Review on Diabetic Retinopathy using CNN

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Abstract: Diabetic Retinopathy (DR) is an eye abnormality caused due to diabetes. As the sickness progresses it results in distortion and blurred vision. One of the most diabetes complication is Diabetic Retinopathy (DR) that causes major loss of vision or blindness. In present day medical science, estimation of images has become key instrument for exact identification of disease. So we have designed a computational model for predicting Diabetic Retinopathy (DR) status which is based on retinal image and neural network. Our computational model has been consisting of a feature extraction phase and a classification phase. In feature extraction phase we have extracted the most appropriate features from digital fundus images by Blood Vessels and Micro aneurysms detection. Finally, we have used CNN to predict the Diabetic Retinopathy (DR).

We used CNN (Convolutional Neural Network) Algoritham ,Deep Learning ,Python.

INTRODUCTION

Diabetes has currently become a worldwide sickness that ultimately ends up in complete vision loss. one in three folks diagnosed with the polygenic disease can have diabetic retinopathy up to an explicit degree and one in ten folks can suffer from vision loss. DR is the most debilitating form of diabetes in which serious damage occurs to the retina and causes visual impairments. It harms the veins inside the retinal tissue, making them spill fluid and contort vision. Alongside maladies prompting visual impairment like, waterfalls and glaucoma, DR is one of the most continuous diseases. There are five stages of DR that is 0, 1, 2, 3, and 4

Each stages has its own symptoms and specific properties, now from normal images doctors can not specify the DR stages. Moreover existing methods for diagnosing are very inefficient because it takes very large time, due to which the treatment may go the wrong way. To detect retinopathy doctors used fundus camera which takes the picture of veins and nerves which is behind the retina. The initial phase of this disease has no signs of DR, so it turns into a real challenge to recognize it into a starting stage.

For early detection we have used the different CNN (Convolutional Neural Network) algorithms, so that doctors can start the treatment at the correct time. DR leads to the harm of blood vessels within the retinal layer of attention. The capillaries could become leaky forming yellow-white flecks that square measure normally noted as exudates.

Diabetic Retinopathy (DR) is an eye abnormality caused due to diabetes. As the sickness progresses it results in distortion and blurred vision. The diagnosing of the DR image needs sure-handed clinicians to spot the presence of vital options that makes this a tough and time-intensive task.

So with the help of Diabetic Retinopathy (DR) doctors are right way to trite the diabetic patient.
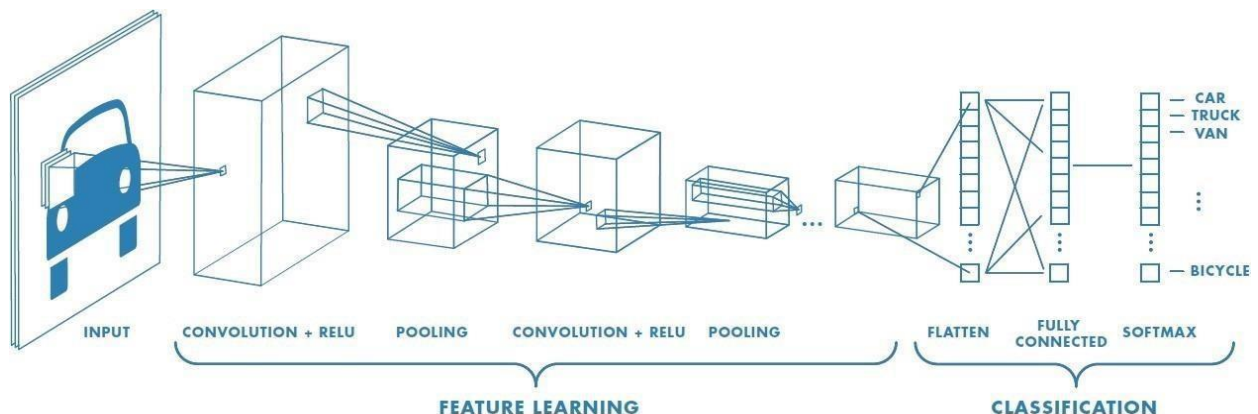

Figure 1: CNN Algorithm steps

I.   LITERATURE SURVEY

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As the amount of facts is growing exponentially now known as Big Data the exceptional manner to enhance the effects of digital assistants is to include our assistants with machine getting to know and train our gadgets according to their makes use of.
Other most important techniques which can be equally vital are Artificial Intelligence, Internet Of Things, Big Data get admission to and control, and so forth.

Diabetic Retinopathy Classification using Deep Learning, Proceedings of the Fourth International Conference on Inventive Systems and Control (ICISC 2020) IEEE Xplore Part Number: CFP20J06-ART; ISBN: 978-1-7281-2813-9. A. Abbas, S. Khan, A review on the state-of-the-art privacy preserving approaches in e-health clouds", IEEE Journal of Biomedical Health Informatics,2014.

In this article the proposed method uses four layers of convolution neural network to train a hundred and thirty anatomical structures and tested on one hundred images. All the images are classified into two classes, images having DR and images not having DR. This R-CNN (Regional CNN) approach was found to be economical in terms of speed and accuracy..

This has been one of the most beneficial improvements in era. Before AI we have been the ones who have been upgrading technology to do a assignment however now the gadget is itself able to counter new responsibilities and clear up it with out need to involve the people to conform it.

● **FUNCTIONAL REQUIREMENTS**
Functional user requirements is nothing but very high-level statement about what the system should and also it should describe clearly an overview of system service in detail
● **User Interfaces**
For user interface we will require any operating system and any support browser(recommended Google chrome) as we are going to deploy it on webserver
● **Hardware Interfaces**
A Hardware interface is needed to run software. Python and Browser compatible hardware required which is minimal requirement
● **Software Interfaces**
It uses python as the backend for model training. Python is used as backend application tool
● **Safety Requirements**
The system is designed in modules where errors can be detected
● **Security Requirements**
The system is designed in modules where errors can be detected
    and fixed easily

MODULES

A.   CNN(Convolutional neural network)
A CNN(Convolutional neural network) is a analyze the images and convert into array
1.   Take a Retina Image Captured from Fundus Cameras
2.   Preprocessing: resize image in the following dimension
        1).Width=128   2).Height=128 3),Depth=3
3. Covert Images to Array

B.   DATASET
We Require Image Dataset of Retina Images both left and Right Retina for Training and Testing model.This is an critical module, mainly in tasks in which we need to keep a track of right dataset. If the modules are too large or heavy then the system will lag and provide gradual responses.
C.   WEBBROWSER
Web-browser module is used to display web-based information to users. For example, if the user wants to scan his retina then his can easily do this browser and user gives input as " retina". Then input is processed using this module and the browser show the result according dataset.
D.   OS MODULE
OS Module provides an operating system dependent functionalities. If we want to perform operations on files like

reading, writing, or manipulate paths, all these types of functionalities are available in an OS module. All the operations available raise an error "OSError" in case of any error like invalid names, paths, or arguments which may be incorrect or correct but just no accepted by the operating system.

DESIGN

The design consists of the following:
(a)   Take image as a input.
(b)   In preprocessing the unwanted part is removed, segmentation will divide the area of interest into number of parts, feature extraction phase will extract the data and will store it for comparison purpose.
(c)   Applying layer is applied to a ReLU function to generate a rectified feature map.
(d)   The image is processed with multiple convolutions and ReLU layers for locating the features.
(e)   Different pooling layers with various filters are used to identify specific parts of the image.
(f)   After classification phase and comparison finally the disease is detected.
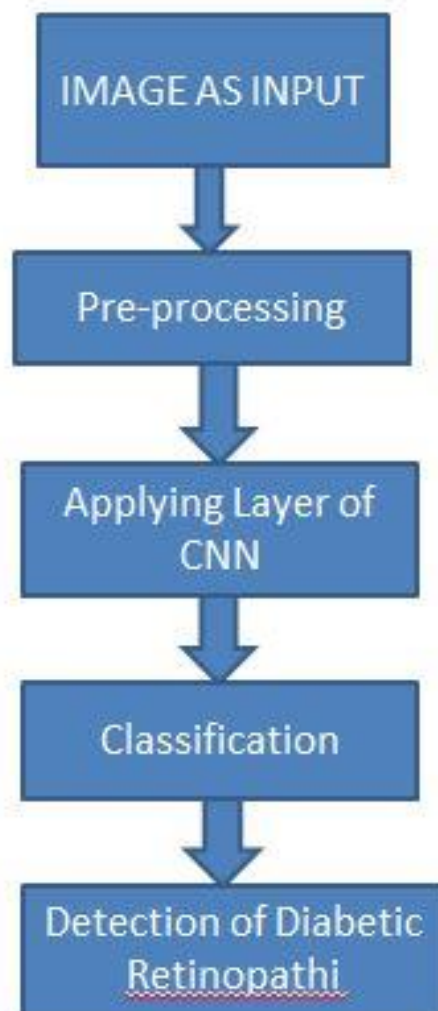(g)   Final output is display on site.

Figure 2:- Block-Diagram Diabetic Retinopathy

DATA FLOW DIAGRAMS:-

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system, which can later be elaborated. DFDs can also be used for the visualization of data processing.

Level 0 Data Flow Diagram
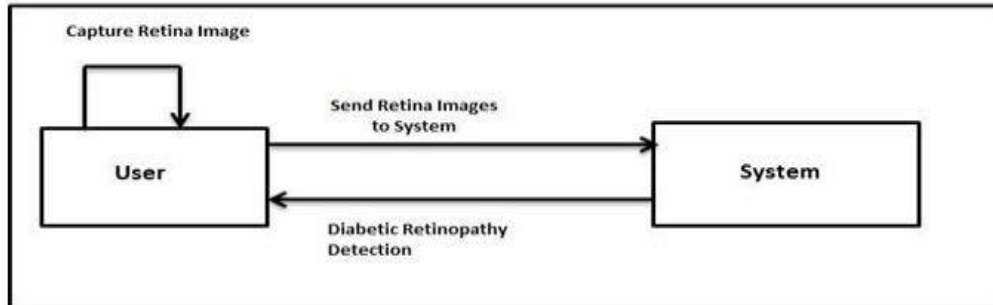
Figure 3:-Level 0 data flow diagram

FUTURE SCOPE

This model can be used in medical Industries for early detection diabetic retinopathy so we can start treatment of patient as possible. Machine learning is Revolution. Many complicated task can be solve using Artificial Intelligence and Machine Learning. In Future, If we will increase more data The destiny of these technology may have the integrated with Artificial Intelligence which incorporates Machine Learning, Neural Networks and IoT. With this technology, we are able to gain new heights.

IV. CONCLUSION

Thus we are going to implement a prototype web based software application in python for Diabetic retinopathy detection using Convolutional Neural Network We are going to per- form operations such as:
1. Pre processing
2. Segmentation
3. Feature Extraction
4. And disease prediction

As it is a prototype model, the accuracy will not be up to the mark , so it will need some improvements and commercial tools to develop a large scale application, which can be done in future after successful implementation of this project.

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