Chapter 61
A Study on Hybridization of Intelligent Techniques in Bioinformatics

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ABSTRACT

This chapter aims to study the use of Hybridization of intelligent techniques in the areas of bioinformatics and computational molecular biology. These areas have risen from the needs of biologists to utilize and help interpret the vast amounts of data that are constantly being gathered in genomic research. Also describes the kind of methods which were developed by the research community in order to search, classify and mine different available biological databases and simulate biological experiments. This chapter also presents the hybridization of intelligent systems involving neural networks, fuzzy systems, neuro-fuzzy system, rough set theory, swam intelligence and genetic algorithm. The key idea was to demonstrate the evolution of intelligence in bioinformatics. The developed hybridization of intelligent techniques was applied to the real world applications. The hybridization of intelligent systems performs better than the individual approaches. Hence these approaches might be extremely useful for hardware implementations.

INTRODUCTION

Intelligent systems which may offer humanlike experience like domain information, uncertain reasoning, and adaptation to a noisy and time-varying environment, are vital in endeavor sensible computing issues. Hybrid intelligent system could be a promising area of modern machine intelligence. An elementary stimulant to the investigations of hybrid intelligent systems is that the awareness within the educational

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communities that combined approaches may be necessary if the remaining robust issues in hybrid intelligent system are to be resolved. The combination of various learning and adaptation techniques are used to overcome individual limitations and to attain cooperative effects through the hybridization or fusion. Hybridization of intelligent systems are becoming a very important problem solving methodology poignant researchers and practitioners in areas starting from science, technology, business and commerce. In recent years, these techniques have contributed to an oversized range of recent intelligent system designs. Most of those hybridization approaches follow an ad hoc design methodology justified by success in certain application domains. Hybridization of various intelligent systems is an innovative approach to construct computationally intelligent systems consisting of artificial neural network, fuzzy inference systems, rough set, approximate reasoning and bio inspire algorithms like evolutionary computation, swarm intelligence and Ant colony technologies so on.

Bioinformatics and machine biology are involved with the utilization of computation to know biological phenomena and to acquire and exploit biological information, increasingly large scale information.

Strategies from bioinformatics and computational biology are increasingly used to augment or leverage ancient laboratory and observation-based biology. These strategies became crucial in biology as a result of recent changes in our ability and determination to acquire massive large biological information sets, and as a result of the ever present, in biological insights that have come back from the exploitation of these information. This transformation from a data-poor to a data-rich field began with DNA sequence data, however is currently occurring in several different areas of biology. DNA sequence analysis (Sathish et al, 2012) is attractive to computer scientists because of the availability of digital information. However, there are many challenges related to this area such as:

1. Parsing a genome in order to find the segments of DNA sequence with various biological roles.
2. DNA sequence analysis (Sathish et al, 2012) is engaging to computer scientists owing to the provision of digital data.

However, there are several challenges associated with this area such as:

1. Parsing a genome so as to search out the segments of DNA sequence with numerous biological roles. As an example, encryption proteins and RNA, and dominant once and wherever those molecules are expressed.
2. Aligning the sequences in DNA sequences so as to check for similarity or variations.

The alignment procedure may be performed locally (DNA fragment level) or globally (genome level). DNA arrays or DNA Chips were projected in the late Eighties by many researchers severally for the aim of DNA sequencing and therefore the technology was named DNA sequencing by Hybridization.

Hybridization of intelligent system is a well-established paradigm with current systems having many of the characteristics of biological computers and capable of performing a variety of tasks that are difficult to do using conventional techniques. It is a methodology involving adaptive mechanisms and/or an ability to learn that facilitate intelligent behavior in complex and changing environments, such that the system is perceived to possess one or more attributes of reason, such as generalization, discovery, association and abstraction. The objective of this article is to present to the hybridization of intelligent system and bioinformatics research communities some of the state-of-the-art in hybridization of intelligent system applications to bioinformatics and motivate research in new trend-setting directions. In this