Protecting from ZBY1

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Challenge

- Goal: Monitor the spread of ZBY1 in the given Ontario high school
- Determine the probability of students & faculty contracting the virus
- Show the correlations that would cause virus transmission

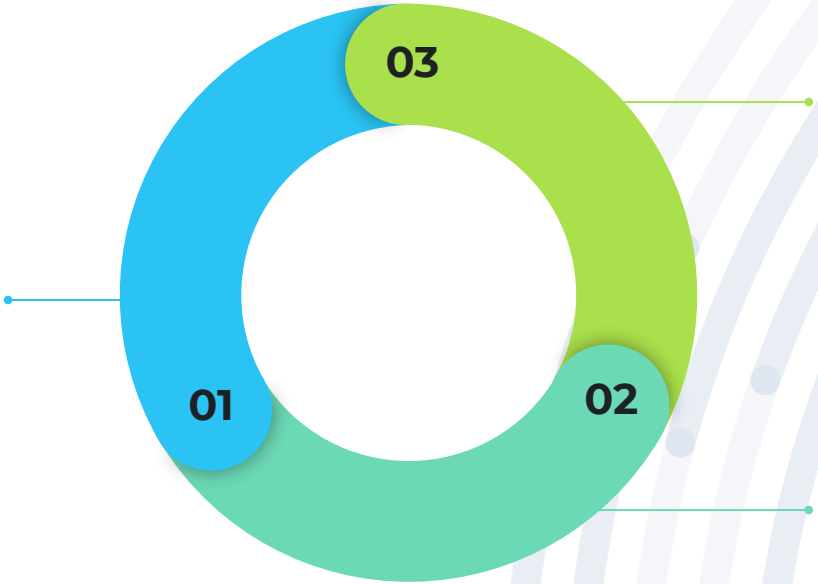
Stakeholders

- Center for Disease Control and Prevention
- Faculty (Teachers and Teaching Assistants)
- Students
- Parents of Students
- Family Friends
- Children & Parents of Faculty
- Ontario (government and citizens)
- Canada (government and citizens)

Design Process

Defining the Problem

The first thing we did as a team was develop a strong understanding of the problem and discuss different solution methods



Plans for Output

Discuss as a team what we want as our output (probabilities, graphs). Next discuss, based on the flow chart, how we can create and complete this process.

Create Diagrams of Plan

Discuss the parameters of the project and create a flowchart to visual what our process will look like.

Development Process

- Divided the project into three sections:
  - Algorithm Simulation
  - Probability Functions
  - Visualization
- Integrate different pieces as a team

Technology

Pandas

Reads Excel file data into Python environment

Numpy

Allows algorithm to be efficient with memory and run fast computations

Plotly

Powerful visualization of probabilities of infection

Our Solution

Simulation/Algorithm

- Iterates over the 6 possible times
  - Periods 1-2, Lunch, Periods 3-4, Clubs
- Custom PeopleQuery class
  - Interface with and store data
- Utilizes probability functions on each iteration
  - Computes likelihood of infection

Probabilities

- Probabilities are divided based on the activity
  - Class, Lunch, Extra curriculars, transitions
- Each calculation accounts for:
  - Carefulness, exposure, time, supervisation
- Additional things considered:
  - Based on COVID-19 restrictions
  - Social distancing and mask use

Output

- Two outputs:
  - Graphs displaying the relationship of each person with another
    - Shows probability of contracting the virus over time
  - Text file containing the final probabilities after 1 day

Demo

Assumptions

- Teaching assistant are near graduation or are post-grad students
  - Average age of ~22
- The amount of time exposed effects the probability of being infected
- Extra-curriculars are outside the the normal schedule but are the same length as a class

Missing

- Surface contact leading to contracting the virus
- Accounting for students in the same family having overlapping risk

Next Steps

Phone App

Creating a phone app like the COVID-19 response app to inform

Recommendations

Sharing recommendations of whether to stay home or not if at a high risk of contracting

Risk Analysis

Determining what risk is too much of a risk for students and/or teachers (based on age, health etc.) to do in person schooling

PPE

Simulating the impact of wearing gloves and masks to provide recommendations on PPE requirements

Online

Determining when students should be required to attend school virtually

Semester Structure

Optimizing learning and safety by simulating different semester structures

Questions?