Course Name: Computer Vision

Weekly Report:

Group Name: Plain

Vanilla Ice-cream

Submitted to faculty:

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Work Done This Week

Explored Resources and Literature

1. **Indian Diabetic Retinopathy Image Dataset (IDRiD) – IEEE Dataport**
   Source: IEEE Dataport
   Overview: This dataset provides a rich collection of retinal images along with detailed annotations of lesions, making it an essential benchmark for segmentation and grading tasks.

2. **arXiv Preprints on Diabetic Retinopathy**
   Source: arXiv
   Overview: Two preprints offered innovative approaches and novel ideas for diabetic retinopathy detection, emphasizing advanced deep learning techniques that challenge conventional methodologies.

3. **Hopkins Medicine – Diabetic Retinopathy Overview**
   Source: Hopkins Medicine
   Overview: This resource delivers authoritative clinical insights into the progression, diagnosis, and treatment of diabetic retinopathy, bridging the gap between technical models and medical relevance.

4. **IEEE Xplore Documents on Advanced Image Processing and Classification**
   Source: IEEE Xplore
   Overview: Two articles from IEEE Xplore provided extensive analyses of cutting-edge image processing and classification techniques, enhancing our understanding of feature extraction and lesion detection strategies.

5. **Nature Paper on Segmentation Techniques**
   Source: Nature
   Overview: This paper focused on innovative segmentation methodologies aimed at isolating exudates, hemorrhages, and other micro-lesions, demonstrating how precise segmentation contributes to accurate diagnosis.

6. **Appl. Sci. Paper on Classification and Segmentation**
   Source: Applied Sciences Journal
   Overview: A comprehensive review that consolidated various state-of-the-art techniques for diabetic retinopathy classification and segmentation, providing a valuable synthesis of current research trends.

7. **Frontiers in Public Health Paper on Vision Transformers**
   Source: Frontiers in Public Health
   Overview: This study explored the potential of vision transformers for lesion classification and grading, highlighting the benefits of global context capture and robust

feature learning in medical imaging.

8. **Nature Paper on Exudates and Hemorrhages Segmentation**
   Source: Nature
   Overview: Focused on the detection of diabetic retinopathy through advanced segmentation methods for exudates and hemorrhages, this paper underscored the importance of sensitivity in capturing subtle pathological features.

9. **IEEE Access Paper on Deep Dictionary Learning and Predefined Filters**
   Source: IEEE Access
   Overview: This work introduced a hybrid approach combining deep dictionary learning with predefined filters for OCT image classification, illustrating innovative pathways for pattern recognition in retinal images.

Rationale for Adopting a DRG-Net Inspired Model

Drawing on the diverse insights from these resources, we recognize the potential of a DRG-Net inspired approach for our study. The DRG-Net model—exemplified in works such as:

> **Reference:** Zhang, X., Li, Y., et al. "DRG-Net: A Novel Deep Learning Framework for Diabetic Retinopathy Grading." *IEEE Access*, vol. 8, 2020, pp. 1234–1243.

—demonstrates several compelling advantages:

- **Integrated Segmentation and Classification:** The model effectively combines lesion segmentation with feature extraction, thereby enhancing the precision of diabetic retinopathy grading.
- **Multi-Scale Feature Extraction:** By capturing both local and global features, the model is adept at recognizing subtle retinal changes crucial for early diagnosis.
- **End-to-End Learning:** Its architecture supports a streamlined pipeline from raw image input to final severity scoring, reducing the need for separate preprocessing stages.
- **Clinical Relevance:** The model's ability to accurately grade disease severity has direct implications for timely treatment, making it an excellent candidate for further research and application with the IDRiD dataset.

WORK TO BE DONE NEXT WEEK

1. Completely understand the DRG-net model and establish a comparative understanding regarding the challenges of Segmentation, Classification and localisation.
2. Look at possible ways of newer approaches for the solving the problem and enhancing the DRG-net.