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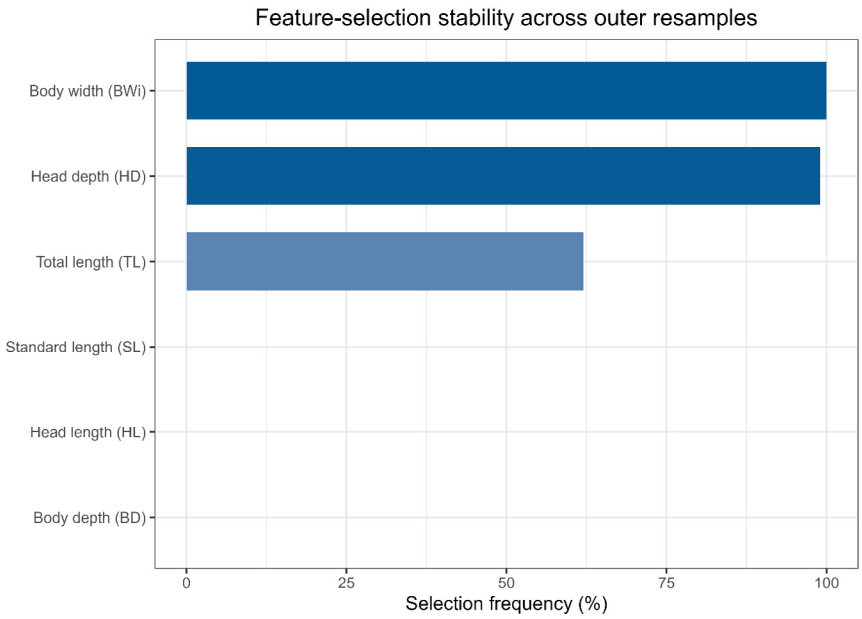
A Comparative Study of Machine Learning Algorithms for Predicting Body Weight of Nile Tilapia (*Oreochromis niloticus*)

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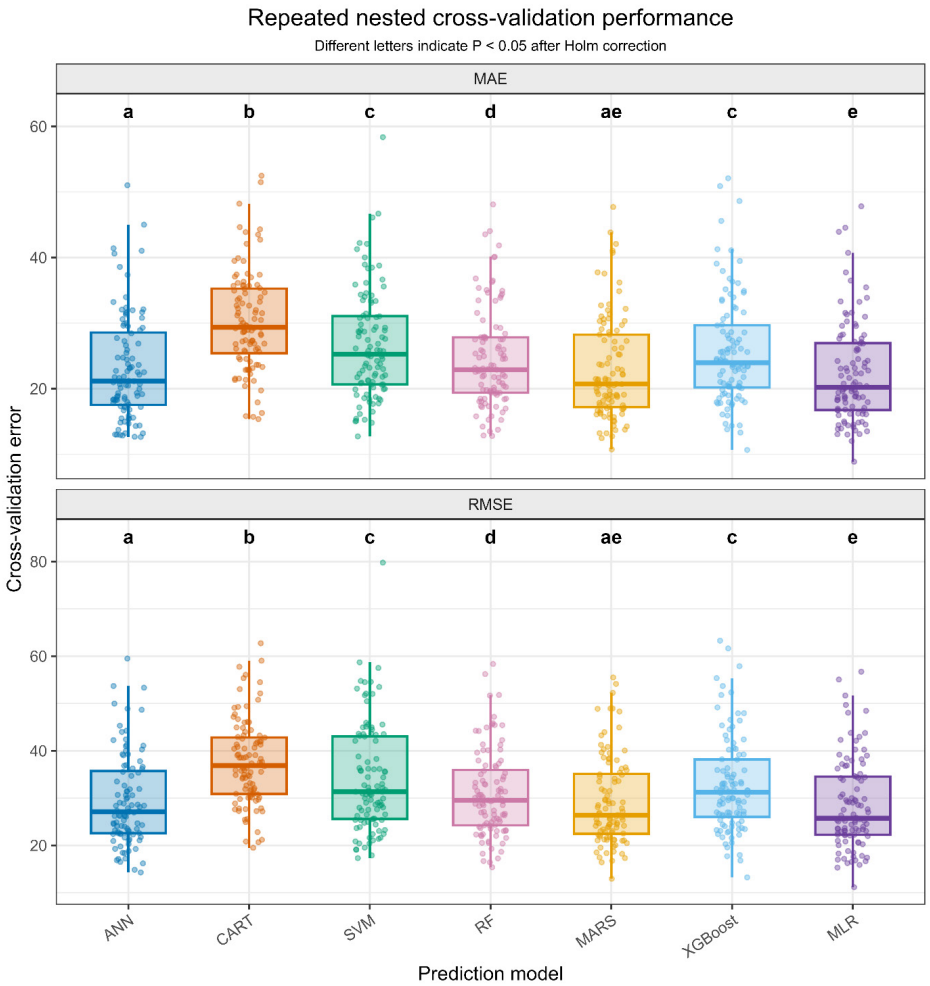
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Supplementary Figure S1: Stability of predictor retention and selection across the 100 outer resampling iterations of repeated nested cross-validation. Selection frequency indicates the percentage of outer training resamples in which each morphometric variable was retained after preprocessing and selected for modeling.



Supplementary Figure S2: Distribution of MAE and RMSE across the 100 outer validation resamples of repeated nested cross-validation. Different letters indicate significant pairwise differences at P < 0.05 after paired Wilcoxon signed-rank tests with Holm correction following a significant Friedman test. Models sharing at least one letter do not differ significantly.

Supplementary Table S1: Final hyperparameters selected for each prediction model.

Model	Final selected hyperparameters
ANN	size = 3; decay = 0.01; bag = FALSE
CART	cp = 0
SVM	sigma = 0.5000; C = 4
RF	mtry = 2; ntree = 1000
MARS	degree = 1; nprune = 6
XGBoost	nrounds = 200; max_depth = 2; eta = 0.05; gamma = 0; colsample_bytree = 0.8; min_child_weight = 1; subsample = 0.8
MLR	No tuning parameters

ANN: Artificial neural network; CART: Classification and regression tree; SVM: Support vector machine with radial basis function kernel; RF: Random forest; MARS: Multivariate adaptive regression splines; XGBoost: extreme gradient boosting; MLR: multiple linear regression

Supplementary Table S2: Computational cost of model training/tuning and prediction.

Model	Training and tuning time (s)	Inference time (ms/observation)
ANN	27.11	0.029
CART	0.83	0.019
SVM	1.45	0.038
RF	5.03	0.106
MARS	2.35	0.019
XGBoost	121.11	0.046
MLR	<0.01	0.006