

ANOMALY DETECTION

The goal of this project is to develop an automated pipeline that will monitor local surveillance data to detect concerning signs of either outbreaks or data quality issues, and flag them for local public health.

MICOM PROJECT: ANOMALY DETECTION AUGUST 2024

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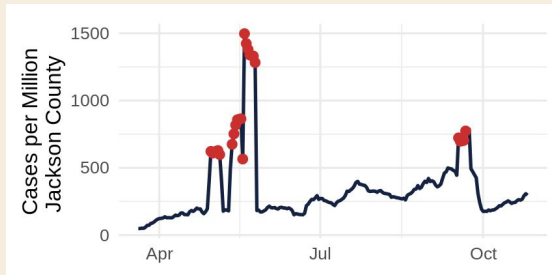


Figure 1. Example local anomaly detection for Jackson County for COVID-19 in 2020.

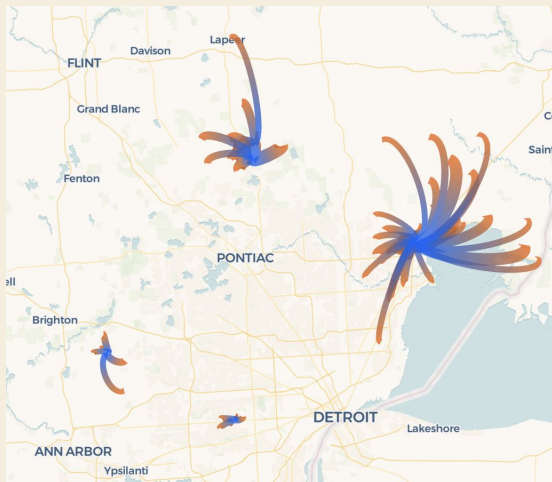


Figure 2. Commute networks for four example origin census tracts using LODES data. Some have longer commutes that cross county borders (top two) while others are more local.

Find signals indicating:

- Early signs of an outbreak
- Data quality issues (such as incorrect data entry, missing data)

Detect local increases as well as spatially correlated patterns based on commuting / mobility patterns

Primary data sources

- Michigan Disease Surveillance System (MDSS)
- Census LEHD Origin-Destination Employment Statistics (LODES) Commute data

Approach

- Time series analysis
- Machine learning/forecasting models
- Spatial statistics (e.g. Moran's I using commuter networks)
- Contextual layered anomaly detection methods from CMU-Delphi

Initially, we plan to develop these analytics as a standalone system, but eventually the goal is to have this system operate as a layer on top of the Michigan Disease Surveillance System (MDSS) to detect anomalies across a wide range of diseases/pathogens and alert designated staff at the corresponding local health departments.

PROJECT LEADS

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