

Analysis of Pre-trained Convolutional Neural Network Models in Diabetic Retinopathy Detection Through Retinal Fundus Images

José Escorcia-Gutierrez, Jose Cuello, Carlos Barraza, Margarita Gamarra, Pere Romero-Aroca, Eduardo Caicedo, Aida Valls & Domenec Puig

Abstract

Diabetic Retinopathy (DR) is a disease on the rise; as this is a complication of diabetes, it becomes an imminent fate in people who have not been treated correctly for the disease, resulting in possible loss of vision if not is detected in time. This disease affects the retina, and the diagnosis is made based on fundus images of patients, through which various lesions and anomalies can be visualized. Visual inspection is a challenging task, and the diagnosis is expert dependent. This article proposes a convolutional neural network (CNN) model to detect DR, a common illness in diabetic patients. This work allows estimating the capacity of a pre-trained CNN (VGG16) using the transfer learning technique to detect symptoms and injuries caused by DR. For learning and feature extraction we used a set of retinal images obtained from the APTOS 2019 Blindness Detection competition in Kaggle. This network is trained and learns to identify between healthy retina and RD with high performance, overcoming other works. The best experimentation we obtained reached an accuracy value of 96.86% for DR detection tasks.

Keywords

Diabetic retinopathy, Retinal imaging, Image recognition, Convolutional neural network, Transfer learning