

Project Design
Phase-I
Proposed Solution Template

Date	24 October 2022
Team ID	PNT2022TMID42855
Project Name	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy

Proposed Solution Template:

The main aim of this project is to create an appropriate machine learning model to detect Diabetic Retinopathy as early as possible.

S No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<p>Diabetic Retinopathy is one of the emerging diseases which is the reason for blindness. DR mutilates the retinal blood vessels of a patient having diabetes.</p> <p>Diabetic Retinopathy (DR) is an ophthalmic disease that damages retinal blood vessels. DR causes imperfect vision and may cause blindness if it is not diagnosed in early stages.</p> <p>Early detection of Diabetic Retinopathy includes the identification of microaneurysms and hemorrhages.</p> <p>Because the signs and symptoms of diabetic retinopathy are typically not present during the first stage of the disease, it can often go undiagnosed until damage to vision has occurred.</p> <p>Existing methods are lacking in the earlier detection.</p> <p>Because preprocessing techniques used in those methods are not effective to analyze such smaller features (nearly 10 microns to 100 microns).</p>
2.	Idea / Solution description	<p>We opt to use multi-layer neural networks as deep NN.</p> <p>Due to the fact that data is Image, the best type of neural network satisfying our goal is Convolutional Neural Networks.</p> <p>As we have to do for most of the data, normalization plays an important role in our process.</p> <p>Before doing any tasks, preprocessing images (our dataset) is highly recommended.</p>

		<p>Consequently better accuracy will be achieved by preprocessed data.</p> <p>After preprocessing and normalizing, the prepared dataset could be used as input to our deep convolutional neural network.</p> <p>Then deep NN will be run and fit to our data and the result will be produced by that.</p> <p>This report will cover step by step how this deep convolutional network be implemented.</p>
3.	Novelty / Uniqueness	<p>One of the major decisions had to be made was choosing the suitable programming language satisfying our goal for extracting knowledge from our data.</p> <p>After some searching the suitable decision has been made by selecting Python as the project programming language.</p> <p>Due to the fact that, a lot of tools and frameworks are available for Python to create powerful Artificial Neural Networks.</p> <p>Also IBM Watson helps to predict future outcomes, automate complex processes and optimize user's time.</p> <p>And also the result accuracy will be increased from 70% which is the accuracy of the test results that the previous developed codes produced.</p>
4.	Social Impact / Customer Satisfaction	<p>It Reduction of Diabetic Retinopathy risk.</p> <p>It Provides Digital Assistance.</p> <p>It is Very helpful in making decisions faster.</p> <p>It Can be used 24x7.</p>
5.	Business Model (Revenue Model)	<p>This can be implemented as an essential diagnosis method in every hospital.</p> <p>Accurate detection and analysis can encourage the increase in financial benefit.</p> <p>It can collaborate with the government for health awareness camps.</p>
6.	Scalability of the Solution	<p>Accurate predictions and extensive use.</p> <p>Based on the times of the correct diagnosis.</p> <p>Availability.</p> <p>This project will help us to detect DR more precisely than the existing methodologies.</p> <p>Also it can produce a result which specifies the stages of Diabetic Retinopathy</p>