Predicting breeding sites of Desert Locust through environmental parameters

By: Sunaina and Bibhu

Motivation: Death locusts are migratory pests. Their swarming behaviour is responsible for crop and pasture destruction at an alarming rate and causes a food crisis in that particular area.

Idea: Using temperature, precipitation and vegetation to predict desert locust breeding site's absence or presence in a particular area.

Dataset: FAO/ESRI Locust Hub has an Ecology dataset containing condition and density and category of vegetation in different X,Y coordinates for different countries from 1985-2021 containing 442,649 records. The temperature and precipitation data are taken from WorldClim from 1985-2021.

Data Preprocessing* (Sunaina)
> Pooling of multiple data sources
> Pseudo-generation of absence data points
> Need to adjust different data sources to the same timescale and spatial distance
> Divide the datasets for training, validation and testing

Modelling
> Logistic Regression* (Bibhu) (baseline)
> Random Forest (Bibhu)
> MaxEnt (Sunaina)

Validation of the model through AUC-ROC, accuracy and precision (will be done by both)

Relevant papers:

1. Kimathi, E., Tonnang, H.E.Z., Subramanian, S. *et al.* Prediction of breeding regions for the desert locust *Schistocerca gregaria* in East Africa. *Sci Rep* (2020)
2. D. Gómez, P. Salvador, J. Sanz, C. Casanova, D. Taratiel, J.L. Casanova, Desert locust detection using Earth observation satellite data in Mauritania, Journal of Arid Environments. (2019)

Add one or more interesting features like soil moisture and soil type, wind speed, humidity, average CO_2 or using the presence of “hoppers” instead of swarms

Expected Results:
Temperature, vegetation and precipitation are the most important factors in determining locust breeding spots but additional features can increase the prediction accuracy.