Essentials of Spatial Ecology: GIS Analysis in R

Week 4 Assignment - Introduction to Logistic Regression

Due: Saturday, April 10 2021 at 11:59 pm EDT

# Description

In this week’s assignment, you’ll follow instructions provided in class to model the occurrence of dorcas gazelle (*Gazelle dorcas*). More widely distributed across the sahara desert than addax (*Addax nasomaculatus*), dorcas gazelle are susceptible to displacement from pastoral land uses and are assumed to be in rapid decline due to poaching and disturbance from oil exploration activities. Sightings of dorcas gazelle were recorded simultaneously with ground-based surveys to record addax occurrence. Your goal in this assignment is to re-analyze the dataset provided in class, with a goal of evaluating how dorcas gazelle use habitat in relation to addax.

Goals of this exercise are to improve your skills working with spatial objects to fit a logistic regression model to the data and provide a raster prediction of dorcas gazelle occurrence. Importantly, you will need to assess model assumptions, graph response curves, and evaluate model coefficients.

Please don’t hesitate to ask questions or to offer help to others on the Blackboard discussion board. We expect everyone to submit an independent project, but there is no problem with providing assistance to others. Part of what we hope to facilitate with this class is a new community of researchers for you to interact with and learn from. Please upload a WORD document answering the question below, along with your annotated R script. Both documents should be posted to the relevant assignment in [Blackboard](https://mymasonportal.gmu.edu/).

# Datasets

All datasets required to complete this homework are included in the “Week4\_Homework\_Data.Rdata” file on Blackboard, within the Week4/Data directory. The files in this data file include:

* A spatial points data frame, named Occ.Hmk, which includes the occurrence of dorcas gazelle (i.e., obsDorcas)
* Raster files (2 files total) of ndvi (ndvi) and surface roughness (rough).

You’ll need the following libraries to complete this assignment:

library(arm)  
library(DAAG)  
library(dplyr)  
library(lubridate)  
library(pROC)  
library(rgdal)  
library(usdm)  
library(visreg)

# Assignment

Load the Week4\_Homework\_Data.Rdata file into R.

You should now see three files in your working environment:

* Occ.Hmk - Spatial Points DataFrame
* ndvi - Raster Layer
* rough - Raster Layer

**Question 1**: Are all files in the same coordinate reference system? If no, reproject the file(s) to UTM Zone 32 North, WGS84.

Convert Occ.Hmk to a dataframe (Occ.Hmk <- as.data.frame(Occ.Hmk)).

Now, follow the instructions from Thursday, except fit a model with obsDorcas as your dependent/response variable. Make sure to scale your continuous variables before proceeding. Don’t forget to change the independent variable sDorcas in your model.

Answer the following questions;

**Question 2**: Are any of the variables collinear? Does your model have any problems with overdispersion?

**Question 3**: What variables are important in predicting Dorcas gazelle occurrence? Are these variables similar or different than the model we generated for addax? Which variables are significantly positive or negative?

**Question 4**: Is your model any good? What statistics could you provide about the predictive power of the model?

**Question 5**: Visually, do Dorcas gazelle tend to use the same areas as Addax (use both rasters and their quadratics for this prediction)?