Victoria Lloyd
COVID19 Data Analytics
Final Project Proposal
Due Fri, April 24, 2020

In my final project I will be building off the work presented by Morbey et al. in "Can syndromic surveillance help forecast winter hospital bed pressures in England?" In this paper, the contributors aimed to use syndromic surveillance data to understand how syndromic respiratory indicators influence the overall daily hospital admittance in order to predict the demand for hospital beds this winter to help avoid deterioration of the healthcare system. To do so, they used linear regression to fit the daily peaks in both hospital admittance and syndromic respiratory indicators stratified according to age, and used R^2 values to estimate how much variation in hospital admittance is explained by respiratory indicators. One area for further research mentioned in the paper is that all linear models underestimated the 2017/2018 data, which suggests a possible overall increasing trend. I plan on exploring more complex models with which to fit the data to see if there might be a more accurate nonlinear regression fit. Additionally, the paper did not explore the impact of environmental factors on this data, although season and weather are known to be associated with health outcomes. To incorporate this into a new, multivariable model for the daily hospital admittance, I plan on drawing on the techniques used in Zhang et al. in "Effects of Meteorological Factors on Daily Hospital Admissions for Asthma in Adults: A Time-Series Analysis" to estimate daily mean temperatures and generate a fit for these temperatures for England's meteorological data as given by the Met Office Weather DataHub. If the explanatory power of this meteorological data is significant for the overall hospital admittance, I will then generate a new multivariable time series model to make predictions about the daily hospital admittance, taking into account both respiratory indicators and environmental factors.

Sources:
Morbey RA, Charlett A, Lake I, Mapstone J, Pebody R, Sedgwick J, et al. (2020) Can syndromic surveillance help forecast winter hospital bed pressures in England? PLoS ONE15(2): e0228804. . https://doi.org/10.1371/journal.pone.0228804
https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0228804&type=printable
Zhang Y, Peng L, Kan H, Xu J, Chen R, et al. (2014) Effects of Meteorological Factors on Daily Hospital Admissions for Asthma in Adults: A Time-Series Analysis. PLoS ONE 9(7): e102475. doi:10.1371/journal.pone.0102475
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0102475
Met Office Weather DataHub
https://metoffice.apiconnect.ibmcloud.com/metoffice/production/