



Bioinformatics against COVID-19

Research Group in Bioinformatics

MSc. Vicente Machaca Arceda

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Overview



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- Objectives

- Presentation

- The purpose of Bioinformatics

- What is Bioinformatics?

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- Pre-requisites

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- ▶ Understand what is Bioinformatics.

Objectives



- ▶ Understand what is Bioinformatics.
- ▶ Learn areas of research of Bioinformatics related to COVID-19.

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- MSc. Vicente Enrique Machaca Arceda.



- ▶ MSc. Vicente Enrique Machaca Arceda.
- ▶ Professor at UNSA university.



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- ▶ Professor at UNSA university.
- ▶ Full time researcher at La Salle university.



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- ▶ Professor at UNSA university.
- ▶ Full time researcher at La Salle university.
- ▶ Leader of research group of Bioinformatics in Arequipa.



Year	Country	Title
2018	Brasil	Fast Car Crash Detection in Video
2016	Chile	Fast Face Detection in Violent Video Scenes
2016	Costa Rica	Real Time Violence Detection in Video with ViF and Horn-Schunck
2016	Costa Rica	Optimization model for face detection in video sequences
2015	Chile	Real Time Violence Detection in Video



Year	Country	Title
2020		DNA sequence similarity analysis using Chaos Game Representation
2020		Machine Learning and Chaos Game Representation for rapid classification of novel pathogens COVID-19 case study
2020	Canada	An analysis of k-mer frequency features with machine learning models for viral subtyping of Poliovirus and HIV-1 genomes
2020	Canada	Forecasting time series with Multiplicative Trend Exponential Smoothing and LSTM: COVID-19 case study
2020	USA	Small Ship Detection on Optical Satellite Imagery with YOLO and YOLT

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Why a person has cancer?

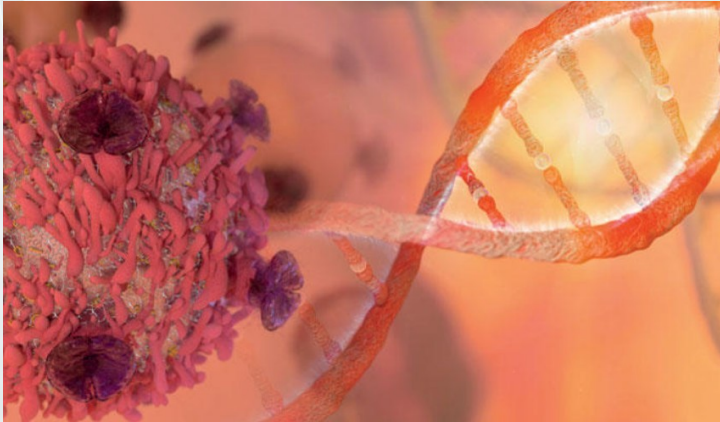


Figure: Why a person has cancer?

The purpose of Bioinformatics

Why some medicines no work in some persons?



Figure: Why some medicines no work in some persons?

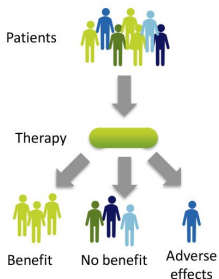
The purpose of Bioinformatics

Treatment Development



Without Personalized Medicine:

Some Benefit, Some Do Not



With Personalized Medicine:

Each Patient Receives the Right Medicine For Them

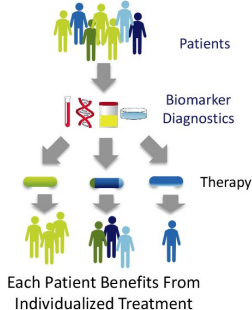


Figure: Personalized Medicine: New Approach to Treatment of Disease

The purpose of Bioinformatics

Protein simulation

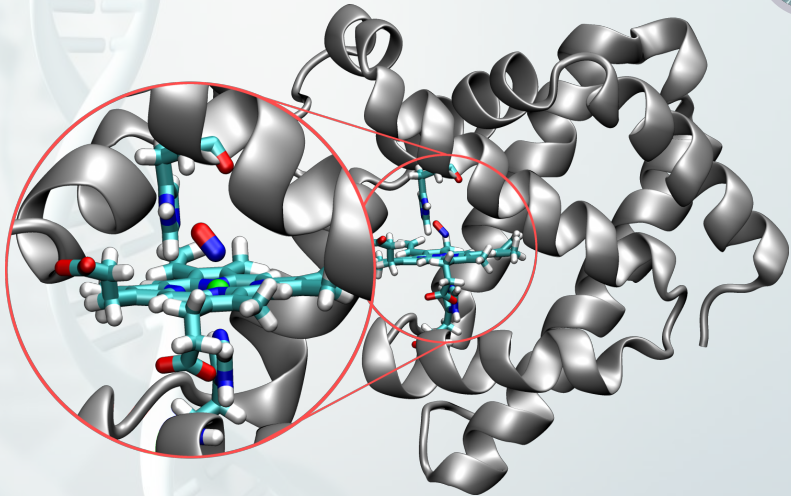


Figure: Computer simulation of protein-ligand.

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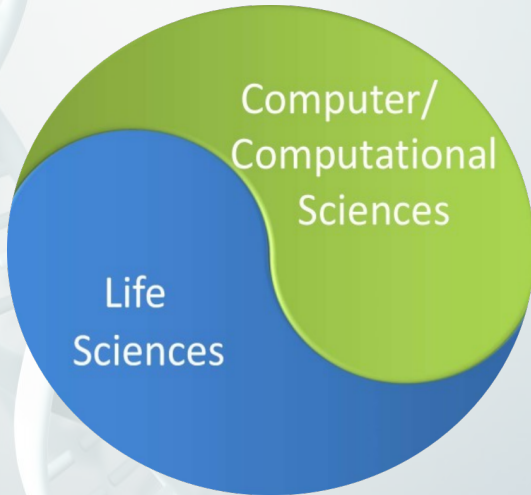
Methodology

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].



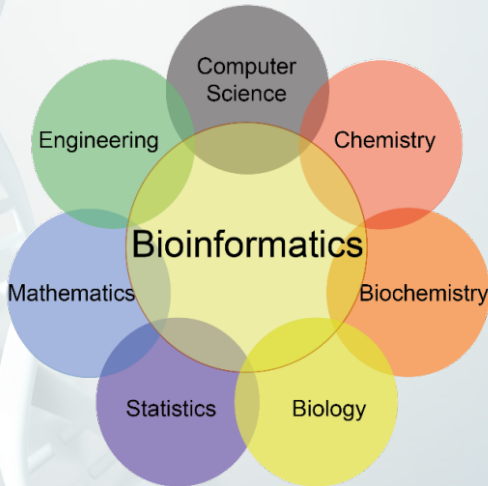


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- ▶ Programming skills.

Pre-requisites



- ▶ Programming skills.
- ▶ Advance data structure knowledge.



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- ▶ Machine learning (Neural networks, SVM, and Deep learning).



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- ▶ Advance data structure knowledge.
- ▶ Machine learning (Neural networks, SVM, and Deep learning).
- ▶ Molecular biology knowledge.

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Long-term

- ▶ Learn.



Long-term

- ▶ Learn.
- ▶ Publish papers.



Long-term

- ▶ Learn.
- ▶ Publish papers.
- ▶ Participate in projects.



Long-term

- ▶ Learn.
- ▶ Publish papers.
- ▶ Participate in projects.
- ▶ Advise in thesis development.



Long-term

- ▶ Learn.
- ▶ Publish papers.
- ▶ Participate in projects.
- ▶ Advise in thesis development.

Short-term

- ▶ Redact a poster.

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- ▶ Meetings each week (**Thursdays 8:45 pm**).



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- ▶ Communication channels: Whatsapp and Google classroom (yen4n4z).



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- ▶ At the beginning, the professor will teach the key concepts.

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- ▶ Communication channels: Whatsapp and Google classroom (yen4n4z).
- ▶ At the beginning, the professor will teach the key concepts.
- ▶ Make groups on different topics.



- [1] N. M. Luscombe, D. Greenbaum, and M. Gerstein, “What is bioinformatics? a proposed definition and overview of the field,” *Methods of information in medicine*, vol. 40, no. 04, pp. 346–358, 2001.
- [2] J. Xiong, *Essential bioinformatics*. Cambridge University Press, 2006.

A white 3D DNA double helix structure is positioned on the left side of the image, extending from the top to the bottom. The background is a light blue gradient. The text "Thank you" is centered in the middle of the image.

Thank you