

What is bioinformatics?

Bioinformatics is a biomedical science field that incorporates computational biology to analyze biological data. It involves the development of computational tools and using these tools to generate data, store, and access, analyze and extract information of biomedical (health) importance from these data. The main types of data involved are DNA, RNA and Protein sequence and structure data. The field of bioinformatics that deals with DNA data is called Genomics. Proteomics deal with protein data and Transcriptomics deals with RNA data. Exome analyses deal with exons of genes while epigenome deals with epigenetics data. Apparently, Bioinformatics is a blend of Molecular Biology and Computational Biology. Structural Bioinformatics is the branch that deals with molecular structures while functional Bioinformatics deals with sequence data and their related ontologies.

What is your perceived role of Bioinformatics in science, today?

Bioinformatics, to me, has taken a center stage in the Biological Sciences today as almost no project can run to completion without incorporating an aspect of Bioinformatics. One particular feature of Bioinformatics in science is that it bridges the gap between the Biological Sciences and Computer Sciences. This affords an extensive capability for developing very effective and efficient intervention strategies. These include more effective vaccines, drugs, high yield crops, pest tolerant crops, cancer chemotherapy, diagnostic kits etc.

For example, many more genetic risk factors of type 2 diabetes (T2D) have been discovered as a result of genome-wide association studies (GWAS). Knowledge of these factors leads to improved lifestyle and healthy living with great attention to one's diet and exercise. GWAS have also lead to many risk and resistant factors to malaria.

Identification and discovery of new organisms and species is a common endpoint in many projects now thanks to Bioinformatics. Once isolation of 16S or 18S ribosomes has been performed, sequencing is done and alignment plus phylogenetic analysis are performed to identify the organism.

Molecular/homology modelling, virtual screening and docking are just a few of the Bioinformatics processes performed to identify or design novel and more effective drug candidates and/or targets against many diseases.

All these examples and many more show the centrality of Bioinformatics to the Biological sciences and Science as a whole.