UNIVERSITY of GUELPH

COLLEGE of ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

MSc Seminar

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Evaluating a surveillance tool and dashboard for highly pathogenic avian influenza (HPAI) prediction.

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Abstract:

Avian influenza is an infectious disease among wild birds caused by flu viruses. This virus's uncontrolled and unexpected spread among birds could end an outbreak. Avian influenza outbreaks could result in many consequences, especially in the economy. Apart from the financial aspects, although these viruses have low infectious through human, it has a high probability of death. It is practical to have effective actions in controlling the avian influenza spread in advance. Early detection of the outbreak comes to attention. Since the spread of avian influenza will endanger the health of other wild or farm birds in the first place, consequently, this will have adversarial effects on chicken farming, international trade, and farmers' livelihoods.

They are multiple studies in which different surveillance tools were introduced; However, in this study, Twitter and Google trends were used to predict the avian influenza spread in the United States and Canada from June 2021 to May 2022. Apart from having Google trends besides Twitter, we compare different classifiers as the training model to identify related tweets from irrelated ones. We concluded with the convolutional neural network as the best-performing method, with an accuracy of 84.51% and F-score of 0.80 over the pre-annotated dataset. As we used the unsupervised dataset from social media, we validated the anomalies found from predicted results based on their distance occurrence compared to the actual outbreak dates. All the anomalies indicating the occurrence of an outbreak through Twitter and Google were valid. By further analysis of the results we obtained, we noticed these platforms represent the avian influenza outbreak trend but not in the same way; Twitter represents a one-month forecast, while Google notifies the huge waves.

As the next step, we aimed to design and evaluate a prototype decision support framework that utilizes a diverse set of data sources for the early detection of highly pathogenic avian influenza (HPAI) and prediction of the risk of future avian influenza (AI) events in North America. The system will use continuous and diverse strategies for data collection, integration, and analysis of AI information to provide early warnings of AI outbreaks.