COVID19 Flight Cancellations
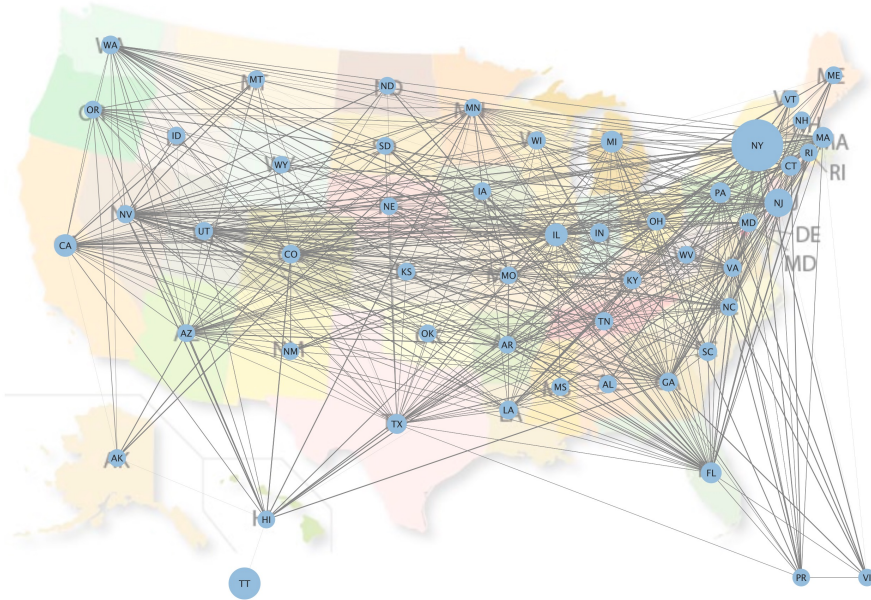
Yian Ann Xu
Department of Physics and Astronomy
Northwestern University

PHY465 final project

Question: correlation between flight cancellations and number of cases during early COVID19.

Why Do We Care

- global/local large-scale pandemics occurs repeatedly in human history;
- COVID19 is one of the most severe pandemics after globalization.
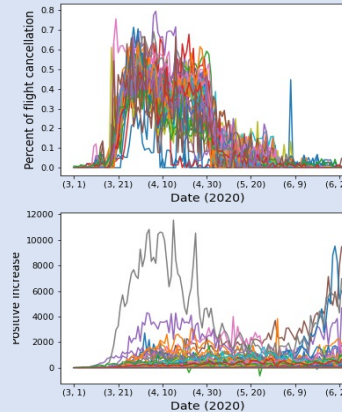- Potential guidance on appropriate pandemic measure for long-distance.

Network Snapshot (March 29)

- 52 states/territories
- Node size scaled with covid increase;
- Link thickness scaled with fraction of flights cancelled.

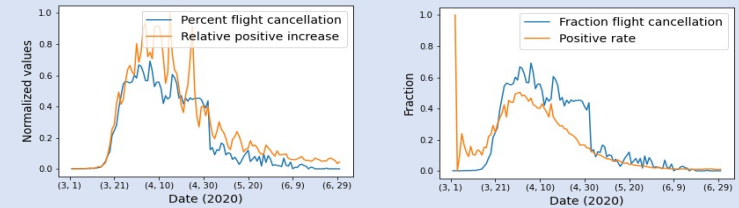## Data (March 1 – June 30; 52 states/territories)

- Nodes – states
  - date, state; positive increase, total results increase
  - → positive rate
- Links – flight cancellations, weighted with percent of flights cancelled
  - ~2.5M flights
  - date, departure state, arrival state;
  - cancelled → total counts + cancelled → fraction canceled

Empirical Results

Figure 1 Empirical data visualization. Each line corresponds to a state/territory. **x-axis**: date (month, day) in 2020. **Top panel**: fraction of incoming flight cancellation; **Bottom left**: number of positive increase; **Bottom right**: Positive rate = positive results / total results (in the given date).
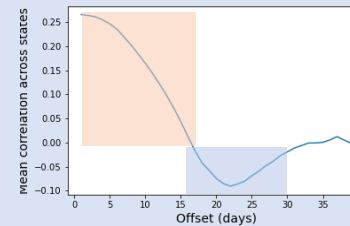
Results Example

Figure 2 New York state COVID and flight cancellation. **x-axis**: date (month, day) in 2020

- The two panels shows two different measures of the covid situation.
- **Orange → blue**: strong positive correlation – increase in covid cases immediately lead to flight cancellations
- **Blue → orange**: delayed negative correlation – increase in flight cancellations lead to relief of covid, but with a time delay

Correlations

- **Small offset (orange)**: positive correlation – covid leads to flight cancellations;
- **Larger offset (blue)**: negative correlation – flight cancellation leads to relief of covid with a time delay. This agrees with the qualitative results.

Figure 3 Correlation between covid19 case increase and flight cancellations with various time delays. **x axis**: time offset from 0 to 40 days. **y axis**: mean correlation across states.