

Chapter 16

Bioinformatics and Its Therapeutic Applications

Sarvesh Kumar Gupta
IIT Allahabad, India

Kamal Kumar Chaudhary
IIT Allahabad, India

Nidhi Mishra
IIT Allahabad, India

ABSTRACT

Bioinformatics has emerged as a major element in contemporary biomedical and pharmaceutical region. Bioinformatics deals with growth in biological data and has led to development of many databases. Bioinformatics deals with collection of data that is relevant clinically and these days separate term clinical information has come up. Data mimics are another field which is gaining importance. This chapter shall deal with introduction of bioinformatics and its applications in medicine and health care.

INTRODUCTION

Bioinformatics is an applied science including computer science and Biological related research area. There is model change in biological research approach used in computer application (Bayat, 2002) many software tools and computational mathematics model in different field experiment in a high labeled (Cohen, 2004). Bioinformatics introduces the exponential development in life science including chemical and biological data development of primary database and secondary database protein sequencing, nucleic acid sequencing and many structures (Altman, 1998). Some of the known database including Protein database, gene database, zinc database, Swissprot database, CATH database, SCOP database and PIR database etc. These databases are easily available in many private internet Server Company and government domain information. Essential research and protein modeling is completed using these database with helpful for the protein sequencing analysis tool like FASTA, BLAST, CLUSTALW etc. and the protein modeled structure are visualized in using (Russo, 2000) Bioinformatics work as im-

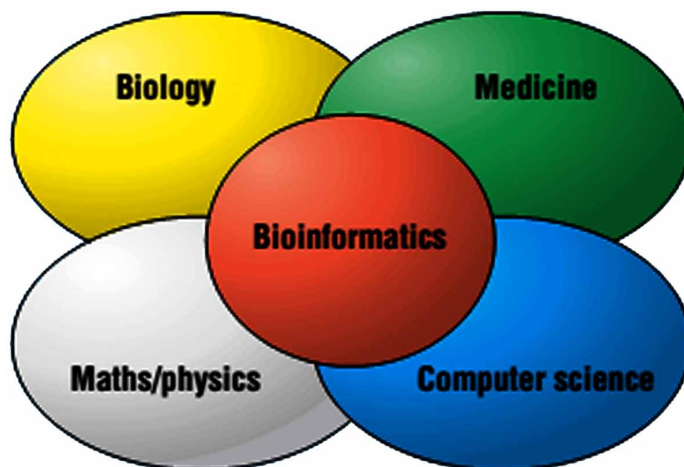
DOI: 10.4018/978-1-5225-1762-7.ch016

portant role in mixture of broad disciplines of biological organ/tissue to understand the organ complex mechanisms of the body cell. Bioinformatics is also the way in which Pharmaceutical investigation, biomedical investigation and health science use the information technology in their testing proof. The complete process of biological and information data collection to analysis of the proof result such testing may be classified under the specific area named –cheminformatics, Pharma co-informatics and clinical information (Wooley, 1999) (Figure 1).

WHAT IS BIO-INFORMATICS

Bioinformatics research and development studies two important information technology steps in modern biology. The first is the step of proteomic & genomics information from the DNA and RNA of an individual *Homo sapiens* organism up to the characteristics of a population growth of such organisms (Altman, 1998). The second is the steps of practical information from observed biological activity phenomena to models that explain them and then to new experiments in order to test these models. The discipline of bioinformatics has its roots in a number of activities, including the body organization of DNA & RNA sequence and protein three-dimensional structural data collections in the 1960's and 1970's (Langridge, 1974). It has become a booming academic and industrial enterprise with the introduction of biological experiments that rapidly produce massive amounts of data (such as the multiple genome sequencing projects, the large scale analysis of gene expression, and the large scale analysis of protein-protein interactions). Basic biological science has always had an impact on clinical medicine & pharmaceutical (information systems), and is creating a new generation of epidemiologic, diagnostic, prognostic, and treatment modalities. Bioinformatics efforts that appear to be wholly geared towards basic science are likely to become relevant to clinical informatics & pharmaco informatics in the coming decade. For example, DNA sequence information and sequence annotations will appear in the medical chart with

Figure 1. Interaction of disciplines that have contributed to the formation of bioinformatics (source- Science, medicine, and the future: Bioinformatics, a new interdisciplinary science, is essential to managing, understanding, and harnessing clinical benefit from new genetic data.)



32 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/bioinformatics-and-its-therapeutic-applications/174134

Related Content

Scoring Functions of Protein-Ligand Interactions

Zhiqiang Yan and Jin Wang (2016). *Methods and Algorithms for Molecular Docking-Based Drug Design and Discovery* (pp. 220-245).

www.irma-international.org/chapter/scoring-functions-of-protein-ligand-interactions/151889

Protein-Protein Interactions (PPIs) as an Alternative to Targeting the ATP Binding Site of Kinase: In Silico Approach to Identify PPI Inhibitors

Sailu Sarvagalla and Mohane Selvaraj Coumar (2017). *Pharmaceutical Sciences: Breakthroughs in Research and Practice* (pp. 1115-1143).

www.irma-international.org/chapter/protein-protein-interactions-ppis-as-an-alternative-to-targeting-the-atp-binding-site-of-kinase/174163

Pharmacological Evidence on Drug-Herbal Interactions on the Human Body: Drug-herb Interactions Between Cardiovascular Drugs and Chinese Herbs

Tan Chia Hui, Jian Xin Chu, Wen Wen Lee and Ching Hua Ng (2023). *Cases on Teaching Pharmacology to Complementary and Alternative Medicine Students* (pp. 130-140).

www.irma-international.org/chapter/pharmacological-evidence-on-drug-herbal-interactions-on-the-human-body/320636

Non-Ionic Surfactant Vesicles (Niosomes) as New Drug Delivery Systems

Abbas Pardakhty (2017). *Novel Approaches for Drug Delivery* (pp. 89-119).

www.irma-international.org/chapter/non-ionic-surfactant-vesicles-niosomes-as-new-drug-delivery-systems/159656

Quasi-SMILES for Nano-QSAR Prediction of Toxic Effect of Al₂O₃ Nanoparticles

Alla P. Toropova, P. Ganga Raju Achary and Andrey A. Toropov (2017). *Pharmaceutical Sciences: Breakthroughs in Research and Practice* (pp. 1573-1584).

www.irma-international.org/chapter/quasi-smiles-for-nano-qsar-prediction-of-toxic-effect-of-al2o3-nanoparticles/174181