Computational Approaches to Biology (BIOL 3070)

Brian Kissmer

USU Department of Biology

Aug. 27, 2024

Learning objectives

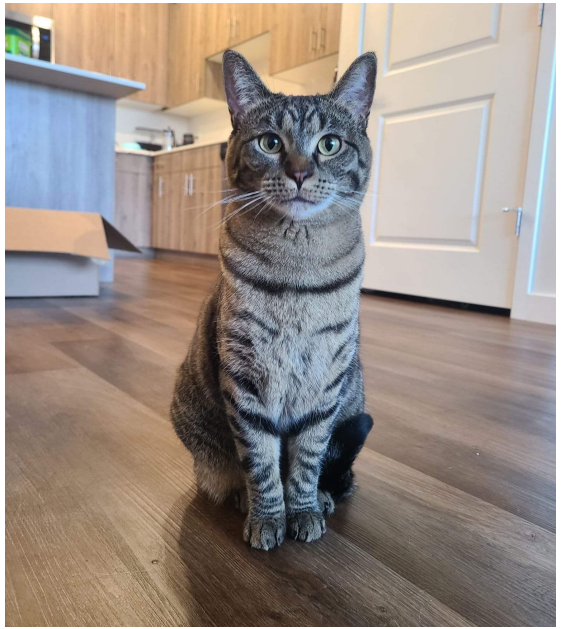
1. Know how this course will work
2. Be aware of the things you will learn in this course

Today's outline

1. Know/want to know exercise
2. Course goals
3. Prior knowledge discussion
4. Course overview
5. Concerns reflection exercise

About your instructor

1. 5th year PhD in Ecology, Gompert Lab
2. Research: Evolutionary genomics
    a. Predictability of evolution
    b. Tools for genomic analysis
3. Has a cat
4. Loves trail running and skiing



Moose

What is computational biology?

Computational biology = using data analysis, mathematical modeling and computational simulations to understand biological systems and relationships.

What do you know/want to know?

Write the answers to these questions on one side of your index card. Keep this for later.

1. What is one thing you know about computational biology?
2. What are two things you'd like to know about computational biology?

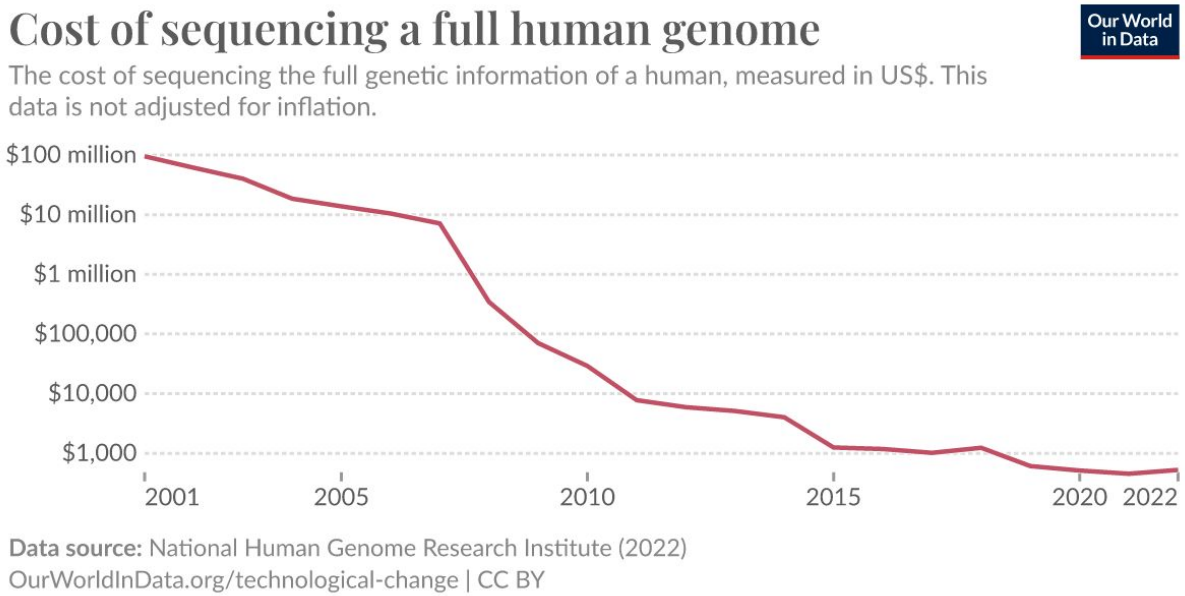
Course goals

By the end of the course you should be able to:

1. Identify and explain major applications of computational methods in biology.
2. Write you own computer scripts and programs to explore and analyze biological data.

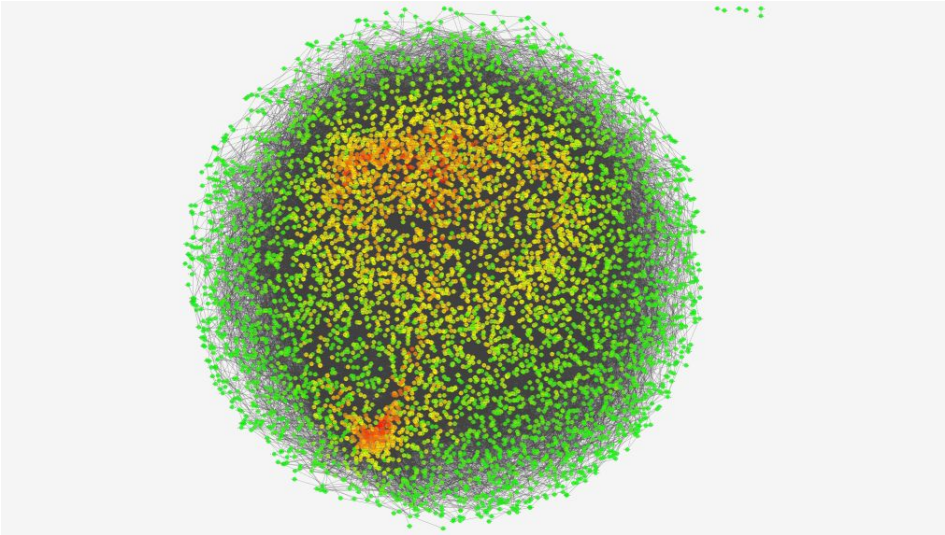
Why computational biology?

Ever-increasing amounts of big data allow us to explore complexity and emergent properties in biology



Why computational biology?

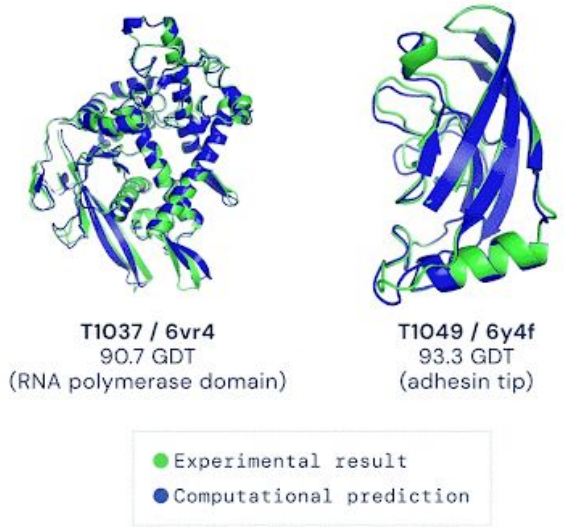
Ever-increasing amounts of big data allow us to explore complexity and emergent properties in biology



Gene co-expression network

Why computational biology?

Ever-increasing amounts of big data allow us to explore complexity and emergent properties in biology



Prediction of 3D protein structure

What is R and why learn to use it?

R is a programming language and environment for statistical computing and graphics.

1. At its simplest, a superpowered calculator
2. Well-developed tools for data analysis
3. Advanced graphical capabilities
4. Packages for specialized tasks
5. Widely used in life sciences

Prior knowledge discussion

The purpose of this activity to is to gauge your prior knowledge about computational biology. With your group:

1. Take turns reading your responses to the “What you know” question posed at the beginning of class.
2. Discuss your answers.
3. Provide a brief (2-3 sentence) summary of what you know about computational biology on “Prior knowledge” discussion on Canvas.

Course structure and topics

See the Canvas page, course website, and syllabus

Concerns reflection exercise

Based on your prior experiences and knowledge and your experience in class today, what is your biggest concern about this course? Write your concern down on the other side of your index card.

Concerns reflection exercise

Concerns reflection exercise

Enjoy the rest of your day, see you next time!