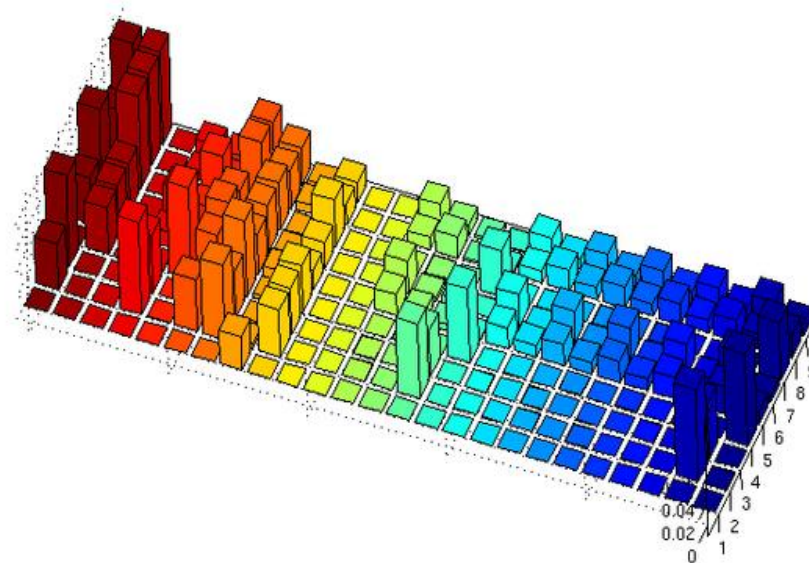


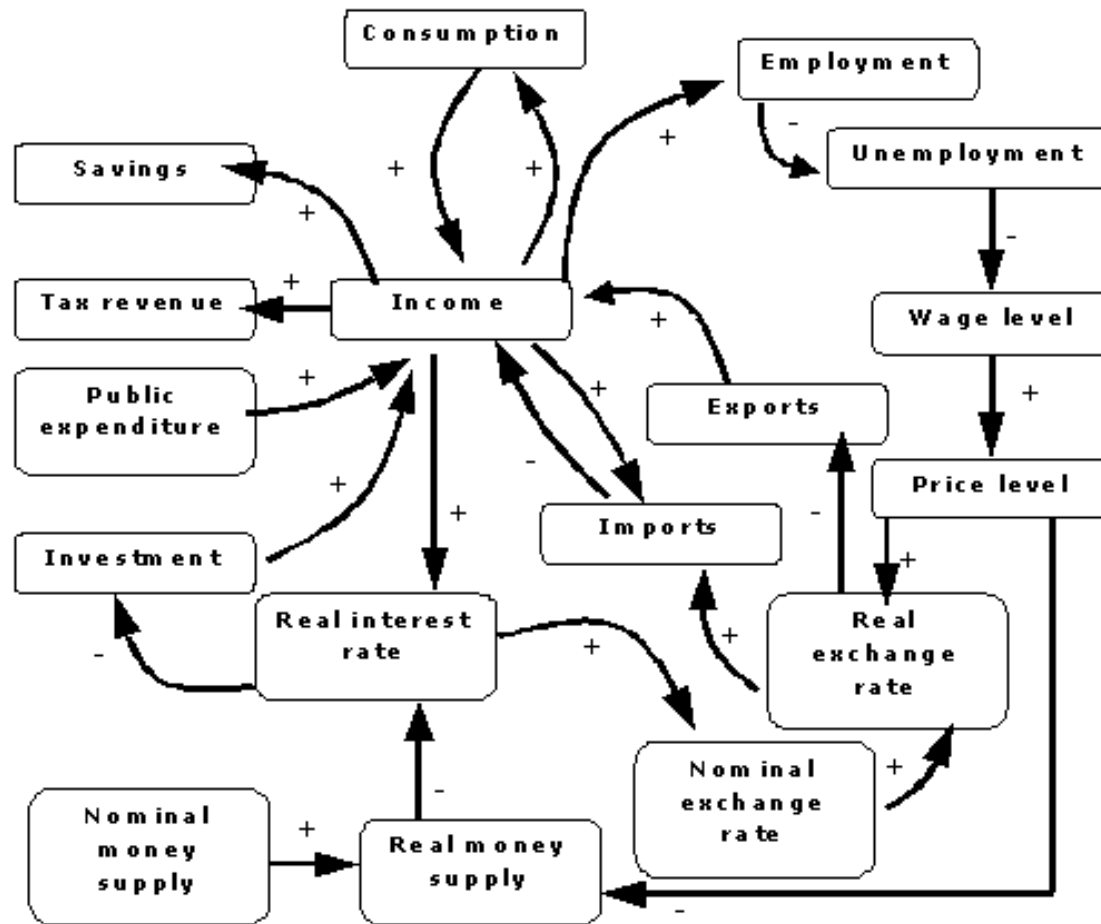
Parameter Sensitivity Analysis

Jae Kyoung Kim

Mathematical Biosciences Institute



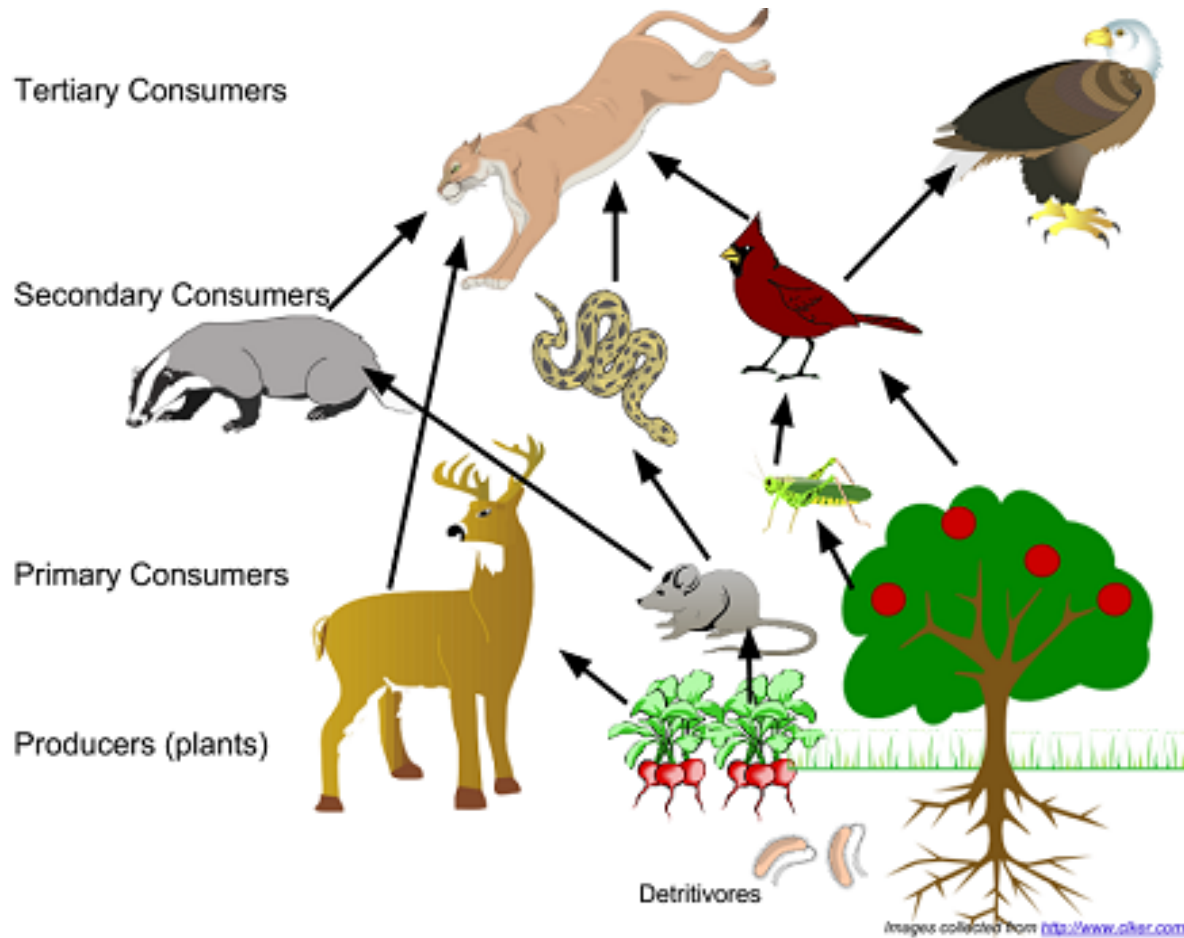
Complex system 1. Macroscopic economy



Q. What would be the policy to increase our income?

Q. To maintain the balance of economy, what is the most important factor?

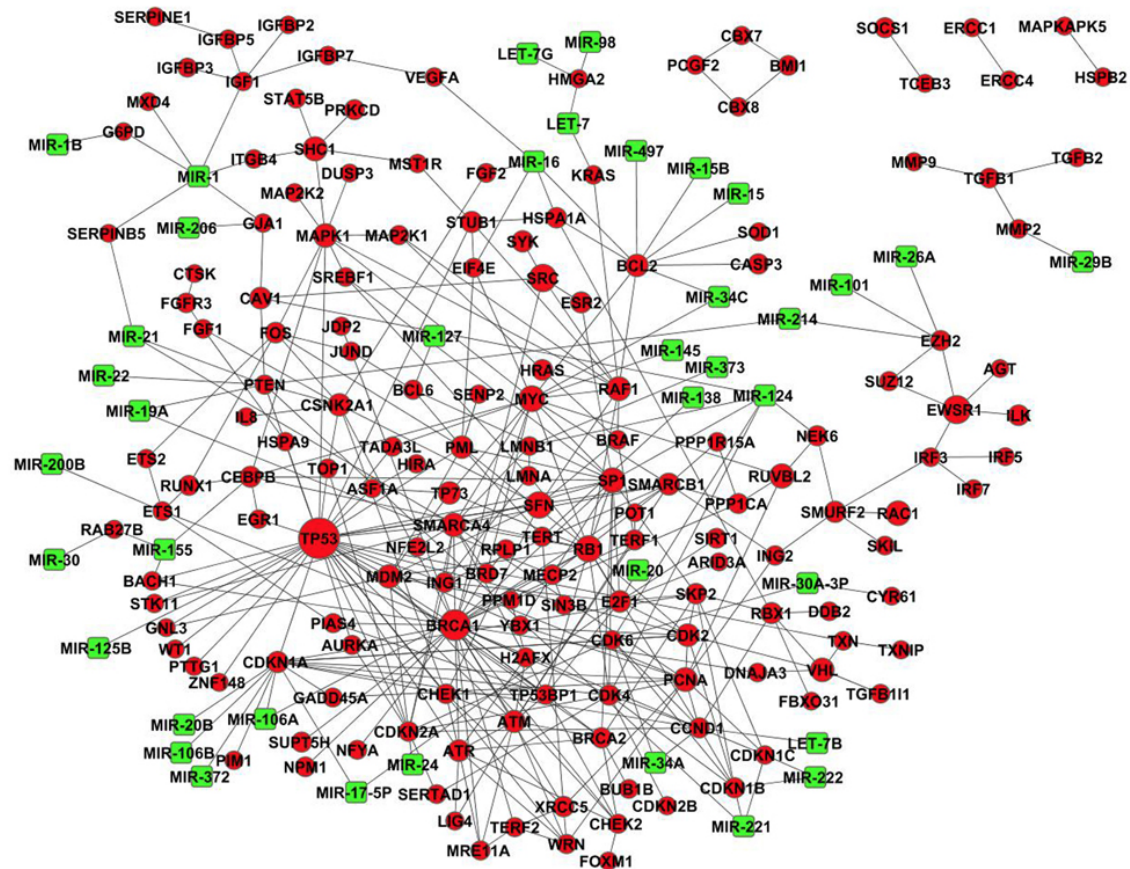
Complex system 2. Food web



Q. How the increase of life span of mice affects other species?

Q. How can we maintain the balance of ecology?

Complex system 3. Cancer



Q. Which gene's mutation is the most dangerous?

Q. Which gene do we have to target for therapy to prevent cancer?

Parameter sensitivity analysis

Parameter sensitivity analysis measures:

“ How the **outputs** of system depends on **parameter** change”

Parameter sensitivity analysis

Parameter sensitivity analysis measures:

“ How the **outputs** of system depends on **parameter** change”

Example:

How does the number of other species depend on mice's life span?
outputs parameters

Parameter sensitivity analysis

Parameter sensitivity analysis measures:

“ How the **outputs** of system depends on **parameter** change”

Example:

How does the number of other species depend on mice's life span?
outputs parameters

What we need to know:

Just derivative and differential equations !!

In this project, we will...



- Learn the basics of conducting a parameter sensitivity and uncertainty analysis
- Develop intuition for why derivatives are (VERY!) useful,
- Explore commonly used biological models,
- Learn how to interpret mathematical results in the natural sciences, and of course

Have fun!