

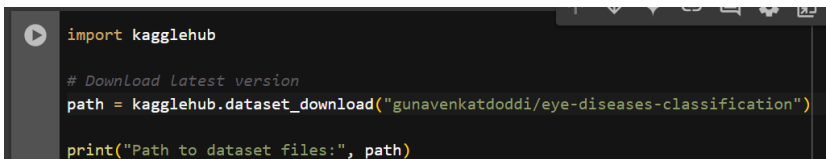
## Data Collection and Preprocessing Phase

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.

Section	Description
Data Overview	<b>Dataset:</b> Medical images (retinal scans, OCT) with disease labels from sources like Kaggle and EyePACS. <b>Format &amp; Labels:</b> JPEG/PNG/TIFF images with CSV metadata, containing disease or healthy labels. <b>Challenges:</b> Class imbalance and image quality issues, handled with preprocessing and augmentation.
Resizing	<b>Resizing:</b> Images are resized to a consistent dimension. <b>Uniformity:</b> Ensures consistent image size for model input. <b>Purpose:</b> Improves processing speed and model accuracy.
Normalization	<b>Normalization:</b> Pixel values are scaled to a range of [0, 1] for consistent model input. <b>Purpose:</b> Helps improve model convergence and accuracy during training.
Data Augmentation	<b>Data Augmentation:</b> Techniques like rotation, flipping, and zooming are applied to enhance dataset diversity. <b>Purpose:</b> Increases the variation in training data to prevent overfitting.

	<b>Benefit:</b> Improves model generalization and robustness
Denoising	<b>Denoising:</b> Removes noise from medical images to improve clarity. <b>Purpose:</b> Enhances image quality for more accurate model predictions.
Edge Detection	<b>Edge Detection:</b> Identifies boundaries and key features in retinal images using techniques like Sobel or Canny. <b>Purpose:</b> Highlights critical structures, such as blood vessels and lesions, for disease detection. <b>Benefit:</b> Improves model focus on important image features for accurate diagnosis.
Color Space Conversion	<b>Color Space Conversion:</b> Converts images from RGB to grayscale for simpler analysis. <b>Purpose:</b> Reduces complexity while retaining key features. <b>Benefit:</b> Improves model efficiency and focus.
Image Cropping	<b>Image Cropping:</b> Crops irrelevant areas to focus on key features. <b>Purpose:</b> Highlights important regions like lesions or vessels. <b>Benefit:</b> Improves model accuracy with focused input data.
Batch Normalization	<b>Batch Normalization:</b> Normalizes activations within batches for stable training. <b>Purpose:</b> Speeds up convergence and reduces covariate shift. <b>Benefit:</b> Improves performance and reduces overfitting.
<b>Data Preprocessing Code Screenshots</b>	
Data Collection	 <pre>import kagglehub  # Download latest version path = kagglehub.dataset_download("gunavenkatdoddi/eye-diseases-classification")  print("Path to dataset files:", path)</pre>

Import the required library	<pre> import splitfolders from tensorflow.keras.preprocessing.image import ImageDataGenerator from PIL import ImageFile ImageFile.LOAD_TRUNCATED_IMAGES = True from tensorflow.keras.applications.vgg19 import VGG19, preprocess_input from tensorflow.keras.layers import Flatten, Dense from tensorflow.keras.models import Model from tensorflow.keras.models import load_model from tensorflow.keras.preprocessing import image import numpy as np import matplotlib.pyplot as plt import matplotlib.image as mpimg %matplotlib inline </pre>
Apply Image Data Generator functionality to Trainset and Test set	<pre> training_set = train_datagen.flow_from_directory('/content/output/train',   target_size=(224, 224),   batch_size=64,   class_mode='categorical')  test_set = test_datagen.flow_from_directory('/content/output/val',   target_size=(224, 224),   batch_size=64,   class_mode='categorical') </pre>
Pre-trained CNN model as a Feature Extractor	<pre> VGG19 = VGG19(input_shape=IMAGE_SIZE + [3], weights='imagenet', include_top=False)  # Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/vg # 80134624/80134624 [=====] - 1s 6us/step  for layer in VGG19.layers:     layer.trainable = False  x = Flatten()(VGG19.output) </pre>
Adding Dense Layer	<pre> prediction = Dense(4, activation='softmax')(x) model = Model(inputs=VGG19.input, outputs=prediction) </pre>
Train the model	<pre> r = model.fit(     training_set,     validation_data=test_set,     epochs=50,     steps_per_epoch=len(training_set),     validation_steps=len(test_set) ) </pre>
Save the Model	<pre> [ ] model.save('evgg.h5') </pre>

