Summary

Asia is sometimes described as a "hotspot" for emerging infectious diseases recently. With the proliferation of low-budget airlines and more visa-free travel agreements among Asian countries, a more rapid spread of infectious diseases is inevitable. Identifying related influence factors for the disease progression is of primary importance in forecasting and making early warning epidemic trends.

This project will develop and assess Least Absolute Shrinkage and Selection Operator (LASSO) based projections in the realm of infectious disease surveillance. It will assess accuracy across a variety of pathogens found across Asia, including those endemic and epidemic to Singapore. We develop multi-model forecasting techniques to predict each disease at different time points for four representative countries in Asia: Taiwan, Japan, Thailand and Singapore. We apply general LASSO algorithm on forecasting weekly state of diseases in Singapore, Taiwan and Japan, meanwhile make monthly point estimates for Thailand.

Seasonal variation is a common pattern for infectious diseases such as dengue, influenza, chickenpox etc. Previous incidences and weather factors including temperature, rainfall and humidity may play a significant role in seasonal changes of infectious diseases. By constructing and comparing LASSO models using prior incidences and climatic factors, we hope to elucidate the factors that have noteworthy effects on disease transmission.

The computerized data set on weekly or monthly notified infectious disease cases are collected from respective national institute of infectious disease for each country. Climatic data obtained from respective meteorological agency and weather underground.

The results demonstrate a strong connection between seasonal behavior of some infectious diseases and weather factors. Relative incidence at a lag of one month, temperature and time effect are significant predictors in modelling.