INFECT: Infection Estimation in Social Networks

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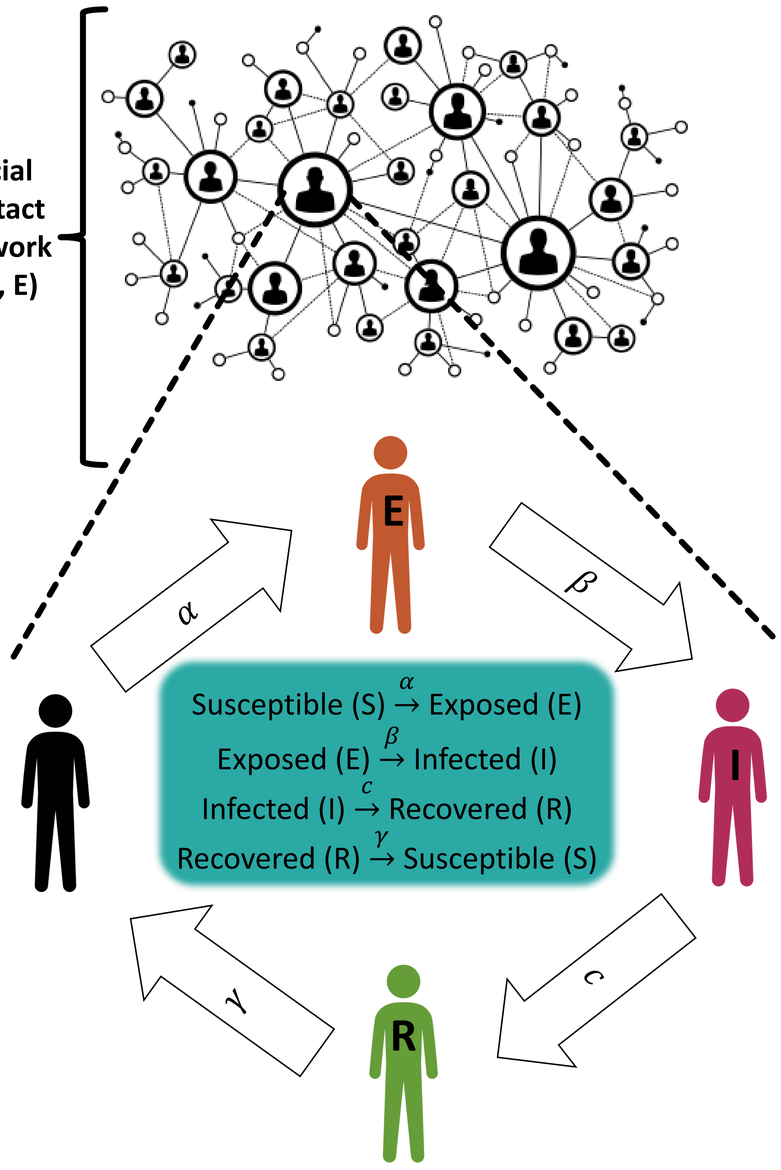
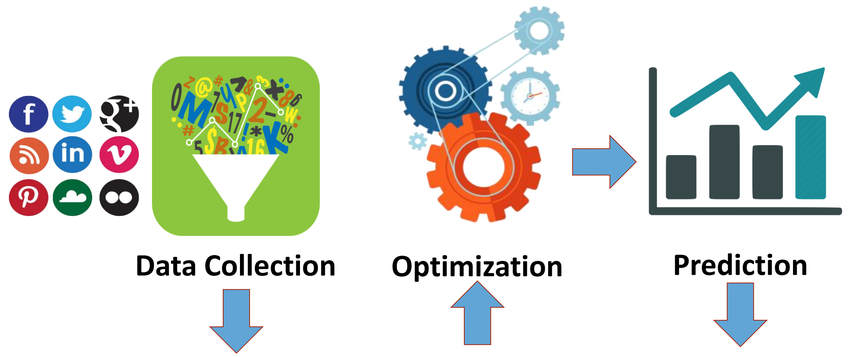
Introduction

- Modeling infectious diseases in networks
- Predicting future trends given history and disease parameters
- Transferring knowledge at the national level

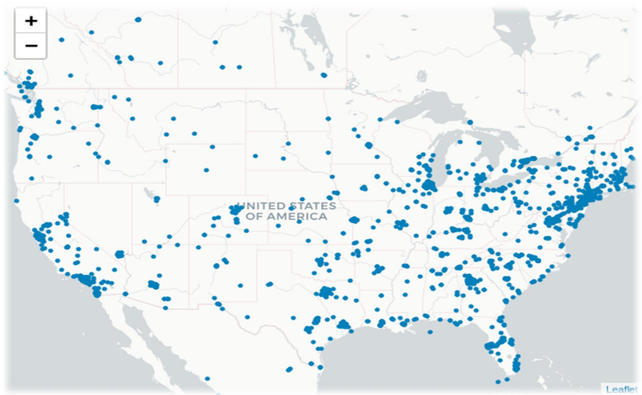


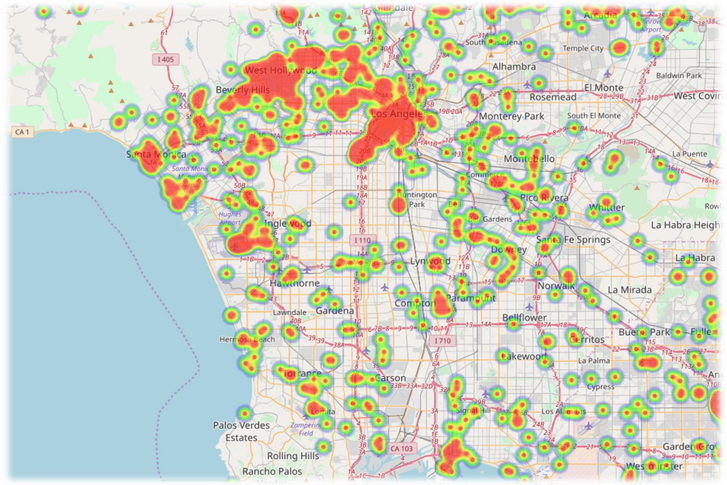


Network (526K nodes)
1. Twitter Stream API
2. Flickr API

Training: 2011 – 2017

Ground Truth
1. Google Trends API
2. Tweets API – “flu” related tweets





$\alpha = 0.01, \beta = 0.1, c = 0.3, \gamma = 0.5$

Optimization & Prediction

1. **LSTM** – Seasonal variations
2. **Grid Search** – Search for optimal α, β, c, γ
3. **Transfer Learning** – Learn parameters from LA, transfer to other cities (disease parameters don’t change)

2018 Flu season

Optimal $\alpha, \beta, c, \gamma = (0.15, 0.8, 0.5, 0.5)$

Infection prediction loss: 7.64

Future Work

1. San Francisco, New York City networks
2. Transfer learning & Gradient Descent