

Run to the Hills?

Modeling the Spatial Distribution of the Common Jogging Human

MET1 - Spatial Modeling and Prediction 2019



Johannes Mast, Eike J. Hoffmann, Jennifer A. McGowan, Dave, Martin Wegmann

Overview

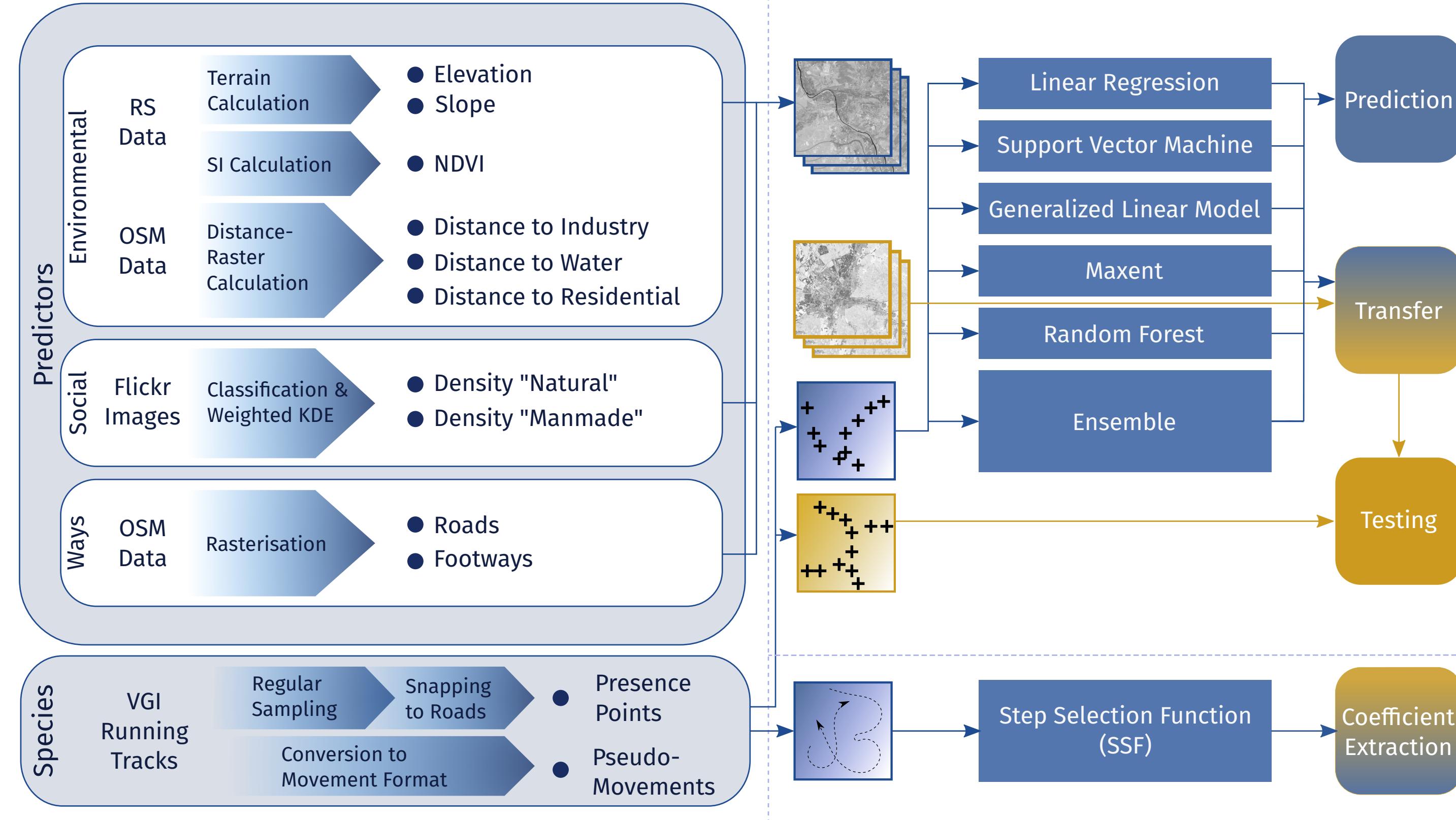
Joggers (*Homo Cursor*) are a common sight in human settlements. To better understand this species and pass the MET-1 course, I modeled the **distribution** of joggers in Würzburg.

This was accomplished using a variety of data sources including OpenStreetMap, Sentinel-2, and Flickr.

A more robust result was achieved by using an **ensemble** of common models and compared to a simple **step-selection-function** model (SSF).

Data Model

A preliminary analysis of the data led to the choice of the following predictors:



Results

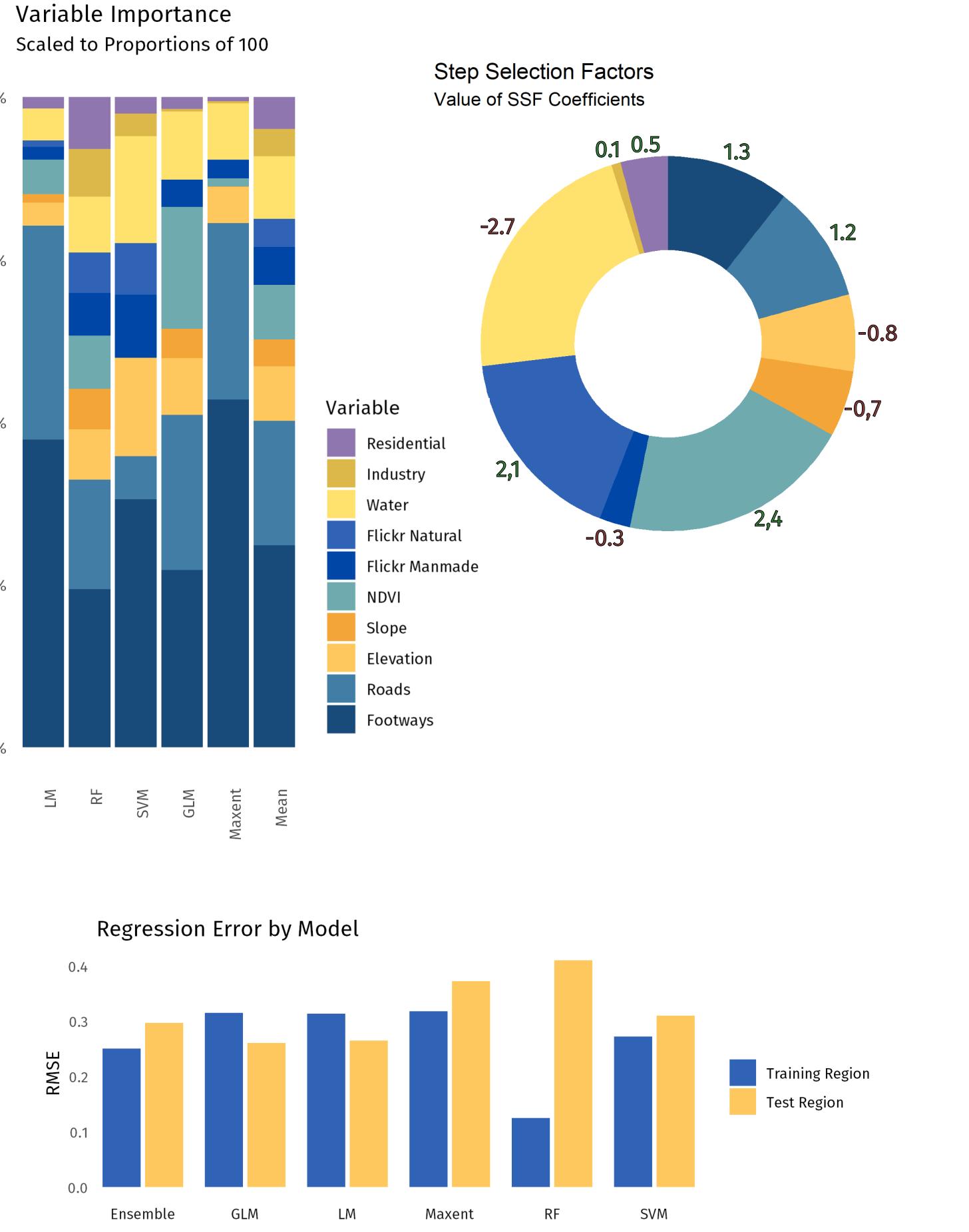
Footways and roads are strong predictors. The importance of the **environmental predictors** NDVI, slope and elevation **varies** strongly between the models.

The Main **river** is assigned a non-zero probability of being occupied by joggers.

The **cemetery**, with a high density of footways and nature in close proximity to residential areas appears to be a **prime** jogging area.

Remote areas, like the **Stadtwald**, are not likely to be traversed.

For most models the training error is much lower than the testing error, suggesting some degree of **overfitting**.



Discoveries

- Joggers are mainly found on **footways** around the **residential areas** close to **water**, where they live. The SSF suggests that their tracks are actually moving **away from water** and **towards vegetation**.
- The **lowest error** in the testing region was achieved by the **Maxent** model. The **RF** model is the most accurate model in the training region, but appears to be **overfitting** strongly.
- The difference between the variable importance of the common models and the SSF is noticeable and most pronounced for the **Flickr-natural** and **NDVI** variables, which are **favored by the SSF**.

Background: Spatial distribution of joggers as predicted by the ensemble model