARNING

Project Abstract

Automated Diagnosis of Diabetic Retinopathy using Deep Learning

==========

Team Members:

- Kanishka K. - 21pd18
- Nilavini B. M. - 21pd22
- Varsha S.- 21pd39

Introduction:

This project encompasses two major approaches for automated diagnosis of diabetic retinopathy (DR) using deep learning models trained on different datasets: **the IDRID Segmentation dataset and the IDRID Disease Grading dataset**.

The goal is to develop efficient models for binary diagnosis of DR and evaluate their performance against each other.

Technology Stack:

The project is implemented using Python and key libraries such as TensorFlow, Keras, OpenCV, NumPy, Matplotlib, and Pandas.

Additionally, the project utilizes Google Colab for collaborative development and model training.

Methodology:

1. Deep Learning-based Binary Diagnosis (IDRID Disease Grading Dataset):

- Data Preparation:

  Retinal images and their corresponding labels are converted into binary labels (presence or absence of DR) are loaded and preprocessed.

- Model Architecture:

Three distinct models are employed for binary classification: a custom Convolutional Neural Network (CNN), an Inception module-inspired model, and the pre-trained InceptionV3 model.

- Training and Evaluation:

The model is trained using ImageDataGenerators and evaluated on test data to assess its performance.

2. Optic Disc Localization and Exudates Detection (IDRID Segmentation Dataset):

- Preprocessing:

Images are preprocessed to enhance features relevant to the optic disc and exudates.

- Segmentation:

Techniques like K-means clustering, edge detection, and contour analysis are applied for segmentation.

- Localization:

Template matching and contour analysis methods are utilized to localize the optic disc and detect exudates.

Results Comparison:

The project compares the performance of the deep learning model trained on the IDRID Disease Grading dataset with the segmentation-based approach using the IDRID Segmentation dataset.

Metrics such as accuracy, sensitivity, specificity, and F1 score are used for comparison and analysis.

Reference Paper and Links:

- The deep learning model architecture and methodologies are inspired by research papers related to diabetic retinopathy diagnosis.

-Dataset Links:

- IDRID Segmentation Dataset:
- IDRID Disease Grading Dataset

Conclusion:

The project aims to contribute to the field of diabetic retinopathy diagnosis by exploring and comparing two distinct methodologies: segmentation-based localization and deep learning-based binary diagnosis.

The results and insights gained from this study can potentially enhance automated screening and detection systems for diabetic retinopathy.
