

Bioinformatics

Introduction to Bioinformatics

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Objectives

- Understand what is Bioinformatics, Computer Biology and Computation Molecular Biology.

Objectives

- Understand what is Bioinformatics, Computer Biology and Computation Molecular Biology.
- Learn the areas of research in Bioinformatics.

Motivation

What microorganism live in our armpits or in our mouths?

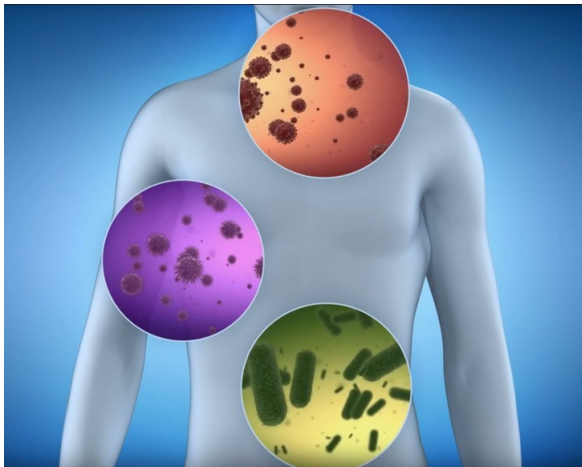


Figure: What microorganism live in our armpits or in our mouths?

Motivation

Is there a kindness gene?



Figure: Is there a kindness gene?

Motivation

Why a person has cancer?

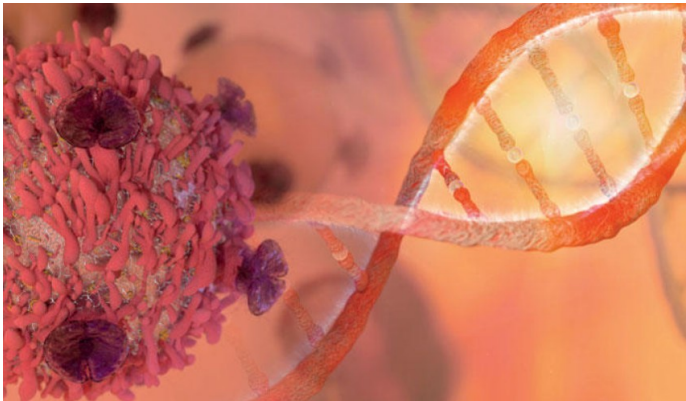


Figure: Why a person has cancer?

Motivation

Why some medicines no work in some persons?



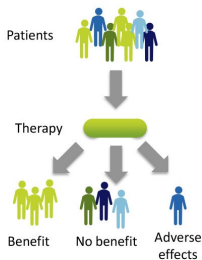
Figure: Why some medicines no work in some persons?

Motivation

Treatment Development

Without Personalized Medicine:

Some Benefit, Some Do Not



With Personalized Medicine:

Each Patient Receives the Right Medicine For Them

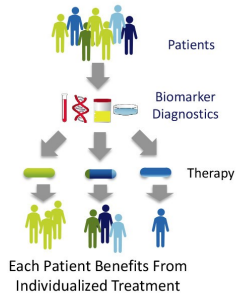


Figure: Personalized Medicine: New Approach to Treatment of Disease

Introduction

What is Bioinformatics?

According to Luscombe et al.: **Bioinformatics** involves the technology that uses computers for storage, retrieval, manipulation, and distribution of information related to biological macromolecules such as DNA, RNA, and proteins [?].

Introduction

Bioinformatics vs Computational Biology

Bioinformatics is limited to sequence, structural, and functional analysis of genes and genomes and their corresponding products and is often considered **Computational molecular biology**. However, **Computational Biology** encompasses all biological areas that involve computation [?].

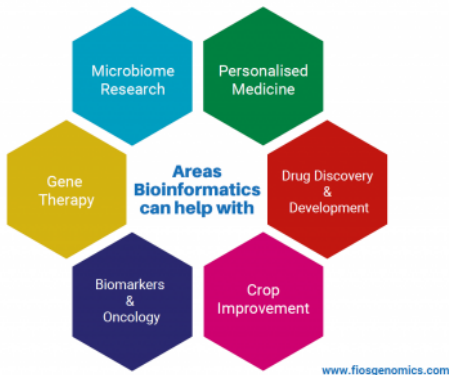
Introduction

Genomics

Genomics is the study of whole genomes of organisms. Genomics uses a combination of recombinant DNA, DNA sequencing methods, and bioinformatics to sequence, assemble, and analyse the structure and function of genomes. It differs from classical **Genetics** in that it study genes and their heredity meanwhile Genomics study the whole genome [?].

Motivation

Areas Bioinformatics can help with

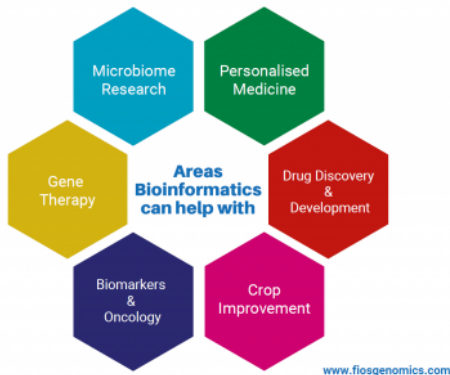


Microbiome
study the genetic material of microbes, bacteria, fungi, etc.

Figure: Areas Bioinformatics can help with.

Motivation

Areas Bioinformatics can help with

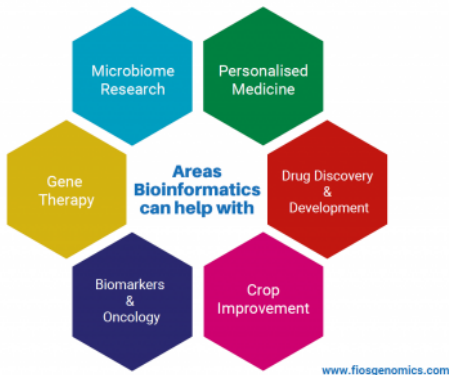


Personalized medicine has the potential to tailor therapy with the best response and highest safety margin to ensure better patient care.

Figure: Areas Bioinformatics can help with.

Motivation

Areas Bioinformatics can help with

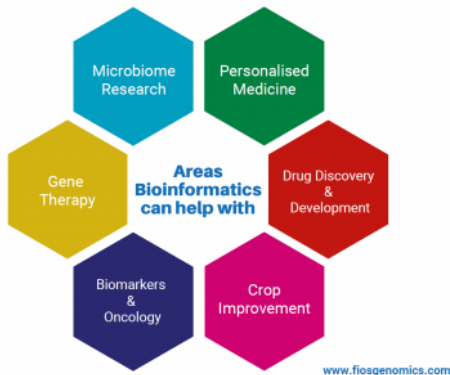


Drug discovery is the process through which potential new medicines are identified.

Figure: Areas Bioinformatics can help with.

Motivation

Areas Bioinformatics can help with

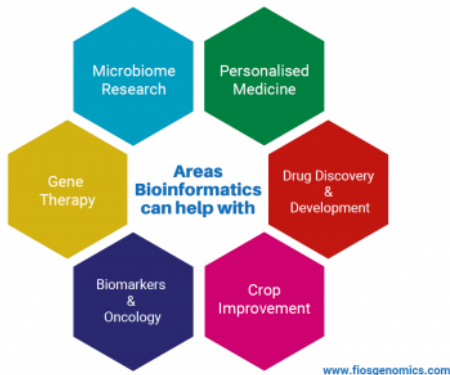


Crop improvement help to produce stronger, more drought, disease and insect resistant crops.

Figure: Areas Bioinformatics can help with.

Motivation

Areas Bioinformatics can help with

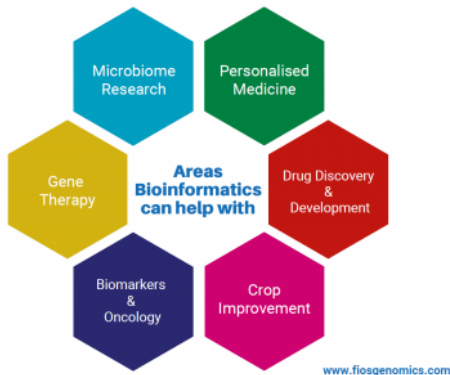


Biomarkers & oncology could be used as screening/early detection tool of cancer diagnostic and prognostic.

Figure: Areas Bioinformatics can help with.

Motivation

Areas Bioinformatics can help with



Gene therapy is an experimental technique that uses genes to treat or prevent disease. In the future, this technique could insert a gene into a patient's cells instead of using drugs or surgery.

Figure: Areas Bioinformatics can help with.

References I

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