Predicting Covid-19 outbreaks using multi-layer centrality measures

Presentation of the Research Report

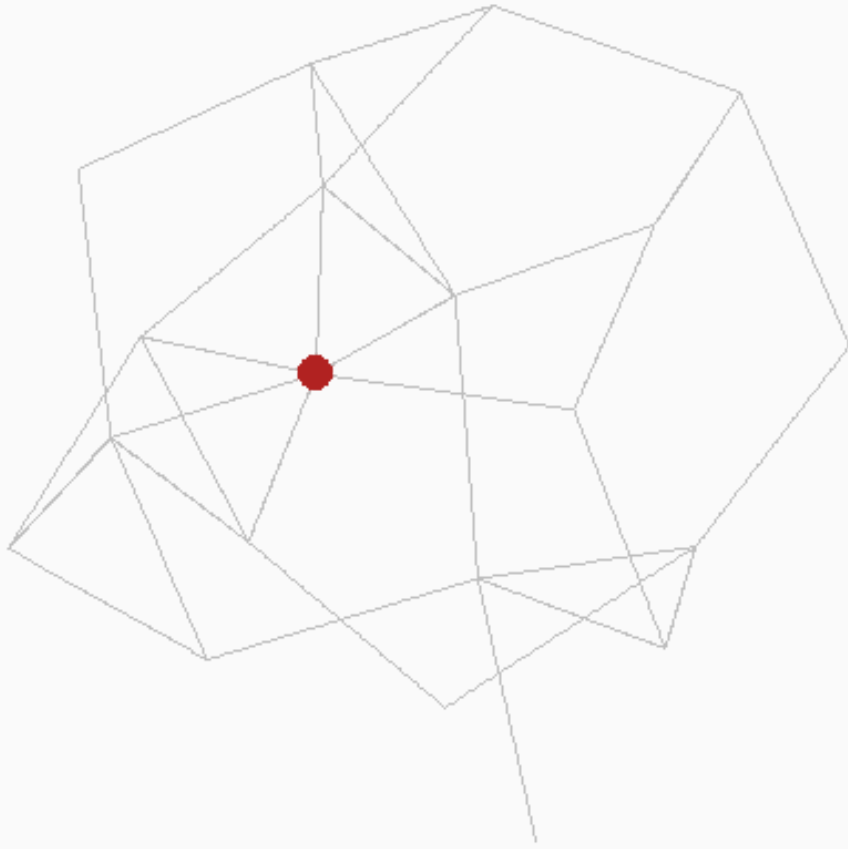Christine Hedde - von Westernhagen

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Let's break it down:

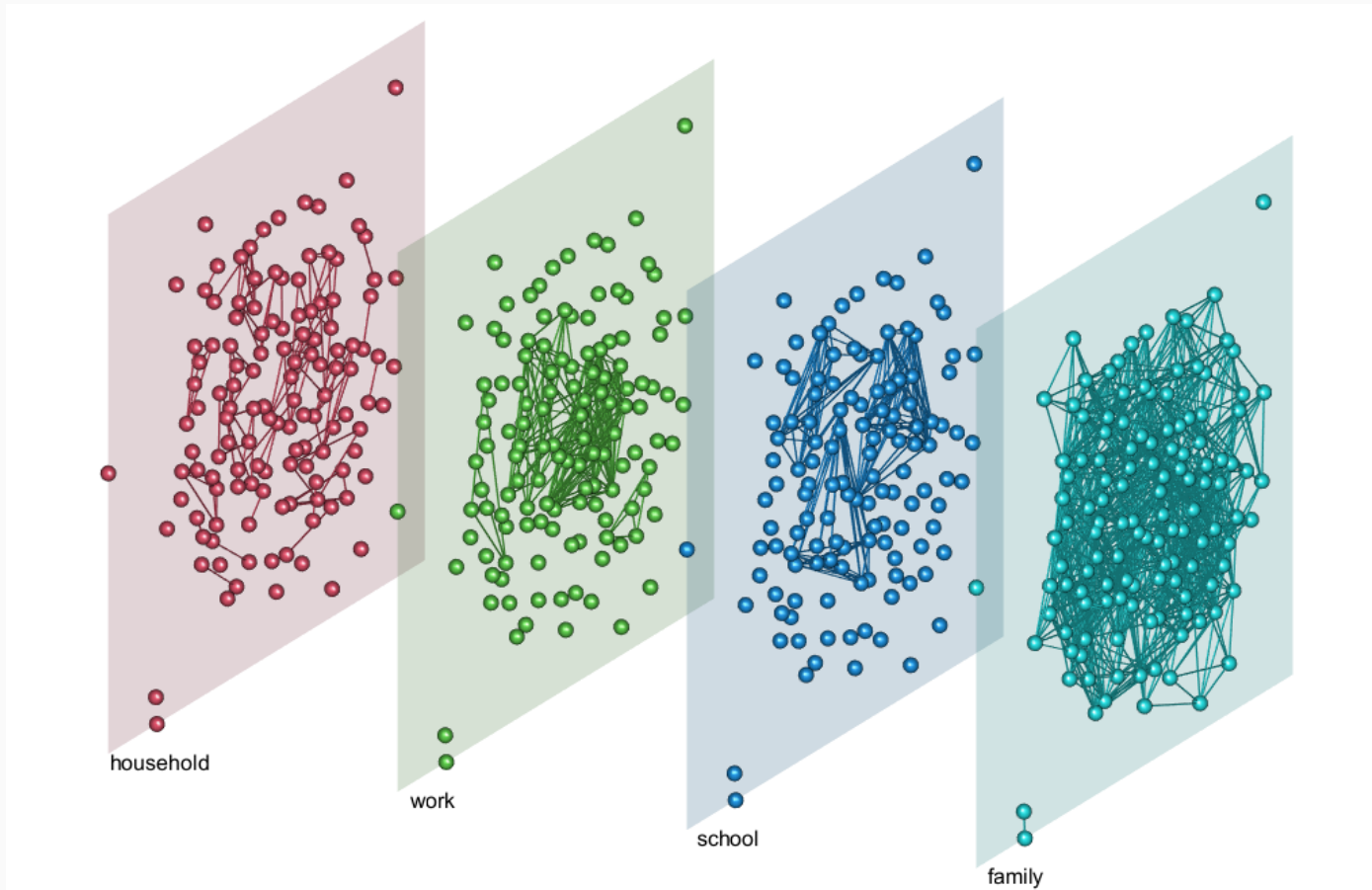# Predicting Covid-19 outbreaks using multi-layer centrality measures

Model spread to inform policy decisions!

Predicting Covid-19 outbreaks using **multi-layer** centrality measures

Our lives are multi-layered.

CBS micro-data allows to construct multi-layer network data set.

Micro-data can be linked to **PCR test data.**

Analyses conducted on regional **sample** .

Predicting Covid-19 outbreaks using multi-layer

centrality measures

Do you have...

👩‍🦰👨‍🦳👶👨 ...many close relatives?

👩‍🦰👨‍🦳👶👨 👫 👩‍🦰👨‍🦳👵👨 ...many close relatives and also a partner with a big family?

✈️🌍 👩‍🦰👨‍🦳👶👨 ...many close relatives, but they live in a different place?
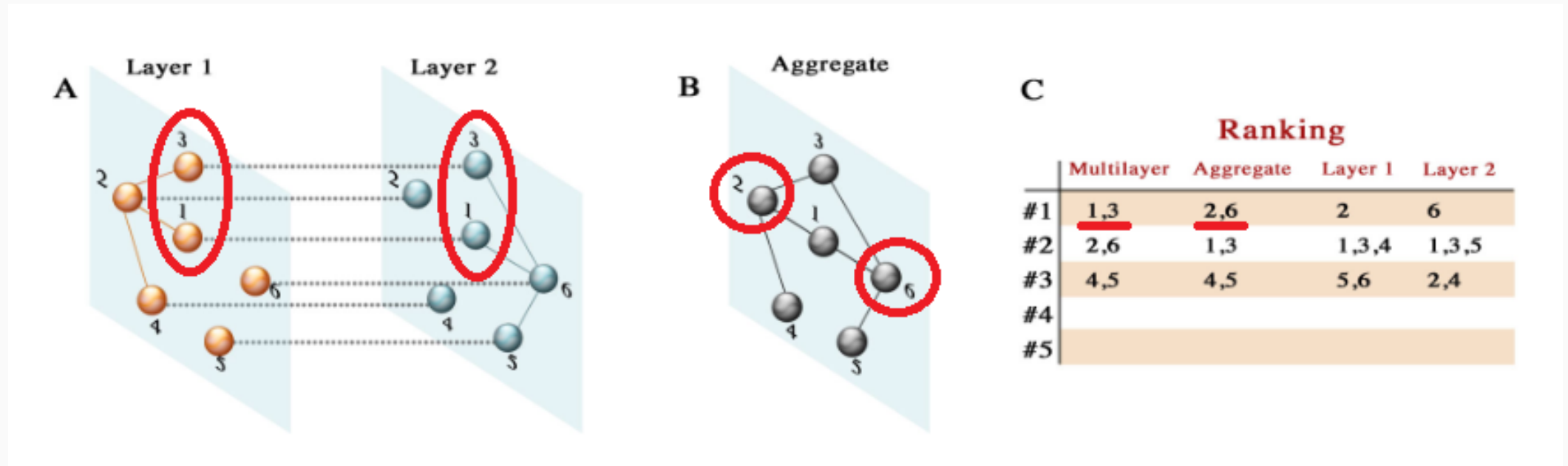

Then you are central!

... and probably a super-spreader.

Single-layer centrality

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Multi-layer centrality

De Domenico et al. 2015, Supplementary Figure 1

De Domenico, M., Solé-Ribalta, A., Omodei, E., Gómez, S., & Arenas, A. (2015). Ranking in interconnected multilayer networks reveals versatile nodes. Nature Communications, 6(1), 6868. https://doi.org/10.1038/ncomms7868

Bringing it all together:

In single-layer networks, a relevant indicator of spreading behavior has shown to be the **centrality** of a node.
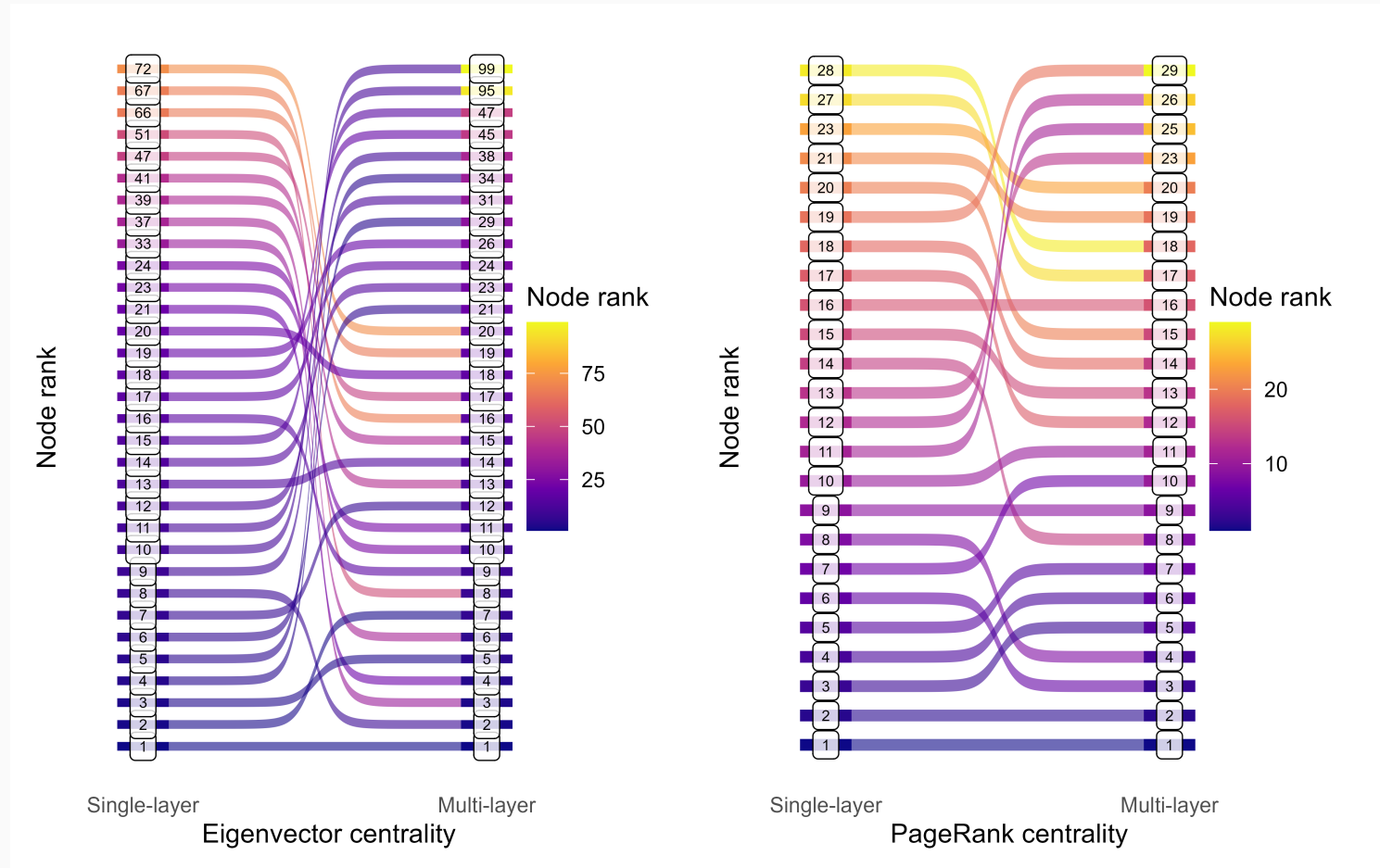
Several studies have used **multi-layer** networks in modeling the spread of Covid.

None of them have included multi-layer centrality measures that adequately **account for the complex network structure**.

Preliminary Results

Ranking nodes: Single-layer vs. Multi-layer centrality

What is **next**:

1. **Simulate** outbreak

2. **Predict** time point of infection with multi-layer measures

3. **Optimize** prediction in a newly created measure

4. **Test** performance of new measure under different epidemic scenarios

5. Tell you what I found!