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THE ROLE OF INTELLECTUAL PROPERTY IN BIOINFORMATICS IN BULGARIA

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Structure of the presentation

1. **Introduction;**
2. Biological sequences – DNA, RNA and protein sequences;
a Short overview;
3. Bioinformatics databases;
4. Software for biological databases;
5. Main types of intellectual property in bioinformatics in Bulgaria;
6. **Conclusion;**
7. Contacts with the authors.

1. Introduction

- The aim of the research is to describe and analyse the nature of Bioinformatics and its relation to Intellectual Property.
- Before understanding Intellectual Property protection in Bioinformatics, it's necessary to understand the nature of the various components that comprise the field of bioinformatics.

1. Introduction

- For the purpose of this article, in general bioinformatics is presented by its three main categories:

1. **Biological sequences such as DNA, RNA and protein sequences;**
2. **Databases** in which these sequences are organized;
3. **Software and Hardware** designed to access, organize and analyze the information contained within this sequences and databases.

2. Biological sequences – DNA, RNA and protein sequences.

- **A biological sequence** is a single, continuous molecule of nucleic acid or protein.

Biological sequences can be presented as follows:

- DNA (nucleotides, 4 types): storage of the genetic information;
- RNA (nucleotides, 4 types): bridge from DNA to protein;
- Protein (amino acids, 20 types): active molecules.
- Genetic code: deciphering genetic information.

3. Bioinformatics databases (BDBs)

- BDBs play a key role in bioinformatics for the collection, storage and maintenance of biological data;
- BDBs are useful for searching information on biological, physicochemical, biochemical and other characteristics of different nucleotide sequences and amino acids and the sites on which they are obtained;
- BDBs is a combined product of biotechnology and information technology and plays a vital role in accelerating modern life science research.

3.1 Basics elements of the Biological Databases are:

- **Sequence** - a key element showing the sequence of nucleotides or amino acids, continuous, as found in nature;
- **Length** - the number of nucleotides or the number of amino acids involved in sequencing sequence;
- **The type of nucleic acid - DNA, mRNA, tRNK, rRNA;**

3.1 Basics elements of the Biological Databases are:

- **Location** - Defines the position of the 5 'end of the nucleotide chain or the location of the genetic map;

- **Segment** - defines the relationship between adjacent, disjoint sections of the sequences if the distance between two or more sequences known to be marked and the number of amino acids or nucleotide.

3.2 POPULAR DATABASES IN BIOINFORMATICS

- ExPASy;
- KEGG;
- NCBY.
- They are freely available, as the oldest

of them is ExPASy, established in 1993 in Geneve

4. Software for Biological Databases

- **Matlab** is a software package, built on a modular principle which has its own language, called the M language, which is similar to the language C + +. The advantage of Matlab is the ability to visualize data in 3D graphics.
- **CIPLEX** is an optimization package to IBM, which can perform both integer optimization, and continuous. This package solves very successfully problems which examine HPfolding.

4. Software for Biological Databases

- **Tomlab** is a software package for optimization that runs in the middle of Matlab, but is installed separately. It has more options than optimization program Matlab.
- **Hyperchem** is a software product that provides good opportunities for establishing a chemical molecular models, spatial monitoring of the established models and tools to optimize them.

4. Software for Biological Databases

During the creation of models can be set and changed certain lengths of chemical bonds, valent and torsion angles and atomic charges. Moreover, the program has databases of amino acids and nucleotides, which makes it easy to be modeled natural polymers - protein and nucleic acids.

5. Main types of intellectual property in bioinformaics

Intellectual Property protection in Bioinformatics is a really important process.

It can:

- afford the owner, the right to exclude others from using the protected technology;
- provide the owner a monopoly right for manufacture and sale the technology.

5.1 Copyright and Bioinformatics in Bulgaria

In Bulgaria Copyright can be used to protect bioinformatics-related materials such as:

- scientific articles;
- books;
- software,;
- compilation of facts (databases);
- manuals and etc.

5.2 Patents and Bioinformatics in Bulgaria

- According to the Law of Patents and Registration of Utility Models by a patent can be protected, "*an element isolated from the human body or otherwise obtained through the technical process, including the sequence or partial sequence of the gene may constitute a patentable invention, even if the structure of this element is identical to that of a natural element*".

5.3 Trade secrets, Trade marks and Bioinformatics

- **Trade secrets** can be used to protect Bioinformatics-related intellectual Property such as software code, manuals, databases, formulas and processes.

- **Trademarks** can be used to protect trade names, product names, domain names, and service marks/slogans for bioinformatics companies.

6. Conclusion

The scope of IP rights (IPRs) varies country to country, Bioinformatics inventions can be protected under IPRs. IPRs are the negative rights, which prevent others from using your invention. IPRs have made revolution in the field of science and technology and assured a protection for your idea or innovation, and motivates the researchers but Indian patent law does not categorize bioinformatics inventions as patents, only copyrights and trade secrets rights are rewarded for an inventor, hence law should get amendment.

6. Conclusion

- Bioinformatics comprises a wide array of components, and it follows that a wide array of protection might be available, depending on the particular nature of the bioinformatic component and its intended use.
- In Bulgaria the IP protection of bioinformatics is still in the beginng and there will be a lot of discussions on this hot point of innovation.
- The article just aimed to outline the framework of main types intellectual property forms of bioinformatics according the Bulgarian laws.

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Thank you for your attention!

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