

# Bioinformatics

## Introduction to Bioinformatics

MSc. Vicente Machaca Arceda

Universidad Nacional de San Agustín de Arequipa

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# Overview

- 1 Introduction
  - Objectives
  - Motivation
  - What is Bioinformatics?

# Table of Contents

- 1 Introduction
  - Objectives
  - Motivation
  - What is Bioinformatics?

# 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?

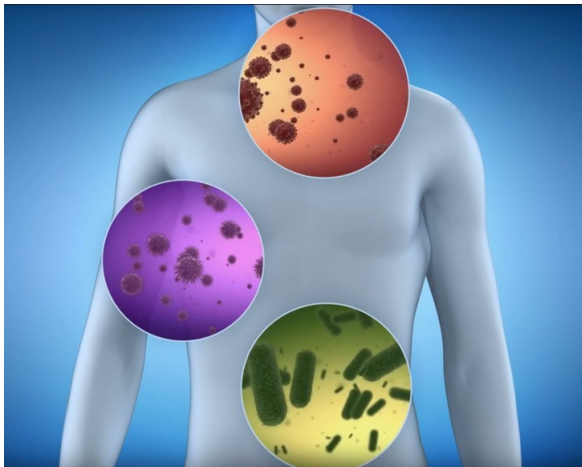


Figure: What microorganism live in our armpits or in our mouths?

# Motivation

Is there a kindness gene?



Figure: Is there a kindness gene?

# Motivation

Why a person has cancer?

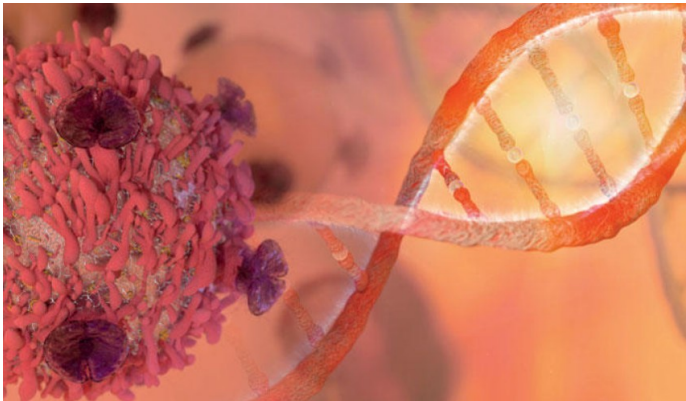


Figure: Why a person has cancer?



# Motivation

Why some medicines no work in some persons?



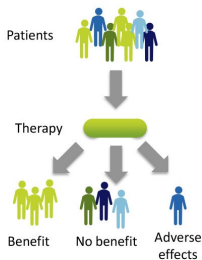
Figure: Why some medicines no work in some persons?

# Motivation

## Treatment Development

### Without Personalized Medicine:

Some Benefit, Some Do Not



### With Personalized Medicine:

Each Patient Receives the Right Medicine For Them

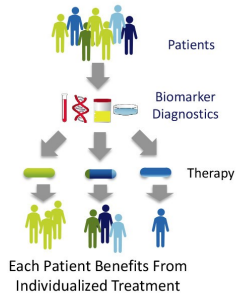


Figure: Personalized Medicine: New Approach to Treatment of Disease

# 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 [1].

# 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 [2].

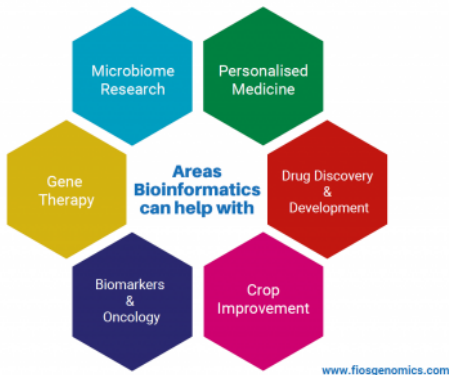
# Introduction

## 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 [3].

# Motivation

Areas Bioinformatics can help with

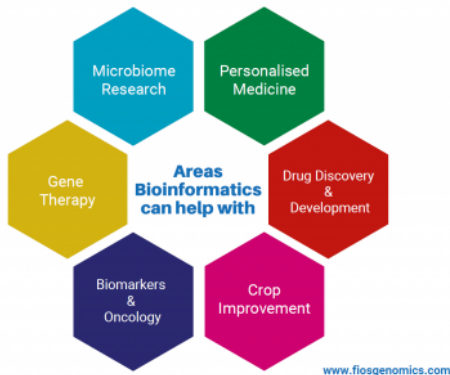


**Microbiome**  
study the genetic material of microbes, bacteria, fungi, etc.

Figure: Areas Bioinformatics can help with.

# Motivation

Areas Bioinformatics can help with

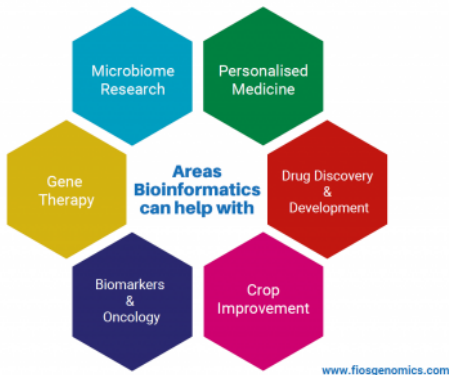


**Personalized medicine** has the potential to tailor therapy with the best response and highest safety margin to ensure better patient care.

Figure: Areas Bioinformatics can help with.

# Motivation

Areas Bioinformatics can help with



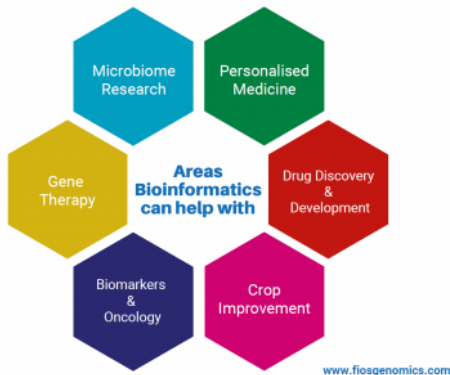
**Drug discovery** is the process through which potential new medicines are identified.

Figure: Areas Bioinformatics can help with.



# Motivation

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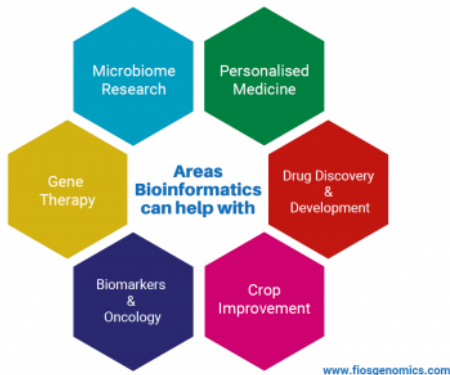


**Crop improvement** help to produce stronger, more drought, disease and insect resistant crops.

Figure: Areas Bioinformatics can help with.

# Motivation

Areas Bioinformatics can help with

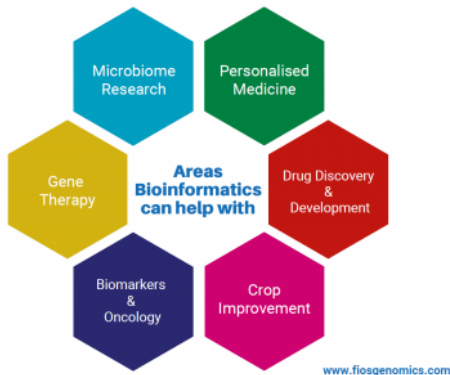


**Biomarkers & oncology** could be used as screening/early detection tool of cancer diagnostic and prognostic.

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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