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Future Prospective of Soft Computing Techniques in Psychiatric Disorder Diagnosis

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1. Introduction

Psychological disorders are an anomalous condition of distress mutilation or unexpected reactions. It is an ongoing dysfunctional pattern of thoughts, emotions, and behaviour. These disorders cover a wide range of human diseases that may affect both the mental and physical state of humans [1]. These disorders may be categorized as mood disorder (depressive, bipolar and cyclothymic disorder), anxiety disorder (panic, obsessive-compulsive, post-traumatic stress, phobias), sleep and eating disorder, dissociative disorder, cognitive disorders (dementia, Parkinson, Alzheimer), Adolescence and Infancy Disorder (autism, speech disorder, attention deficit disorder with hyperactivity) and personality disorders. Biological, psychological and social causes are three major categories of causes for the development of these disorders [2]. As per the report, one-third of overall health-related problems are due to one or other psychological disorders [3-4]. Furthermore, as per the World Federation for Mental Health 2018 report, approximately 20% of youth have been suffering from one or another psychiatric disorder. Unfortunately, the prolonged presence of these disorders may further lead to several chronic and life-threatening disorders. To avoid, these types of problems the diagnosis of these human disorders should be done as early as possible.

2. Soft Computing Techniques

Soft computing is a consortium of methodologies that handles ambiguity in real-life situations. Unlike hard computing techniques, soft computing techniques are tolerant to imprecision, uncertainty as well as an approximation [5][6]. In general, these are optimization techniques that are supposed to solve real-life problems (NP-hard, NP-complete) effectively. Fuzzy logic, Artificial Neural Network (ANN), Nature-inspired Computing (NIC) techniques, stochastic reasoning and deep learning techniques are some of the major soft computing approaches:

- The idea of fuzzy logic was given by Dr Lotfi Zadeh of the University of California. Fuzzy logic deals with the degree of truth rather than the exact value such as true or false and can effectively handle imprecise or incomplete problems [7].
- An artificial neural network is a parallel computing technique that tries to mimic the working model of the brain. The neural network itself is not an algorithm, rather, it sets a framework for many different machine learning algorithms to work together and process complex data inputs [8].
- NIC methods are stimulated from different aspects of nature like humans, birds, insects, animals, water etc. There exist more than a hundred nature-inspired computing algorithms [9].
- Stochastic reasoning assists in reckoning the values for the random variable [10].
- Deep learning is based on learning data representation as opposed to task-specific algorithms. In other words, it is an emerging artificial concept that deals with emulating the learning approach of