An Introduction to Bioinformatics and Computational Biology for Computational Intelligence Researchers

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Bioinformatics is most broadly the use of (and development of) computer science and statistical tools and techniques to acquire, store, organize, archive, analyze and visualize biological data. More specifically, the term has come to refer to forms of biology that relate to genetics, such as comparison of genetic sequences across individuals or species, evolutionary relationships based on the genetic record, and the relationships between gene expression levels and disease. The related term of Computational Biology is often used to refer to other forms of using computational approaches to understand and model biological phenomena. While on the one hand, Bioinformatics and Computational Biology is an enormously specialized are, on the other hand, it is a broad field covering a wide range of biological, chemical, and physical questions and a wide range of computational and quantitative approaches. This breath can make the field intimidating at first.

This tutorial is intended to introduce researchers in Computational Intelligence (CI) to the field of Bioinformatics and Computational Biology, with two primary intentions:

1. Making Bioinformatics and Computational Biology research talks at WCCI more accessible.

2. Helping CI researchers understand how they might participate in this research area and the benefits of doing so.

The tutorial will proceed in two strands. In the first strand, relevant biology concepts and molecular biology techniques will be introduced, along with the research questions to be pursued. In the second strand, an overview of CI research to address these will be presented.