

# Diabetic Retinopathy Prediction using Deep learning

**Publisher :** IEEE

**Year :** 2021

**INSPEC Accession Number:** 21524405

**DOI:** [10.1109/CSITSS54238.2021.9683553](https://doi.org/10.1109/CSITSS54238.2021.9683553)

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## Abstract

Diabetic retinopathy(DR) is a problem in diabetic patients and one of the leading cause of blindness affecting the majority of people around the world. It can cause blindness if not diagnosed early. Due to the diversity and complexity of DR, identifying DR through tedious manual diagnosis is extremely difficult. Therefore, this paper focuses on classifying a certain set of fundus images into 4 stages using deep learning approach as a combination of Deep Convolutional Neural Networks (DCNN) and RNN-LSTM (RNN=Recurrent Neural Network, LSTM = Long Short-Term Memory). This approach automatically detects all the stages of DR. This combination extracts many features of fundus image. In total, approximately 2000 fundus images were used to form the combined model. This study demonstrates that the extraction of those features from fundus images using DCNN and RNN-LSTM has significantly improved the accuracy predicting the DR stages.

## Merits

The nerve locations are accurately spotted with spatial features and provides the boundary of the eye ball precisely.

Using DCNN (Deep convolutional neural network) the computational efficiency is increased which inturn provides automatic feature detection.

Combining the RNN with LSTM, LSTM has feedback connections, i.e., it is capable of processing the entire sequence of data, apart from single data points from such images so that the network remembers the previous input's prediction that is timely collection of records.

## Demerits

This network needs to predict spatial features precisely, hence it requires large number of data (ie) training the network needed higher samples for better accuracy.

Since dataset must also be more this reduces RNN's computational time.