Regression of species richness biodiversity indicator from satellite observations and environmental parameters

MALIS course project, fall semester 2020

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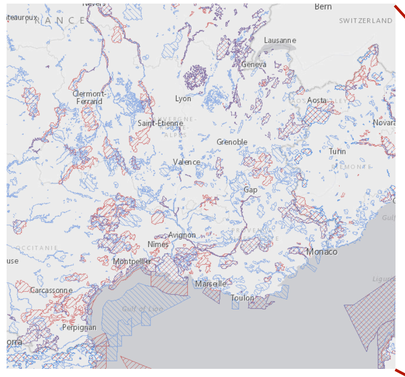
Sophia Antipolis

Dataset and features

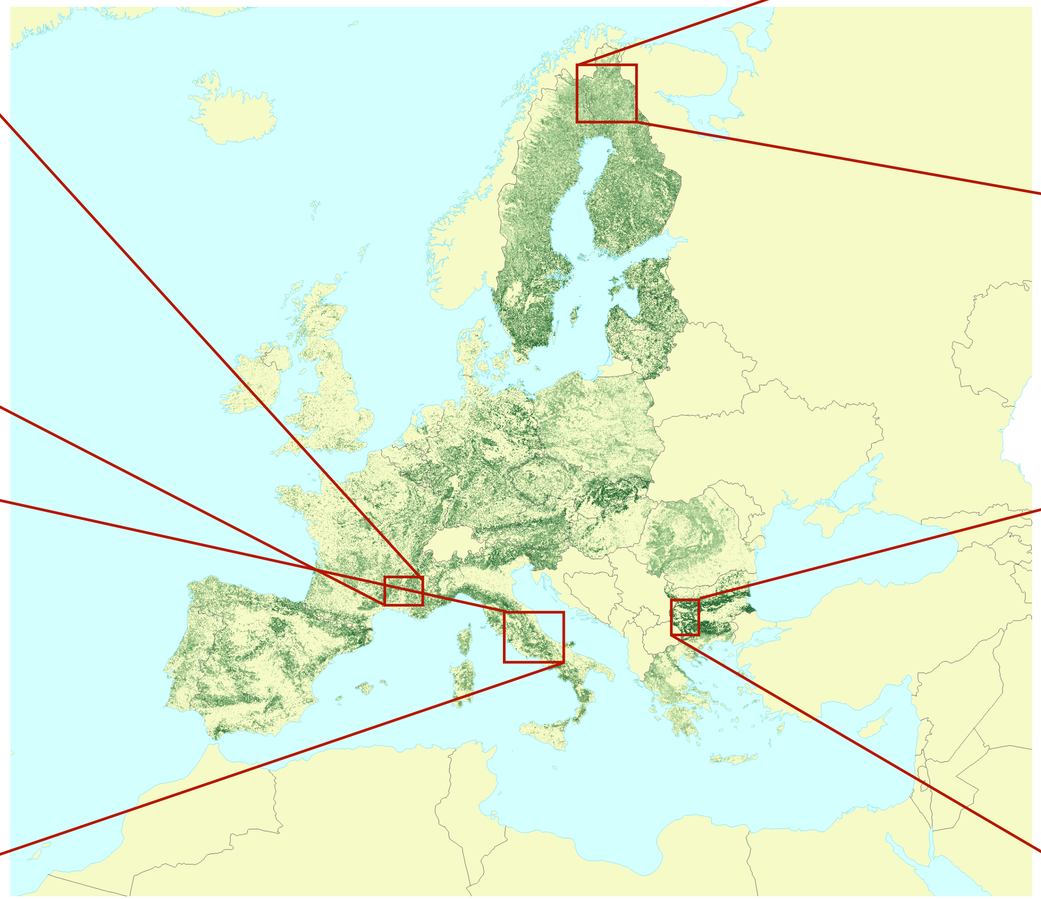
Features

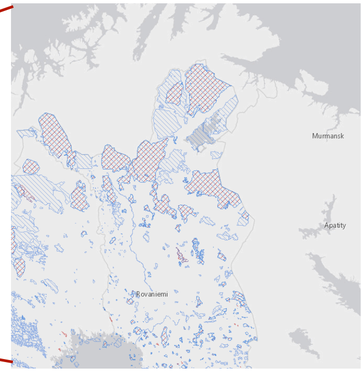
Regression index

Chosen areas

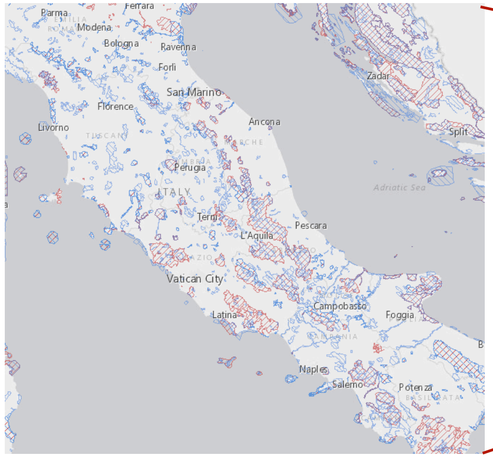


France, N 44.4 - 44.8° E 3.6 - 4.5°

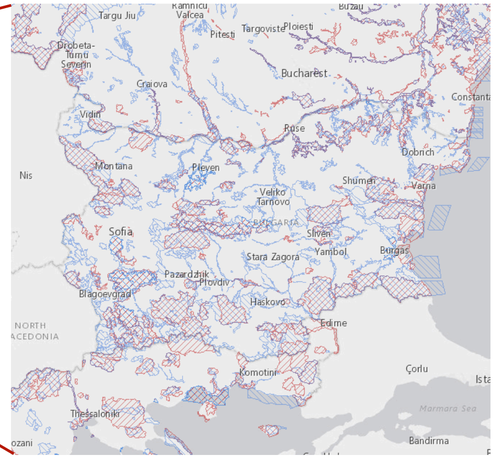




Finland, N 67.0 - 69.0° E 25.0 - 28.0°



Italy, N 40.5 - 43.0° E 12.5 -15.5°



Bulgaria, N 41.0 - 43.5° E 22.0 - 24.0°

EEA geospatial data catalogue, Richness of forest-related species and habitats indicator 2012 dataset, Nov. 2018

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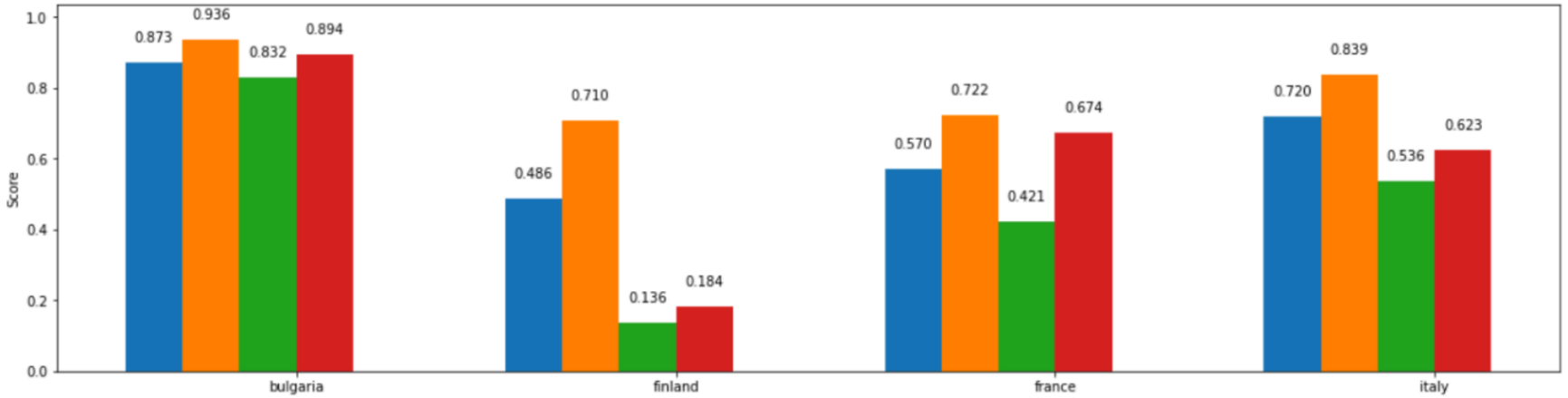
Data cleaning

Handling invalid data and pre-processing

Region	*Remove*	*Mean*	*Closest mean*	*knn imputer*
Bulgaria	0.918	0.925	0.925	0.923
Finland	0.713	0.717	0.717	0.717
France	0.732	0.742	0.742	0.735
Italy	0.803	0.832	0.835	0.827

Models comparison

R^2 score of the model for each region for a 4-fold cross validation



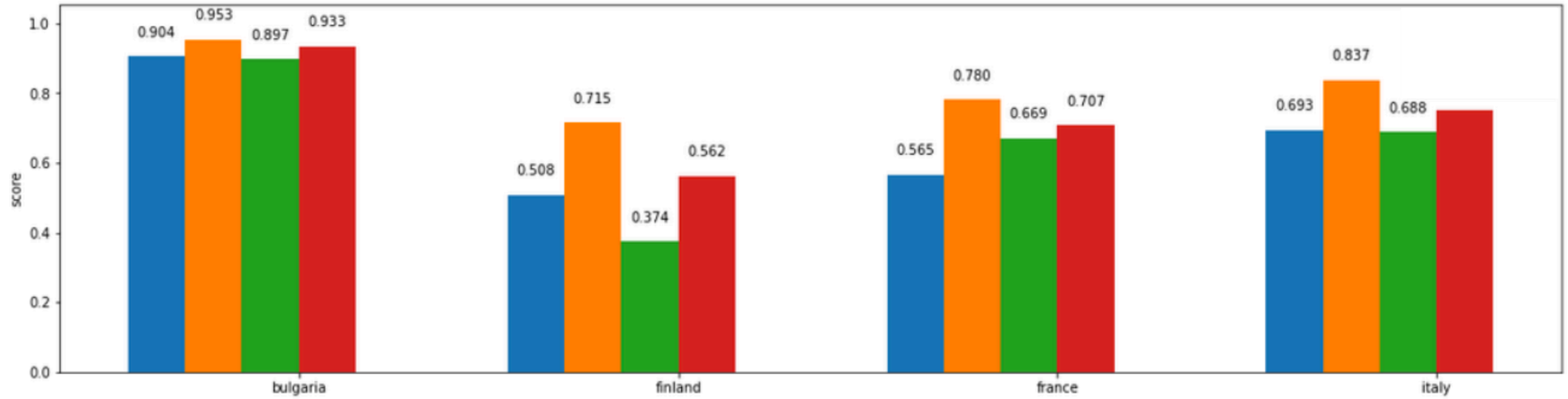
Decision Tree

Random Forest

Support Vector Machine

Neural Network

R^2 score of the model for each region for a 4-fold cross validation on log(species richness)



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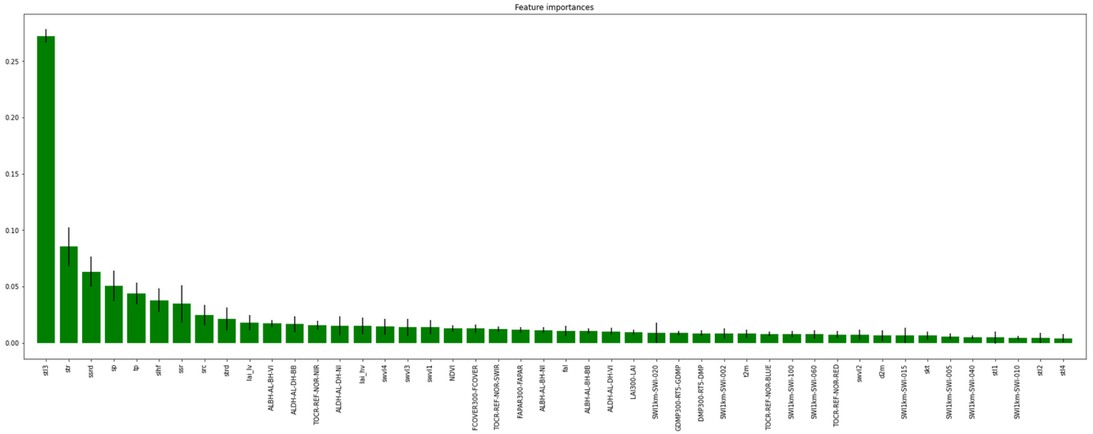
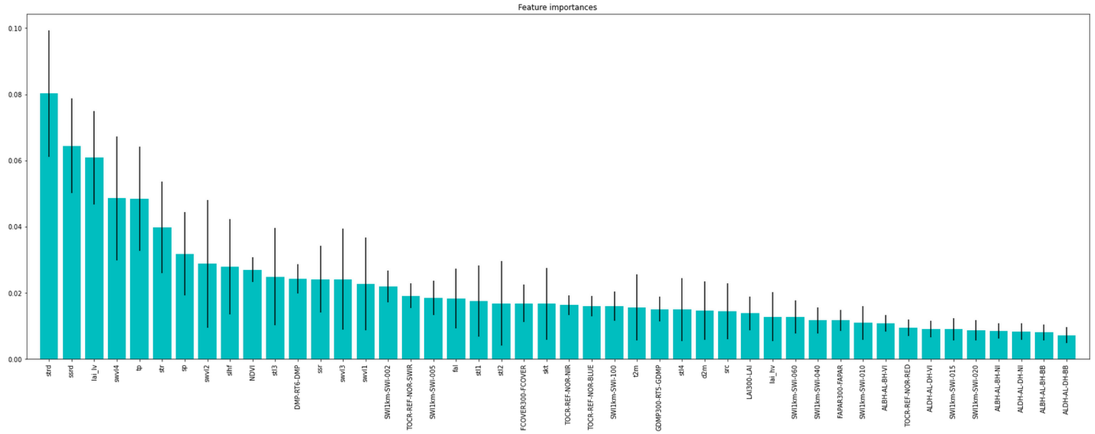
Feature importances

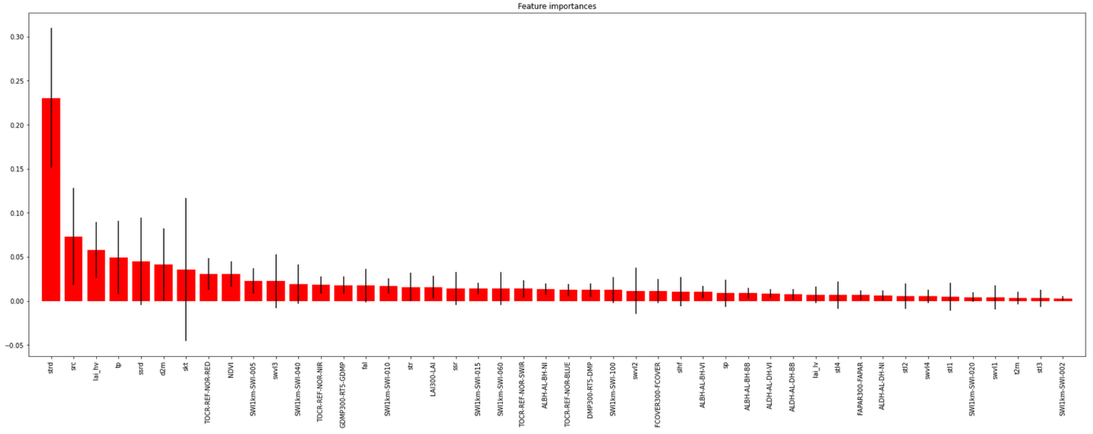
Bulgaria



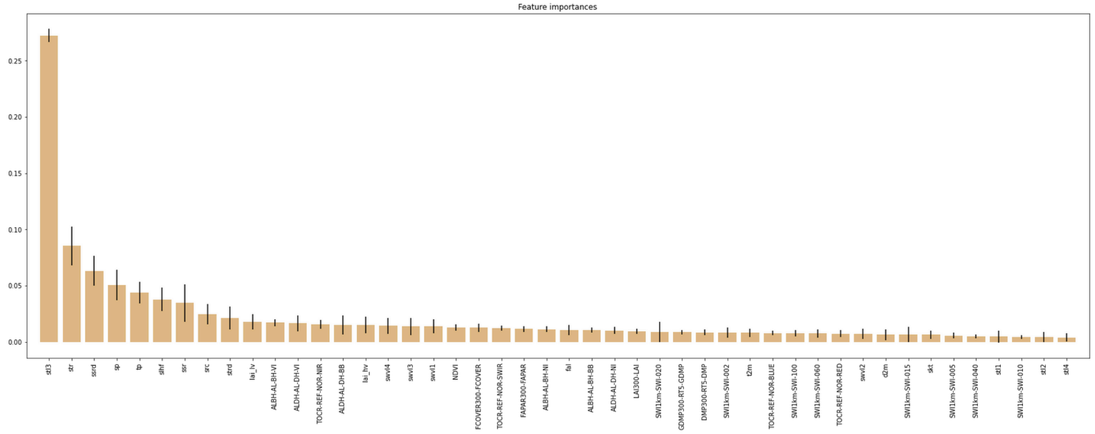
Finland



France



Italy



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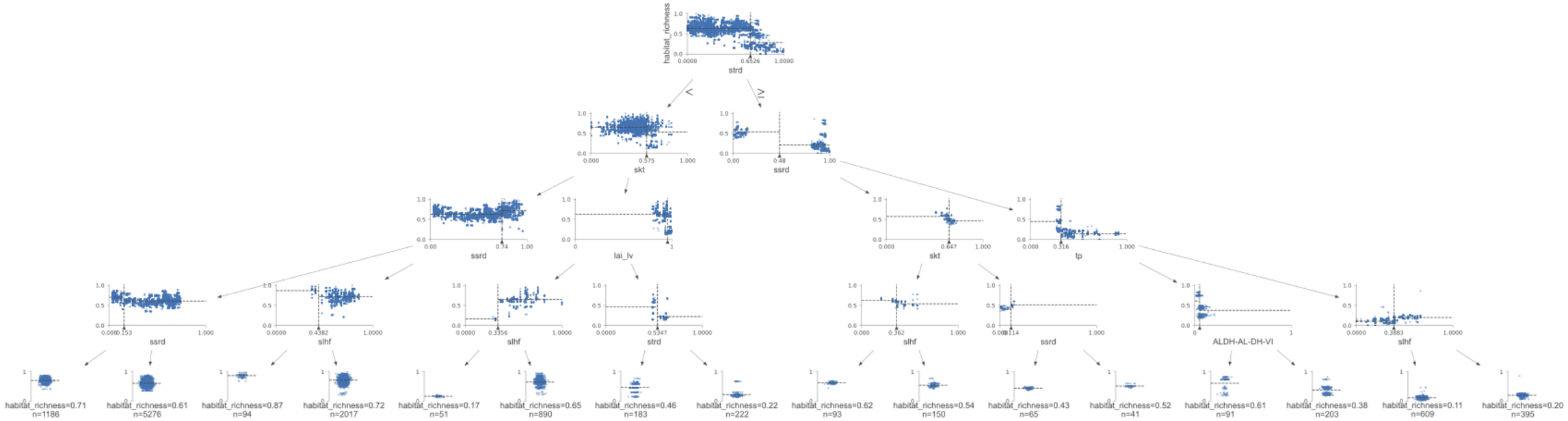
Regression Tree visualization

Insight into the model’s decisions



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Discussion and future work

Conclusions

- Greater score with respect to the literature
- Only open access data that can be derived by satellites observations
- Ecological insight by analysis of feature importances and regression trees
- Scalability to different habitats

Limitations

- Performance is influenced by area size and internal composition
- Possibility of error propagation from feature derivation
- Need for further validation on different areas and richness indexes

Thank you!

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Code, datasets and visualizations are available at:
https://github.com/vincenzomadaghiele/Regression-of-biodiversity-indicators