Aims of bioinformatics

The aims of bioinformatics are threefold.

1. First, at its simplest bioinformatics organizes data in a way that allows researchers to access existing information and to submit new entries as they are produced, eg the Protein Data Bank for 3D macromolecular structures. While data- curation is an essential task, the information stored in these databases is essentially useless until analyzed. Thus the purpose of bioinformatics extends much further.
2. The second aim is to develop tools and resources that aid in the analysis of data. For example, having sequenced a particular protein, it is of interest to compare it with previously characterized sequences. This needs more than just a simple text-based search and programs such as FASTA and PSI-BLAST must consider what comprises a biologically significant match. Development of such resources dictates expertise in computational theory as well as a thorough understanding of biology.
3. The third aim is to use these tools to analyze the data and interpret the results in a biologically meaningful manner. Traditionally, biological studies examined individual systems in detail, and frequently compared them with a few that are related. In bioinformatics, we can now conduct global analyses of all the available data with the aim of uncovering common principles that apply across many systems and highlight novel features.

Summary: The field of bioinformatics has three main objectives:

1. To organize vast reams of molecular biology data in an efficient manner
2. To develop tools that aid in the analysis of such data
3. To interpret the results accurately and meaningfully.

Scope of bioinformatics

Bioinformatics is being used in following fields:

1. Microbial genome applications
2. Molecular medicine
3. Personalised medicine
4. Preventative medicine
5. Gene therapy
6. Drug development
7. Antibiotic resistance
8. Evolutionary studies
9. Waste cleanup
10. Biotechnology
11. Various Fields of Bioinformatics Climate change Studies
12. Alternative energy sources
13. Crop improvement
14. Forensic analysis
15. Bio-weapon creation
16. Insect resistance
17. Improve nutritional quality
18. Development of Drought resistant varieties
19. Vetinary Science

Applications in Medicines:

In the field of medicine applications of bioinformatics is used for following areas

A. Drug discovery- The idea of using X-ray crystallography in drug discovery emerged more than 30 years ago, when the first 3D structure of protein was determined. Protein structure can

influence drug discovery at every stage in design process. The Bioinformatics help us to detect Protein structure.

B. Personal medicines- Personalized medicine research is attempt to identify individual solution based on the susceptibility profile of each individual. It s hoped that these fields will enables new approaches to diagnosis, drug discovery and individualized therapy.

C. Preventive medicine- Preventive medicine consist of measures taken to prevent disease rather than curing them to treating their symptoms.

D. Gene therapy- Gene therapy is a novel form of drug delivery that enlists the synthetic, machinery of the patient's cell to produce therapeutic agents. It involves the efficient introduction of functional genes into the appropriates cells of the patients in order to produce sufficient amount of the protein encoded by transferred gene (tansgene) So as to princely and permanently correct this disorder.

Microbial genome applications:

Waste cleanup- in bioinformatics, bacteria and other microbes are identified which are helpful in cleaning waste. *Deinococcus radiodurans* bacterium has the ability to repair damaged DNA and small fragments from the chromosomes by isolating damaged segments in a concentrated area. Gene from the other bacteria have been inserted to the *D. radioduranas* for environmental cleanup.

Application in Agriculture:

Bioinformatics plays a significant role in the development of the agricultural sector, agro-based industries, agricultural by-products utilization and better management of the environment Crop improvement- Collection and storage of plant genetic resource and wisely application of bioinformatics help to produce stronger, more drought, disease and insect resistant crops and improve the quality of livestock making them healthier, more disease resistant and more productive.