COMBATTING EMERGING BIOLOGICAL THREATS – PREPARING FOR THE FUTURE TODAY

Multiscale Analytics For Pathogen Prediction

Nileena Velappan Los Alamos National Laboratory   **William Rosenberger** Los Alamos National Laboratory   **Alina Deshpande** Los Alamos National Laboratory

Los Alamos National Laboratories' Analytics for Investigation of Disease Outbreak tool (AIDO, available at https://aido.bsvgateway.org/), previously funded by DTRA contains library of representative outbreaks of diseases that can be combined into syndrome families (e.g. gastrointestinal disease, mosquito borne disease). Through the modification of the similarity algorithm developed for specific disease investigation, we have demonstrated the potential for identifying the causative agent of an unfolding gastrointestinal and mosquito-borne outbreaks of unknown origin. We have established collaborations with mesur.io and Gryphon scientific to develop a new set of analytics for the development of an automated multiscale pathogen prediction tool called Analytics for Pathogen Detection (APD). Advantages of this automated web based tool that could perform differential diagnosis at the individual scale, or pathogen prediction at the population scale early in an infectious disease outbreak will be discussed. The automated data collection would facilitate algorithm development using AI/ML methods. The output of this standalone analyses platform would provide early alert for emerging diseases. APD could also be linked with other DTRA funded web applications facilitating development of analytics that allow predictions of emerging disease and pandemic risk.

Traditional surveillance systems using clinical diagnosis, laboratory confirmation, and communication by public health officials have been an effective strategy in disease outbreak detection. Unfortunately in many instances, pathogen identification and outbreak declaration tends to be quite slow and may result in loss of lives during early stages of an outbreak. Analytics that can facilitate pathogen identification of an unfolding outbreak using syndromic/symptom data will have many advantages. Used early in an outbreak, the information provided can be used to narrow down the number of laboratory tests required to identify a specific pathogen. This will help to cut down expenditure and time required. This novel automated analytics platform could offer a comprehensive analysis of an unfolding event in the early stages of an outbreak facilitating effective mitigation measures.