Executive Summary for Birds Time

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Overview:
A study in 2019 showed the loss of around 3 billion birds in the U.S. and Canada since 1970. Additionally, the 2022 State of the Birds Report identifies 70 birds that have lost half or more of their populations in the last 50 years and stand to lose another half in the next 50. 90% of the birds lost come from 12 different families of birds that include sparrows, blackbirds, warblers, and finches. Our project, trained on 7 years of both bird sighting data (EBird) and weather data (NOAA), predicts future bird migration patterns and sighting, which may in the future help understand the relationship between migration and climate.

Stakeholders:
- Conservationists, interested in their preservation
- Local Government, especially in regions with conservation efforts and endangered populations
- Farmers
- Birders or Bird Enthusiasts

Methodology and Results:
We generated datasets by region and date for basic weather data and density of bird sightings. We then applied linear regression, time series, and RNN models. Our results were as follows:

- Our linear regression had MSE 22.8
- Our averaging Time Series model had MSE 19.6
- Our Naive Time Series model had MSE 16.6
- Our RNN had MSE 11.7

Based on these results we decided to go with RNN. Because it outperformed Average and Naive Models, we determined that RNN generated useful predictions in regards to bird migration patterns.

Future Directions:
- Gather weather forecasts from online to automatically predict locations and density by location and species
- Use cross-species and cross-location information for prediction (currently, our time series and RNN models consider information one location and species at a time)