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Title
Temporal Predictions on the Virulence of H1N1 in the USA

Abstract
Introduction:
Rapidly changing trends in the incidence of strain A-H1N1 have made long term predictions infeasible. Based on the weekly Influenza like Illness (ILI) incidence reports from the Centre of Disease Control and Prediction (CDC), we are able to predict the ILI at 10 different regions of the US and at a National level for 2 consequent weeks and seasonality of ILI for 4 consecutive weeks within a 95% confidence interval. Also, the rate of mortality is estimated for 6 major cities in the mid-western region of the US.

Methods:
The selected temporal prediction models include: Time-Series, Neural Networks for ILI predictions, and Bayesian Networks, Monte-Carlo Simulations for mortality predictions. Weighted ILI incidence reports from weeks 40 in the year 2008 till week 41 of year 2009, and mortality reports from week 1 in 1997 till week 41 in 2009 are used as data. ILI trends are estimated using differenced time-series models, while ILI weekly predictions are predicted using neural networks. Bayesian Networks and Monte-Carlo Simulations predict the number of mortal casualties within a 95% confidence interval due to Pneumonia and Influenza.

Results, Discussion:
While the time-series models have the lowest AICC/BIC values, neural network models are characterized by coefficient of determination (R2) values in the range of (0.8261-0.9811) and symmetric mean absolute percentage error (SMAPE) in the range (3.492-12.289). ILI predictions at a National level for the US shows 8.21% and 8.07% ILI in week 42 and 43 in the year 2009 with an increasing trend till week 42, followed by a slight decreasing trend till week 46. Mortality in the Midwest is estimated to be in the range of (5.67-14.8) deaths per week for most major cities, while as many as 2.74 deaths per week are estimated in Kansas City till week 46 in the year 2009.