**Data Collection and Preprocessing Phase**

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| Date | 02 October 2024 |
| Team ID | 740031 |
| Project Title | OptiInsight - Revolutionizing Ophthalmic Care With Deep Learning For Predictive Eye Disease Analysis |
| Maximum Marks | 6 Marks |

**Preprocessing Template**

the preprocessing steps involve several key stages. First, data collection is crucial, where you gather eye disease datasets such as retinal scans, OCT images, and other relevant data from public sources like Kaggle or EyePACS. Once the data is collected, it’s important to clean it by addressing missing values, removing duplicates, and handling any corrupted image files.

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| **Section** | **Description** |
| Data Overview | **Dataset**: Medical images (retinal scans, OCT) with disease labels from sources like Kaggle and EyePACS.  **Format & Labels**: JPEG/PNG/TIFF images with CSV metadata, containing disease or healthy labels.  **Challenges**: Class imbalance and image quality issues, handled with preprocessing and augmentation. |
| Resizing | **Resizing**: Images are resized to a consistent dimension.  **Uniformity**: Ensures consistent image size for model input.  **Purpose**: Improves processing speed and model accuracy. |
| Normalization | **Normalization**: Pixel values are scaled to a range of [0, 1] for consistent model input.  **Purpose**: Helps improve model convergence and accuracy during training. |
| Data Augmentation | **Data Augmentation**: Techniques like rotation, flipping, and zooming are applied to enhance dataset diversity.  **Purpose**: Increases the variation in training data to prevent overfitting.  **Benefit**: Improves model generalization and robustness |
| Denoising | **Denoising**: Removes noise from medical images to improve clarity.  **Purpose**: Enhances image quality for more accurate model predictions. |
| Edge Detection | **Edge Detection**: Identifies boundaries and key features in retinal images using techniques like Sobel or Canny.  **Purpose**: Highlights critical structures, such as blood vessels and lesions, for disease detection.  **Benefit**: Improves model focus on important image features for accurate diagnosis. |
| Color Space Conversion | **Color Space Conversion**: Converts images from RGB to grayscale for simpler analysis.  **Purpose**: Reduces complexity while retaining key features.  **Benefit**: Improves model efficiency and focus. |
| Image Cropping | **Image Cropping**: Crops irrelevant areas to focus on key features.  **Purpose**: Highlights important regions like lesions or vessels.  **Benefit**: Improves model accuracy with focused input data. |
| Batch Normalization | **Batch Normalization**: Normalizes activations within batches for stable training.  **Purpose**: Speeds up convergence and reduces covariate shift.  **Benefit**: Improves performance and reduces overfitting. |
| **Data Preprocessing Code Screenshots** | |
| Data Collection |  |
| Import the required library |  |
| Apply Image Data Generator functionality to Trainset and Test set |  |
| Pre-trained CNN model as a Feature Extractor |  |
| Adding Dense Layer |  |
| Train the model |  |
| Save the Model |  |