

Chapter 13

Artificial Intelligence Approaches to Detect Neurodegenerative Disease From Medical Records: A Perspective

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ABSTRACT

This chapter gives a brief overview of the state of the art of machine learning approaches in detection of the neurodegenerative disease from medical records (brain scans, etc.). It starts with an understanding of the sub-field of artificial intelligence, machine learning, then goes to understand neurodegenerative disease, with a focus on four major diseases and then goes on to giving an overview of how such diseases are detected using machine learning. In the end, it discusses the future areas of research that needs to be done in order to improve the field of research.

BACKGROUND

The application of artificial intelligence in the diagnosis of the disease is not at all new. But what is new is the approach that has been and is being regularly updated to be taken. The technologies that are taken like support vector machine and other technologies are of interest here. Basically these technologies are used to speed up the diagnosis process that is evident from the usage in the technologies and also remove the error in the process of diagnosis.

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INTRODUCTION

Neurodegenerative disease is a condition of the humans where the Neurons or the brain cells are affected and hence the patient gets many kinds of symptoms like shaking, tremble etc. This condition is generally progressive in nature and is a disease of no perfect cure. This is the reason why

Introduction of Artificial Intelligence

A question that intrigued many philosophers and mathematicians alike is the fact that whether there is a mathematical description of what we call as learning and can that mathematical description be developed into a method which can be programmed in computer so that the computers can also think. We have tread a long way from the philosophical angle of computational machines that can think to what we call today as machine learning. Machine learning a part of artificial intelligence is the method by which the machines can also think in limited ways. To be able to make the computer learn and also think we have to take a multi-disciplinary way of thinking to be able to develop algorithms which can be converted into computer programs so that the machines can think Jordan, m. I., & Mitchell, t. M. (2015). Mathematical processes of learning is lying at the intersection of statistics, mathematics and computer technology. It is this multi-disciplinary approach that makes it possible for the computers to think in the ways that humans do but in limited domains. This field of research has a very unique and specific questions which it intends to answer:

1. Can we develop algorithms that it will make the computer think and reason?
2. How do humans reason and think?
3. Does the processes of human reason and thinking follow some specific laws which can be developed and denoted by mathematics?

These questions are rather philosophical than scientific one. To answer this questions we have to think in ways which is different from what people think about machine learning. The simple answer to this question lies in the fact that human thinking can be mathematically representable and be turned into a computer program so that it is possible for the computers to reason and think Murphy, k. P. (2012); Hastie, t., et al. (2005). Methods of artificial intelligence and machine learning are unique in nature in that they inculcate the various mathematical and statistical methods to learn but are also similar to how humans learn. Artificial intelligence and machine learning tries to emulate the way humans learn and it also so it's exceeds in doing it by the computational power in the speed of doing it. Most of the problems of artificial intelligence and its subset machine intelligence or what we called as machine learning is classification and regression. It is a requirement for the machine learning to classify the input data into various classes so that it may then worked upon the various classes of data so that it be able to make decisions and augmented for the human to make decisions. Mainly the methods of artificial intelligence is of finding the optimum solution to a problem devised by the humans for diverse requirements. This is a type of solution to a problem call the functional approximation. The accuracy of the functional approximation problem is to be increased by the learning that the machine is going through by online methods, reinforcement methods or other methods of machine learning. Machine learning which is a subset of artificial intelligence tries to emulate the problem into different classes of data and then trying to find out the one dimensional or multidimensional answer to the multi class data thus produced.

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