
Mathematical Model

Description:

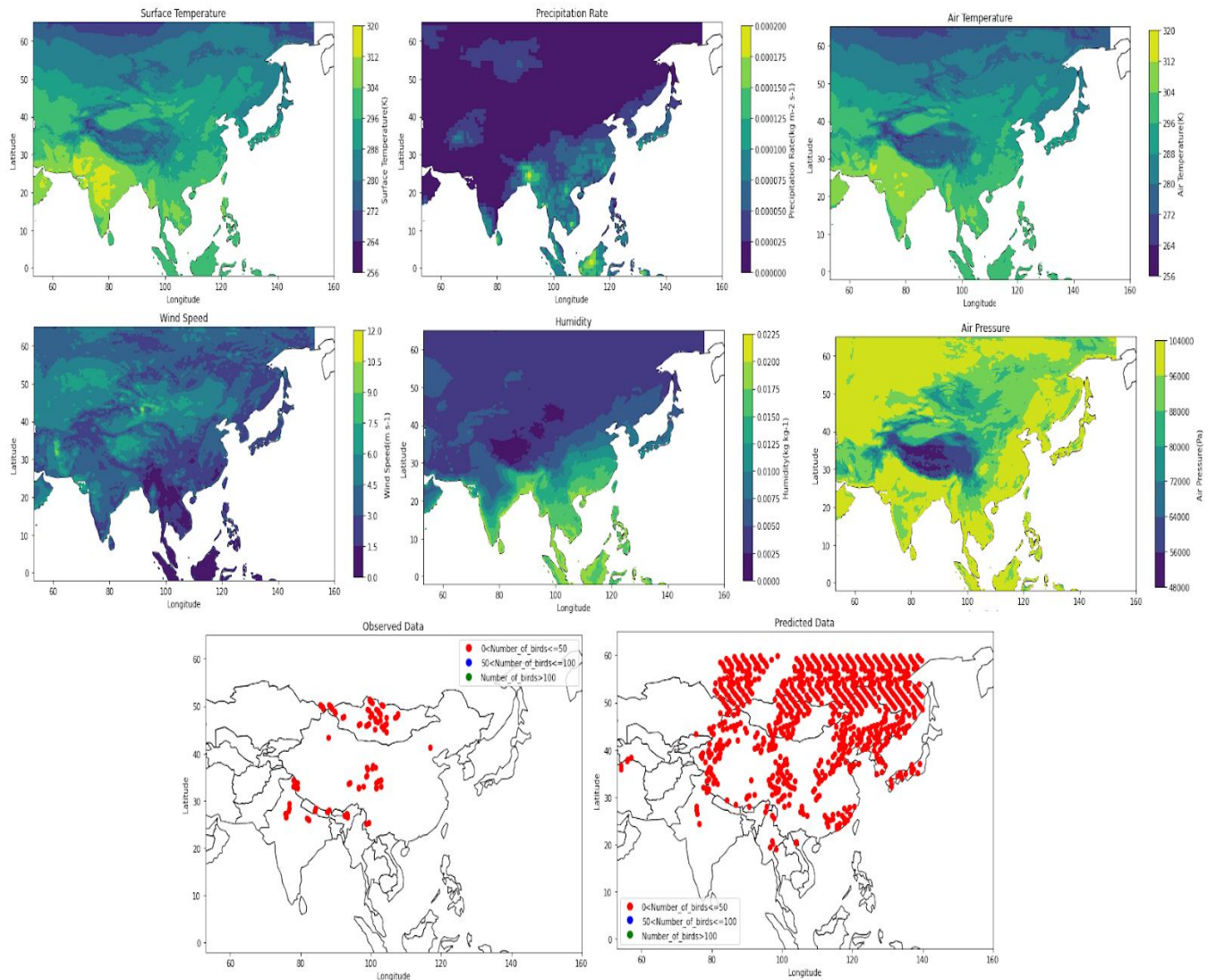
We modeled the distribution of bar headed goose in 4 different categories. We took six factors into consideration for modeling. They are Surface temperature, Air temperature, Humidity, Precipitation rate, Wind speed, Air Pressure. We took data of human observations for birds and we categorized that data into four categories. We resampled this data by applying Undersampling and Oversampling algorithms. We got data for environmental variables from NASA's project GLDAS. We used ANN(Artificial Neural Network) in order to make models predictive. We prepared 4 hidden layers of each having 16 neurons. We predicted for 4 different categories. We trained the model and were able to achieve 85% of accuracy.

Preparation of data:

To train the model, we used data of the years from 2000 to 2017. We compared its predictions with actual observations of year 2018. To predict the number of birds for a particular month, all the coordinates where geese were observed during 2000-2017(of each month) will become presumptive coordinates. After inserting data of all the six factors for that particular month, the model will predict the coordinates where geese can be found for that month. The coordinates which are not predicted out of presumptive coordinates, will be categorized as zero. We got the number of birds by rounding off the coordinates of locations where the birds were observed. This data was very much imbalanced because the number of samples of zero category was very high than others. We balanced this data by applying the sampling algorithm on zero category data and over sampling on others.

Site	Arrival Period	Departure Period
Breeding Areas	<i>Late April To Early May</i>	<i>September To November</i>
Wintering Areas	<i>Mid October To Early December</i>	<i>Around mid march</i>

Breeding period(May)



Wintering Period(Dec)

