CORONAVIRUS – SOCIAL DISTANCING MECHANISM

Presentation by Kaitlin Pollet
Mentors: David Pennock and Amelie Marian
ORIGINAL IDEA: PARTITIONING INTO GROUPS – COLLEGE EXAMPLE

Group 1

In person class – Monday
Dining Hall Assigned Times
Lunch - 11:30-12
Dinner - 5-5:30

Group 2

In person class – Tuesday
Dining Hall Assigned Times
Lunch – 12-12:30
Dinner - 5:30-6:00

Group 3

In person class – Wednesday
Dining Hall Assigned Times
Lunch - 12:30-1
Dinner - 6-6:30

Group 4

In person class – Thursday
Dining Hall Assigned Times
Lunch - 1:00-1:30
Dinner – 6:30-7:00
REPRESENTING VIRUS SPREAD ON A GRAPH

- Node – person
- Edge – connection/social interaction
RELATED CONCEPTS

• Percolation Theory
• Graphical Congestion Game
• Correlated Equilibrium
• Random Grouping & Graph
• Fairness
• But different relationships have different weights
GRAPH 2 – RANDOM WITH WEIGHTS

• Assigning random weights to edges (define by number of times a person sees another in a given period of time)
• Remove edges of weight less than a given value
• Partition into groups from here (randomly or keeping removing higher weight level)
CONNECTED CAVEMAN GRAPH

Idea: fits with partitioning people into groups but has realistic quality that cheating would be involved
SIMULATION - TESTING

• 120 nodes
  • 10 groups of 12 versus 12 groups of 10
  • 8 groups of 15 versus 15 groups of 8
  • 10% group & 30% group
Differences between 1st node in 10% versus 30%

- Group of 15 - 1st node in 10%
- Group of 15 - 1st node in 30%
- Group of 8 - 1st node in 30%
- Group of 8 - 1st node in 10%
- Group of 12 - 1st node in 30%
- Group of 12 - 1st node in 10%
- Group of 10 - 1st node in 30%
- Group of 10 - 1st node in 10%

1st node in 10% versus 30% at the end of simulation
Is it worth seeing my friend to possibly get sick?

Is it worth seeing my aunt to possibly spread the virus?

Is it worth going to the store if I am immunocompromised?
ACKNOWLEDGEMENTS

• DIMACS REU Program
• NSF Grant CCF-1852215
• Mentors: David Pennock and Amelie Marian
REFERENCES


