PROJECT TITLE

Self-supervised learning for medical image analysis using image context restoration

Guided by : Prof. U. A. Nuli

INTRODUCTION

- Deep Learning methods have achieved great success in computer vision but its model usually requires a decent amount of labeled data.
- The amount of unlabelled data is substantially more than the labelled ones.
- So, the pre-trained models from the natural images are not useful on medical images.
- Labelling natural images are somewhat easy. But, the annotation for medical images requires expert knowledge.

INTRODUCTION

- There is also scarcity of experts to annotate medical images present.
- The experts are scarred in count as well as if they are available they are very busy in order to give diagnosis. The diagnosis process also takes more time.
- So we learn representations without labels by getting supervision from the data or image itself Which is known as self-supervised learning.

OBJECTIVES

1. To Generate training images for self-supervised context disordering.

2. To build self-supervised based model on context restoration to learn useful semantic features from images.

3. Fine tuned the self supervised model for target task

SCOPE

1. Proposed model is useful in segmentation of medical images, specifically for retinal images.

2. The retinal image dataset generated can be useful for training other models.

3. Generated Model can be used to extract blood vessels from retinal fundus images.

METHODOLOGY

Architecture Diagram :-

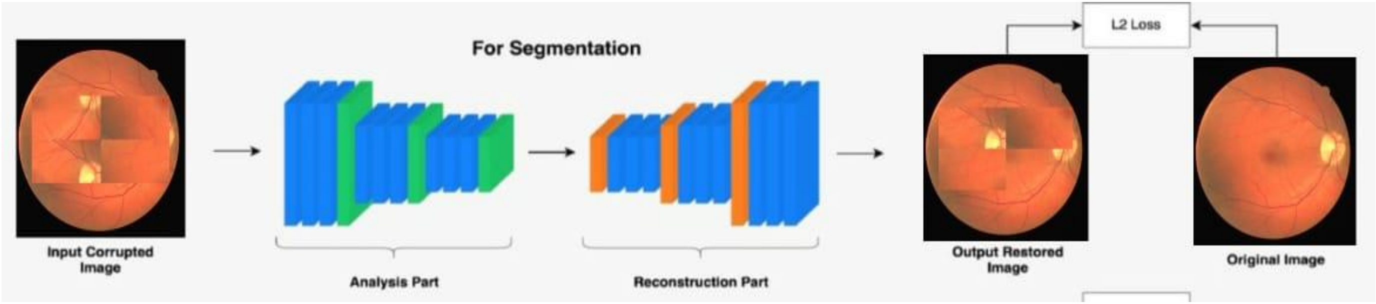


Fig. General CNN architecture for the context restoration self-supervised learning

METHODOLOGY

Components :-

- The **Encoding part** of the CNN is responsible for extracting feature maps from the input images. This is done using stacks of convolutional units and down sampling units.
- The **Decoding part** of the CNN is responsible for generating output images in which the context information has been restored. This is done using stacks of convolutional layers and up-sampling layers.

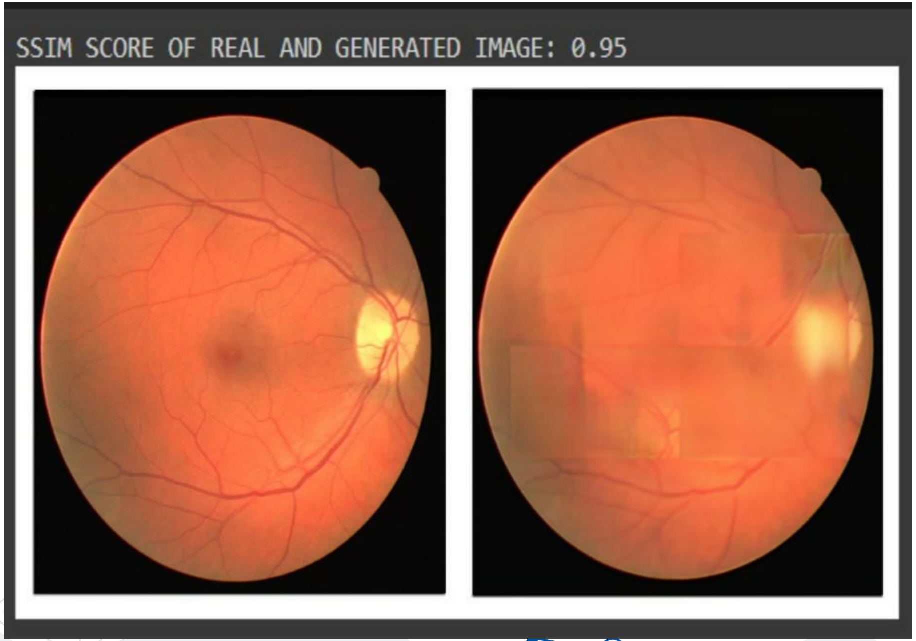
Testing and Performance Analysis

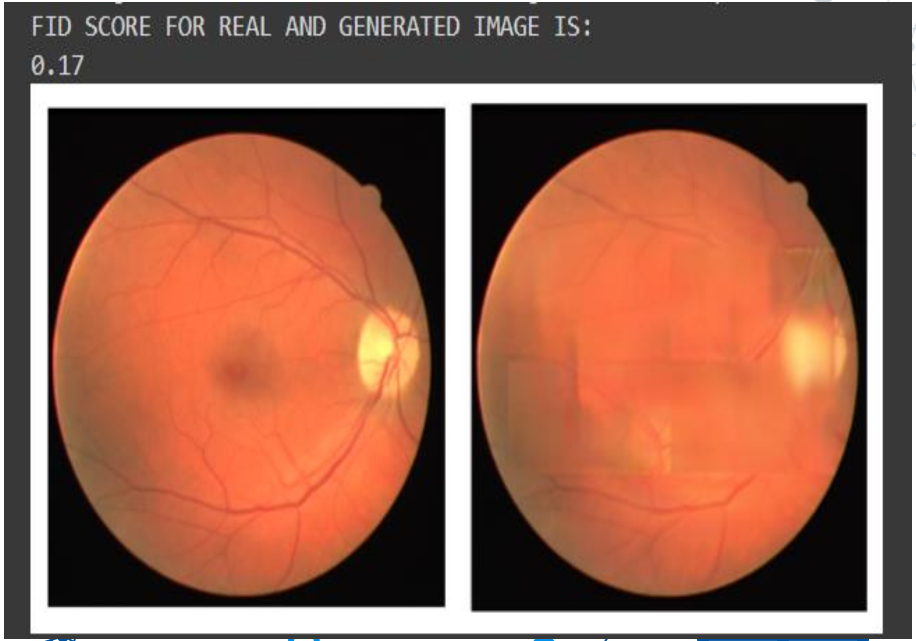
- The evaluation phase of Retinal Image Synthesis is crucial for assessing the quality and fidelity of the generated images. Various metrics are employed to measure the performance and assess the synthesized images.
- Among these metrics, SSIM (Structural Similarity Index), FID (Fréchet Inception Distance) are utilized to evaluate the quality and fidelity of the retinal images generated

Testing and Performance Analysis

- Both SSIM and FID provide quantitative measures to assess the performance of machine learning models.
- SSIM focuses on assessing the structural similarity between images. Its value ranges from -1 to 1.
- FID takes into account the statistical properties of images and provides a measure of similarity in terms of visual features. FID scores are typically positive values, however a lower FID value is desired.

SSIM & FID Scores





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THANK YOU !