

Chapter 11

Deep Learning Models for Detection and Diagnosis of Alzheimer's Disease

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ABSTRACT

The chapter explores the implications of deep learning in medical sciences, focusing on deep learning concerning natural language processing, computer vision, reinforcement learning, big data, and block-chain influence on some areas of medicine and construction of end-to-end systems with the help of these computational techniques. The deliberation of computer vision in the study is mainly concerned with medical imaging and further usage of natural language processing to spheres such as electronic wellbeing record data. Application of deep learning in genetic mapping and DNA sequencing termed as genomics and implications of reinforcement learning about surgeries assisted by robots are also overviewed.

INTRODUCTION

Deep learning (LeCun et al., 2015) is a subpart of a machine learning family and has very high computational power. The sudden and extreme growth of deep learning is because of its very high computational power and the availability of huge datasets. The dramatic advancement in the field of deep learning is the manipulation capability of machines especially speech (Hinton et al., 2012), images (Russakovsky et al., 2015), and languages (Hirschberg & Manning, 2015). Deep learning models can manipulate large datasets with the requirement of high computing hardware and will improve gradually with the increas-

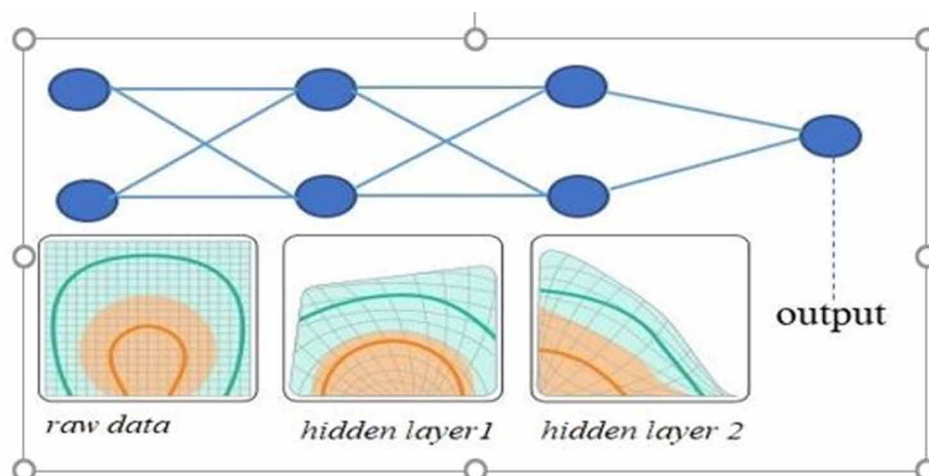
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ing size of data and thus enhancing its capability to do better than many traditional machine learning approaches. The striking feature of deep learning is to accept many data types as input which specifies its aspect of specific pertinence for different health care data. The figure below depicts a simple, multilayer deep neural network that takes input data from two different classes of data, with two different colors, and separates them in a linear fashion linearly by recursively changing the data as it flows from one layer to next layer. The classification is done by last output layer and generates the possible output from any one of the class. This illustration explains the straightforward perception implemented by huge scale networks.

ALZHEIMER'S DISEASES

From the medical point of perspective, the illness is not a complete scientific concept, as an additional health concern. Every person possesses remembrance or distinctive awareness of the long-standing disease and one of the most important anthropological apprehensions (Armstrong & Hilton, 2014). De facto definition of any disease in medical sciences is the general ailment of the normal functioning of the body with specific signs and indications. (Armstrong & Hilton, 2014; Scully, 2004). The ailment is an amalgam of visible signs and indications that doctors must understand properly. Analysis and treatment have guided this course of action. The Disease diagnosis in healthcare is a complicated and difficult process, that is why doctors find several reasons and conditions for medical signs at the same time (Leaman et al., 2013). Disease prediction in healthcare situations have no specified definition, but addresses the assessment building process in overall healthcare, which helps in understanding complex health issues of a patient (Committee on Diagnostic Error in Health Care, 2015). Evaluation of the disease is central in the formation of clinical judgment, which includes various individual and unprejudiced factors. A prompt and crystal-clear diagnosis, therefore, has the dynamic role in critical diseases or disorders. That is why, the recovery plan can't be determined until an absolute diagnosis is regulated (Scheuermann et al., 2009). The main objective of present medical science projects with the

Figure 1.



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