

Predicting breeding sites of Desert Locust through environmental parameters

By: Sunaina and Bibhu

Motivation: Desert 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.

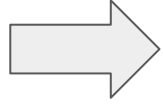
Idea: Using temperature, precipitation and vegetation to predict desert locust breeding site's absence or presence in a particular area.

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*

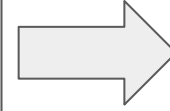
(Sunaina)

- > 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 CO₂, 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.