

# Method of AOA explained in figures

Supplementary to the paper ‘Predicting into unknown space? Estimating the area of applicability of spatial prediction models’

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## Create Sample data, scale and weight them

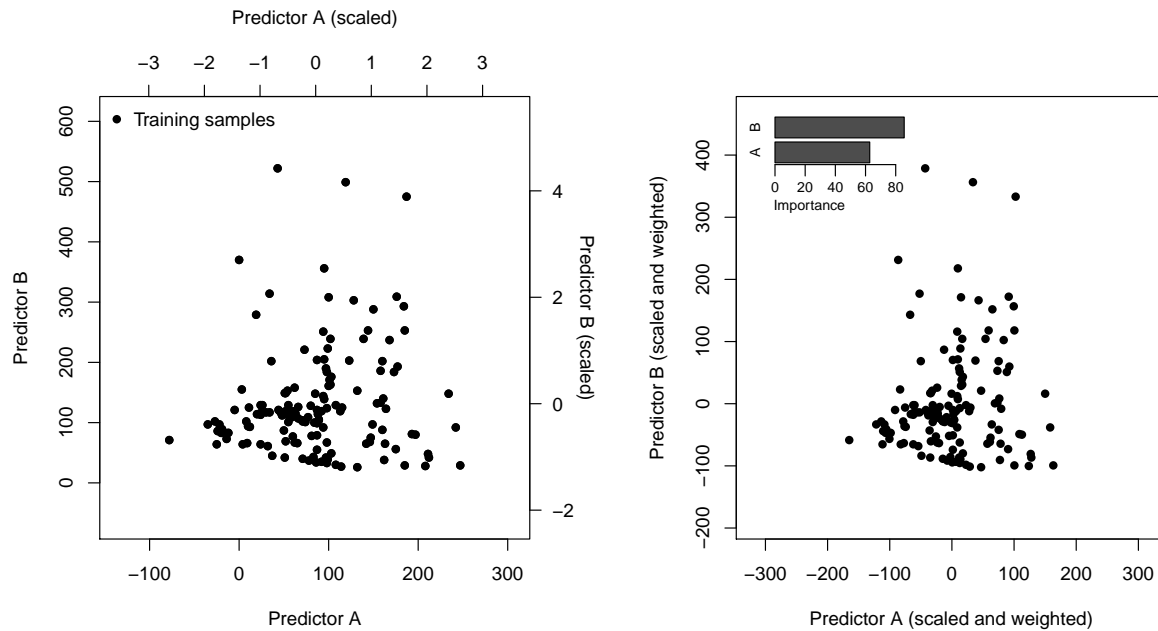


Figure 1: Initial situation: Training samples in a multidimensional (here 2) predictor space. First, the predictor space is scaled and weighted (second x and y axis) according to the estimated variable importance shown in the topright corner.

Calculate the DI within the training data to get the threshold for the AOA

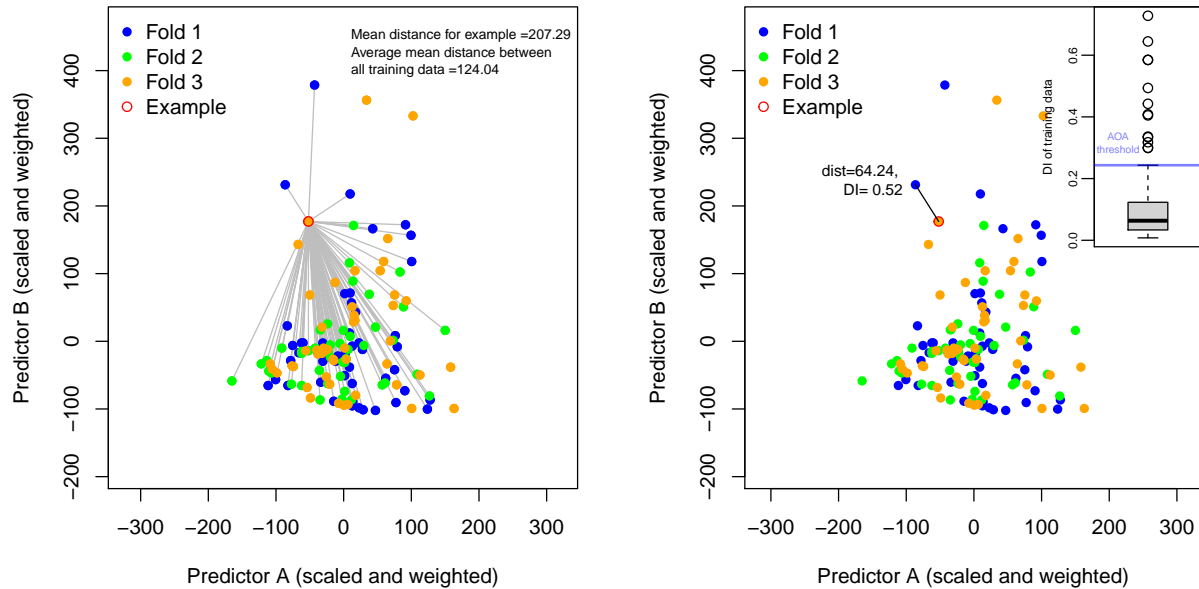


Figure 2: To answer the question if the trained model can be applied to a new data point, a threshold is used. This is the outlier-removed maximum DI of the cross-validated training data. The calculation of the DI of the training data is shown here for one example: The example data point is in fold 3 of the model. Therefore the distance to the nearest training data point NOT located in fold 3 is calculated (b) and this distance divided by the average of the mean distances between all training data (a). The DI is calculated for each training data point (boxplot) and the threshold is then derived from these DI values, so that a data point is outside the AOA if it is more dissimilar than the dissimilarity observed within the training data.

## Calculate the DI of a new point

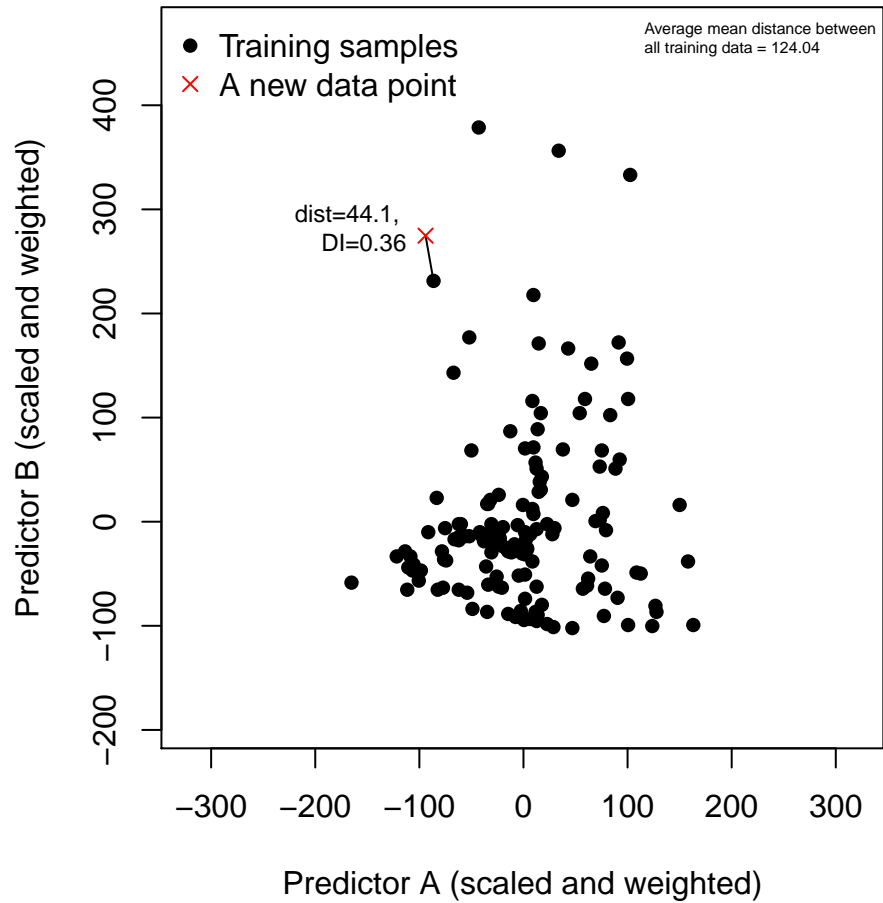


Figure 3: the DI for a new data point is then estimated by calculating the distance to the closest training point in the predictor space. This distance is divided by the average of mean distances between all training data.

Estimate the AOA for each new potential data point

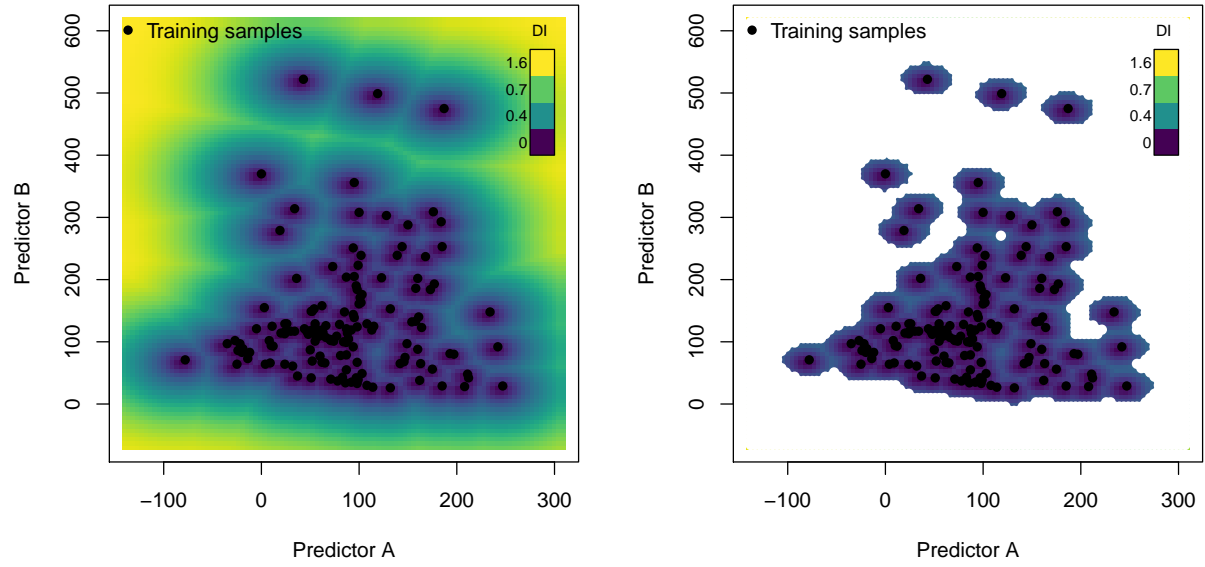


Figure 4: This threshold can be applied to the entire predictor space to derive the AOA (b) from the DI (a) of each new data point.

## Additional figures

### Threshold thoughts

