

Robust approaches to supervised machine learning techniques for seven fish species recruitment prediction in fisheries

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Contribution

A pipeline of supervised classification methods proposed in [1] is applied to seven fish species of commercial interest in the Bay of Biscay.

Pipeline methods

- Wrapper recruitment discretization
- Supervised predictors discretization
- Supervised feature selection
- Naive Bayes classifier

Pipeline properties

- Predictions with its uncertainty associated
- Predictions and scenarios easy to interpret
- Recruitment and predictors boundaries that can be interpreted
- Higher predictors stability (leaving one out selection)
- Error balanced through all recruitment levels

Pipeline validation

The whole pipeline is applied after splitting in folds (10-times 5-fold cross-validation) for honest validation. Repeated cross-validations allow to have more robust performance estimations with its variability measured. Accuracy performance score measures model performance without considering the associated likelihoods, whereas Brier score considers these assessments.

Performance: generalization

	Accuracy (%)	Brier score	True positive (%)
Anchovy	48.7 ± 7.2	0.27 ± 0.05	38.4, 33.1, 57.2
Hake	45.1 ± 9.9	0.29 ± 0.07	36.8, 34.1, 40.6
Sardine	45.0 ± 7.1	0.31 ± 0.06	45.2, 31.3, 41.7
Mackerel	30.6 ± 6.3	0.31 ± 0.12	27.1, 17.9, 25.2
Horse mackerel	27.3 ± 8.3	0.38 ± 0.07	19.9, 32.3, 11.5
Tuna	47.5 ± 7.4	0.19 ± 0.04	60.7, 28.1, 49.4
Blue whiting	51.3 ± 7.6	0.26 ± 0.04	34.7, 56.7, 43.8

A good fit does not guarantee a good generalization or predictive power (e.g. horse mackerel shows a good fit, however it is the one with the worst generalization).

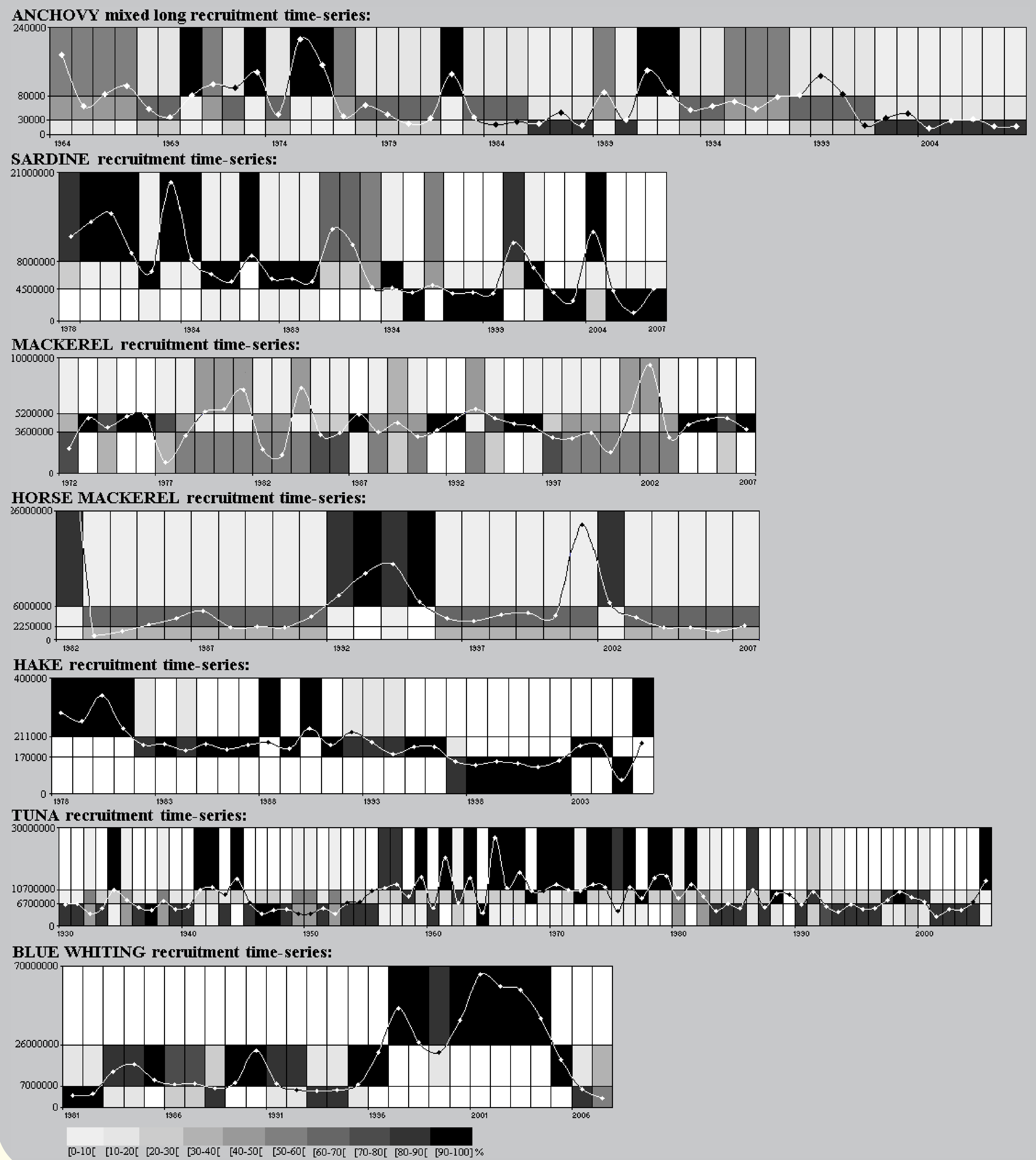
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References

[1] Fernandes J. A., Irigoien X., Goikoetxea N., Lozano J. A., Inza I., Perez A., Bode A, 2009. *Fish recruitment prediction, using robust supervised classification methods*. Ecological Modelling. In press (DOI: 10.1016/j.ecolmodel.2009.09.020).

Performance: goodness of fit



Anchovy recruitment scenarios

