

## Utilization of Bioinformatics in the Field of Biotechnology-A Review

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### ABSTRACT

*Bioinformatics can be defined as “It is the utilization of computational approaches for the analysis, management and storage of biological data”. The usage of Bioinformatics tools in the field of biotechnology has made possible of sequencing data managements and drugs designs at very high rate. The development of Bioinformatics has revolutionized the biotechnological approaches. To analyze, manage, store and interpret different biological complex systems, numerous apparatuses and software have been produced. Many techniques in Bioinformatics have been developed like dynamic simulations, annotations, dockings, modellings, data sequencing and aligning and other ones which all these have enhanced the rate of research and technology in the Biotechnology. We can expect from the scientists that they will develop more beneficial techniques in Bioinformatics. These new techniques will be more helpful for the scientific community and other human beings. In this review, we will discuss the main roles of Bioinformatics in many fields of the Biotechnology.*

**Keywords:** *Biotechnological tools, Bioinformatical tools, Complexity, Modellings, Genomics study, Proteomics analysis, Drugs discoveries.*

### INTRODUCTION

Biological Informatics or shortly bioinformatics is the branch of science which deals with the computational study of the genomics. We can say it deals with the analyzing, sequencing, storing and interpreting of the biological complexities. Now a days, many researchers say it as computational

biology. The humans genome project came into development is only due to the Bioinformatics. In simple words, we can say that Bioinformatics deals in coordination with computer sciences, information technologies and biological sciences (Goodman, 2012). Then, all these branches collectively make a single field of study called Bioinformatics.

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It also comprises of many other fields of biology like evolution, genomics, genetics, proteomics and transcriptomics. The main focus of this biological branch is that we should be able to know about the unseen and unknown aspects of the universe (Jhalla et al., 2000). The engineering tools along with different scientific methods are present in this branch. This mostly runs on discoveries of new and latest algorithms programs, software and new updated databases that all aid in the solving most biological complications. So at the same time, many tools, software, databases and programs are present to solve the complex biological systems. Thus, we can easily save our time, expenditures and technician costs as we have already stored or managed data. In 1956, first of all the proteins databases in sequenced forms were produced. But this was possible only due to bioinformatics. Now we take the example of human genomes sequencing projects. The human genome is so large if fixed in books, the compiled data will come fit into 200 volumes of the 1000 pages of each and the reading will take about 26 years in all over the clock. This impossible work became possible only due to bioinformatics. In this review, we shall discuss main roles of the bioinformatics in many fields of the Biotechnology (Rao et al., 2008).

### **Genomics**

The genomics deals with the scientific study of the genes and gene expressions. This branch deals with generation of a huge amount of the data obtained by gene sequencing, their interrelations and programing. For the management of this extensive data management and storage, the bioinformatics is utilized and its implications are applied to quantify the data. By adopting different techniques and programs, we can easily detect systematically running functional behavior at the cellular level up to organism level. This branch have a good role in nutritional, functional and structural genomics (Kanehisa et al., 2010).

### **Proteomics**

The scientific study of the proteins compositions and their complete interrelations

with functions produced by a cell up to organism level is named as proteomics. It is the very important branch of biotechnology. It deals along with tools of biochemistry, genetics and biology. Due to Bioinformatics, a huge database between protein to protein interrelations, protein compositions, protein activities and organelles ingredients. This all is covered and handled by Bioinformatical tools and software. Finger printing and many other like 2D gels are examples of it (Tyers, 2003).

### **Transcriptomics**

It is the scientific study of the all sets of messenger RNA molecules in a cell. It is also called as Expressions Profiling in which DNA microarrays are utilized to configure the expressions levels of messenger RNA in the given cells populations. Micro array technology is very important in determining and profiling the mRNA sequences. There are numerous software by which the data is stored and analyzed. This transcriptomics deals with expressions of m RNA and it is also utilized to check the cell transcriptomics (Aplin & Singh, 2008).

### **Cheminformatics**

It is the branch of bioinformatics in which information about chemical compounds is recorded, indexed, stored and interpreted to check the different results and effects of chemicals even at molecular level. All the information is stored in computers through latest software and tools. The virtual screenings and QSAR models testing are done through this branch (Fourches et al., 2014).

### **Drugs Discoveries**

The role of bioinformatics in drug discoveries is very important and obvious. By analyzing stored databases of different chemicals and their effects we can easily discover different ways or tools by which we will be able to synthesize new and effective drugs. All the information is stored in the computational forms by using different software. By bioinformatics, we are able to produce drugs with very low input cost and these have less or no side effects. Hopefully in the near future, there will be more revolution in the field of drug discoveries (Aplin & Singh, 2008).

### Phylogenetics

The scientific analysis of the evolutionary relations among organisms is called Phylogenetics. Many taxonomists take the anatomical data of the organisms to identify their phylogenetic linkage. It is very important branch of bioinformatics (Tyres, 2003).

### Crops Improvements

Agriculture is the backbone of the economy of the world. We depend directly or indirectly on the agriculture. So, this field must be focused well to accomplish the need of food and feed as well. Bioinformatics plays a major role in the crop improvement because through it the scientists can easily get the information about genomics, anatomy, physiology and other ones and can merge the information in to stored form in computational forms. So, this information is very helpful for making different techniques to overcome many problems in the agriculture (Rao et al., 2008).

### Veterinary Sciences

Livestock provides a lot of benefits to the humans and has a great role in the community. The bioinformatics has revolutionized the field of veterinary science as it has many tools and programs by which advancements in the veterinary field have been made. All these techniques and programs confirms the livestock products by analyzing the profile of chemicals and genetics of the animals by which they breed (Jhalla et al., 2000).

### Forensic Sciences

This branch deals with the finger printing of the organisms by utilizing DNA microarray technology. It plays very important role in the community as criminal cases are interrelated with this branch and moreover, the personal information is stored in the computers in the forms of database by this technology. Forensic science has a major role in determining the personal identification from a cluster of population (Goodman, 2012).

### Biofuels

This deals with the production of biofuels to provide renewable energy to the world. The field of genomics and proteomics deals together to make such tools by which the massive energy is produced. This is very

important form of energy which is produced by living organism (Tyres, 2003).

### CONCLUSION

From the above discussion, it is concluded that the bioinformatics is a very important branch of biotechnology. Its usage in different branches of biotechnology is very high. Many drugs, phylogenetic linkages, genetics maps and other ones are made only due to bioinformatics. It also makes life much easier as there are different tools in it which help to fix the problems from cellular up to community level.

### Future Perspective

We can expect from scientists that in future most powerful tools will be discovered and new inventions will make the scientific study easier.

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