Chapter 10
Survey or Review on the Deep Learning Techniques for Retinal Image Segmentation in Predicting/Diagnosing Diabetic Retinopathy

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ABSTRACT

Artificial intelligence (AI)-based image segmentation plays an important role in image processing and computer vision. AI can be used in the medical field (e.g., ophthalmology, disease prediction which involves direct visualization and imaging) as a frequent method for diagnosis. Deep learning comes under machine learning and as a part of AI. Deep learning algorithms have yielded considerable results in the medical field. Diabetic retinopathy is one of the most common causes of blindness, which is diagnosed by examining the appearance of the retina. The diabetic retinopathy stages are determined based on the changes seen in retina or retinal image. This chapter gives a detailed survey on different algorithms used for diagnosing diabetic retinopathy and different deep learning techniques used for medical image segmentation.

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INTRODUCTION

Deep learning architecture has various kinds of layers such as convolutional, fully connected and recurrent layers. It also includes supervised and unsupervised learning of feature representation with various layers. The hidden layers of an Artificial Neural Network are also included in deep learning layers. To maximize the development of deep learning algorithms in different fields, distinct deep learning algorithms have different algorithms. Deep learning has a huge impact in healthcare. It has enabled the sector to improve patient monitoring and diagnostics (Alyoubi, 2020). Deep learning can interpret medical images like X-ray, MRI scan, CT scan etc. An image is made up of a number of distinct pixels. Image segmentation is used to group pixels with similar properties together. Image segmentation is the process of dividing an image into multiple segments. An object type is allocated to each pixel in the image throughout this process. As some area of the image contain no information, it is not necessary to process the entire image. Therefore, image segmentation is done to extract the key segments for processing. The Semantic segmentation and instance segmentation are the two types of image segmentation. All objects of the same type are identified by a single class label in semantic segmentation as in Figure 1. But in instance segmentation, related objects are identified by their own labels. Recognizing the pixels of organs or lesions from background medical pictures such as CT or MRI scans are the key challenges in medical image processing in order to offer important information on the shapes and sizes of these organs.

Figure 1. Types of Segmentation