

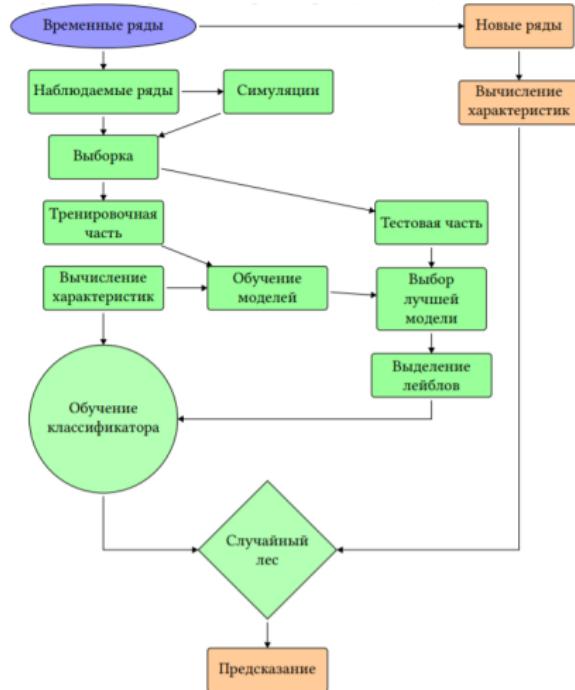
The principle of meta-learning for model selection in time series forecasting

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Session 2019

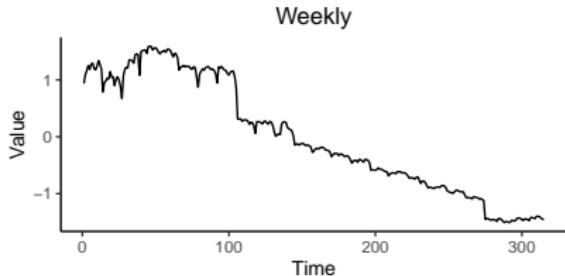
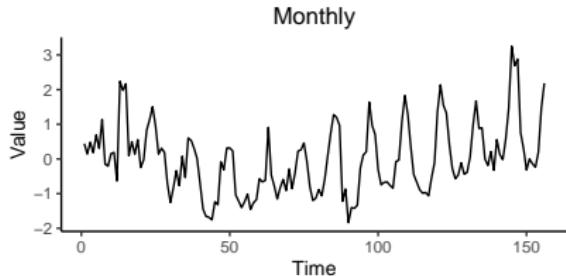
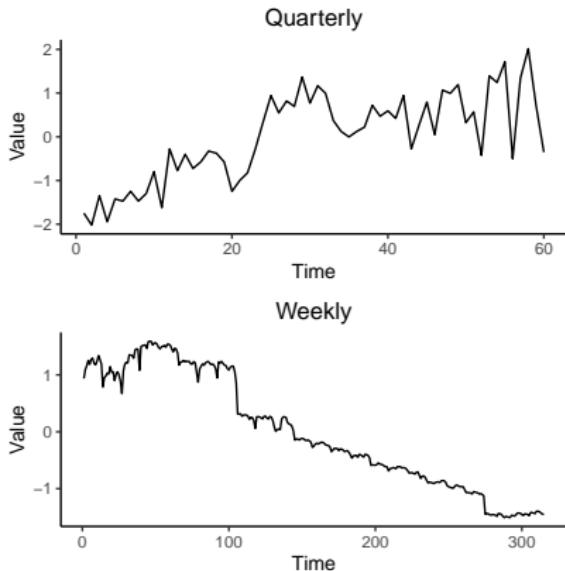
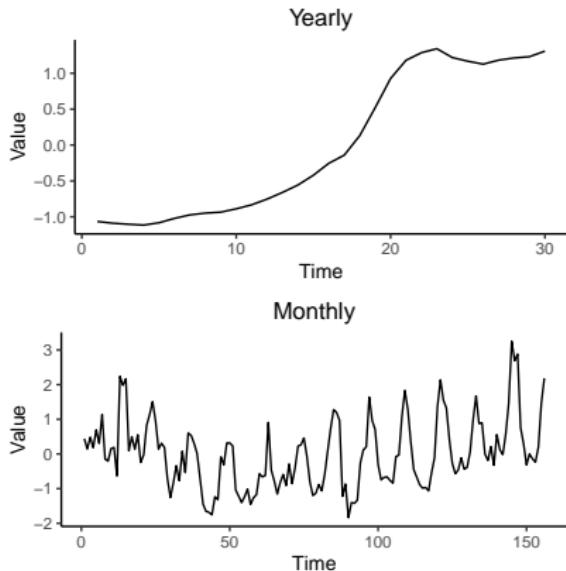
Model selection algorythm



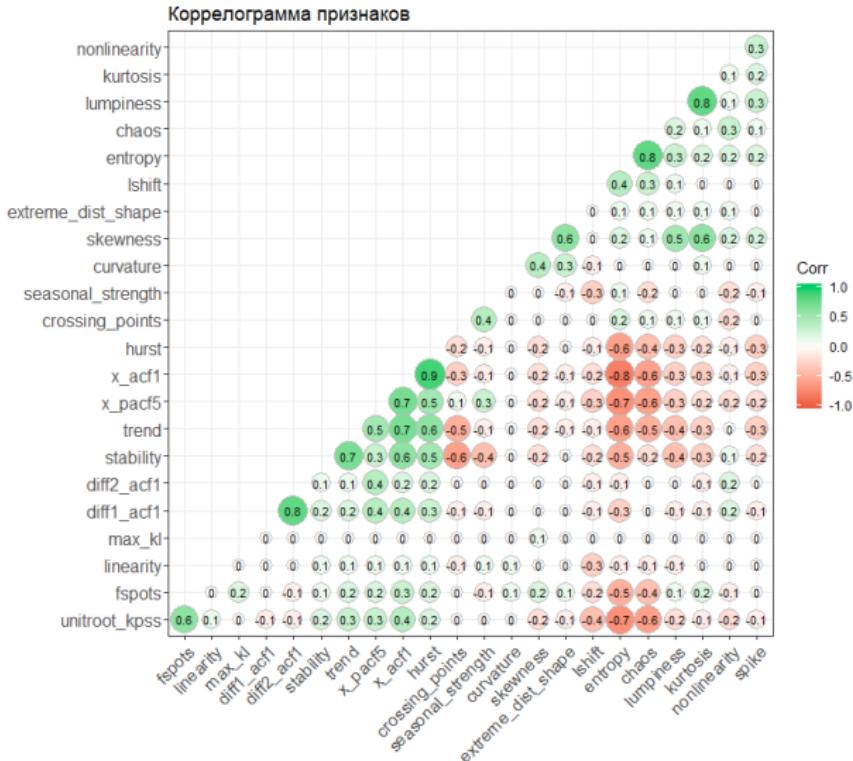
Sample

Class	Quantity	Length	Seasonality
Yearly	2000	30	1
Quarterly	2000	60	4
Monthly	2000	156	12
Weekly	286	315	4
Daily	2000	500	7
Hourly	245	720	24
Total	8531		

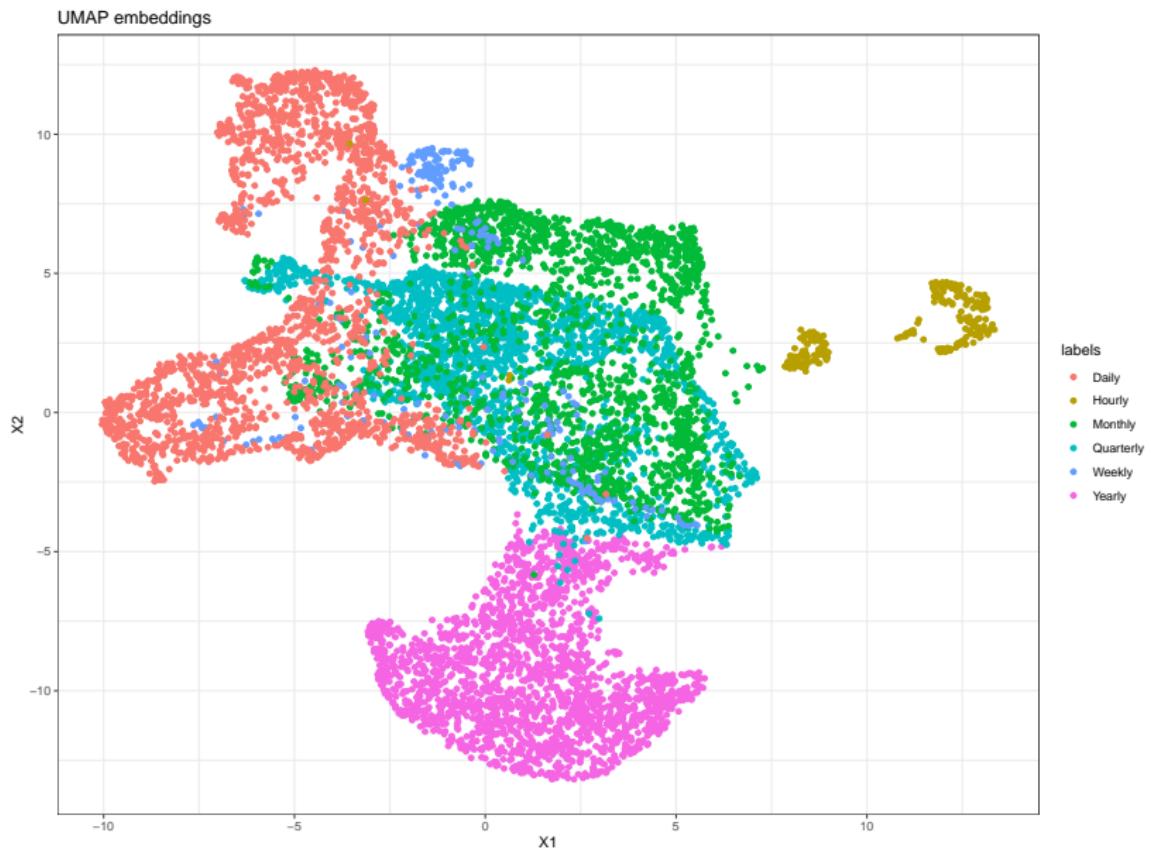
Time series examples



Correlation of features

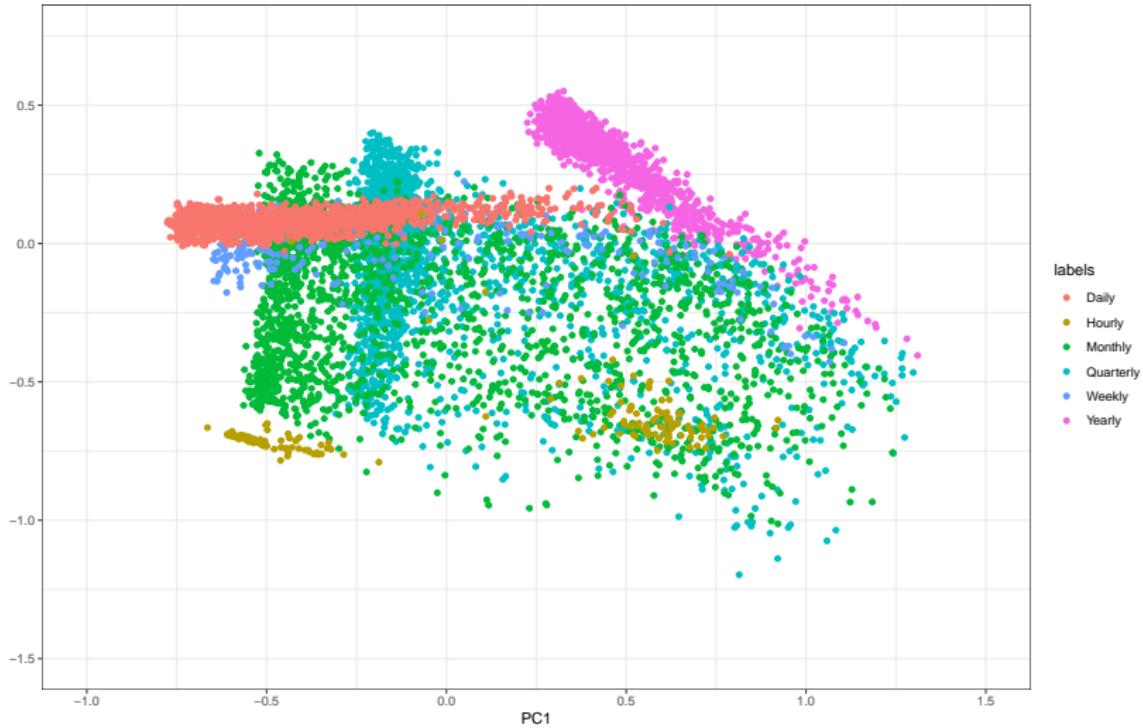


UMAP embeddings

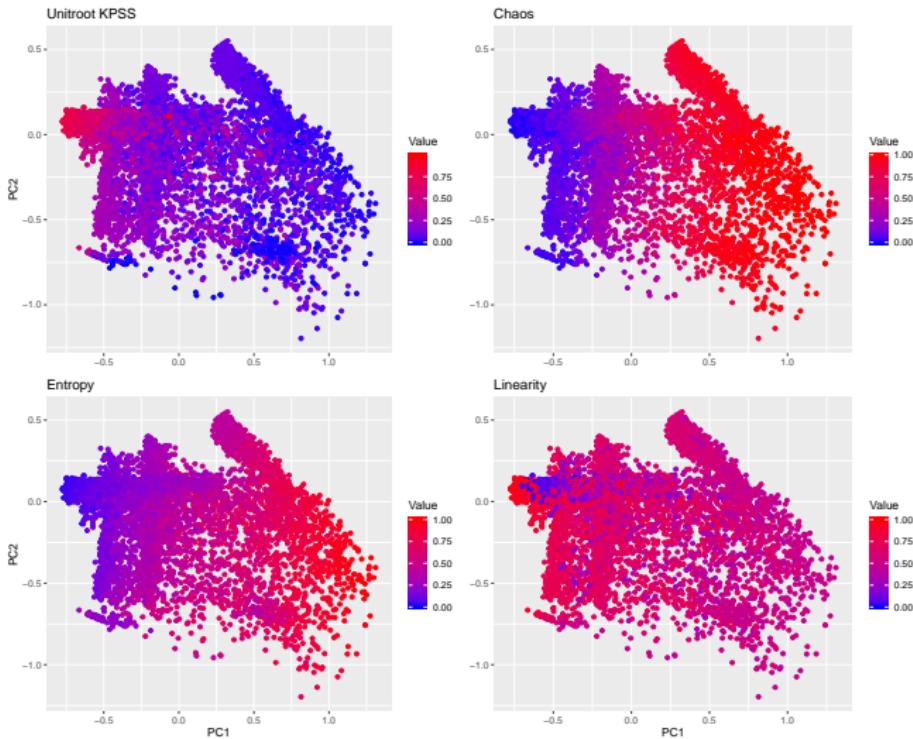


PCA

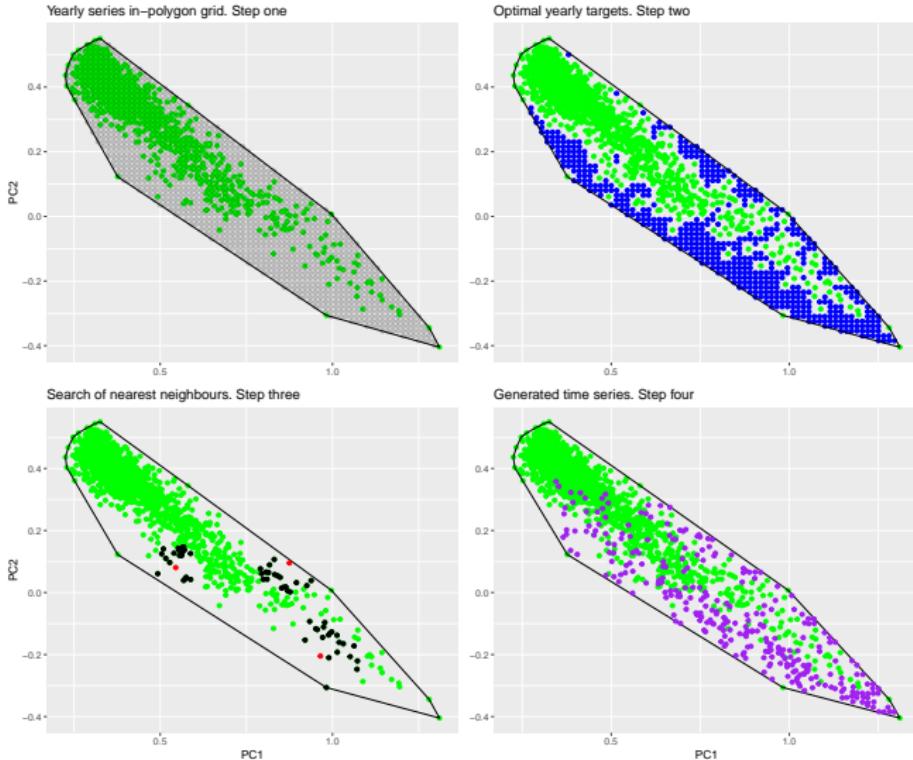
Time series clusters



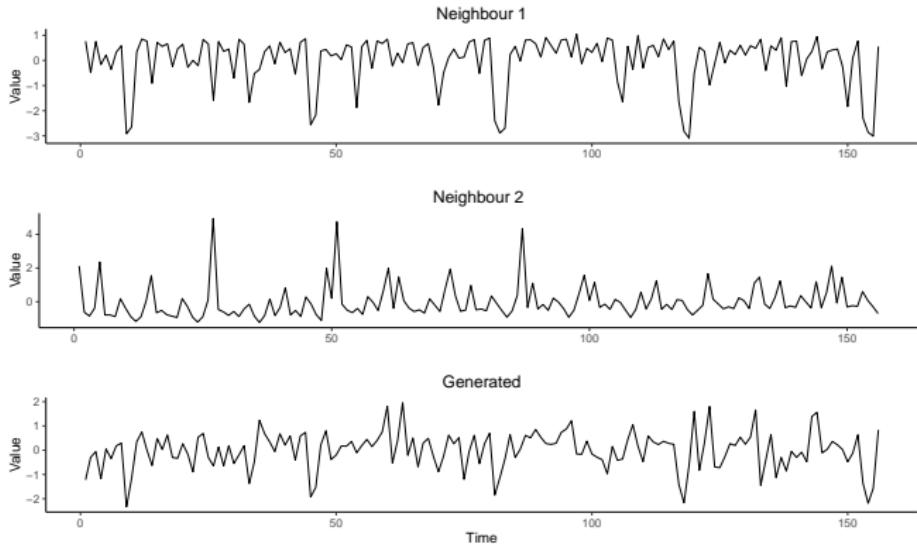
Strength of features



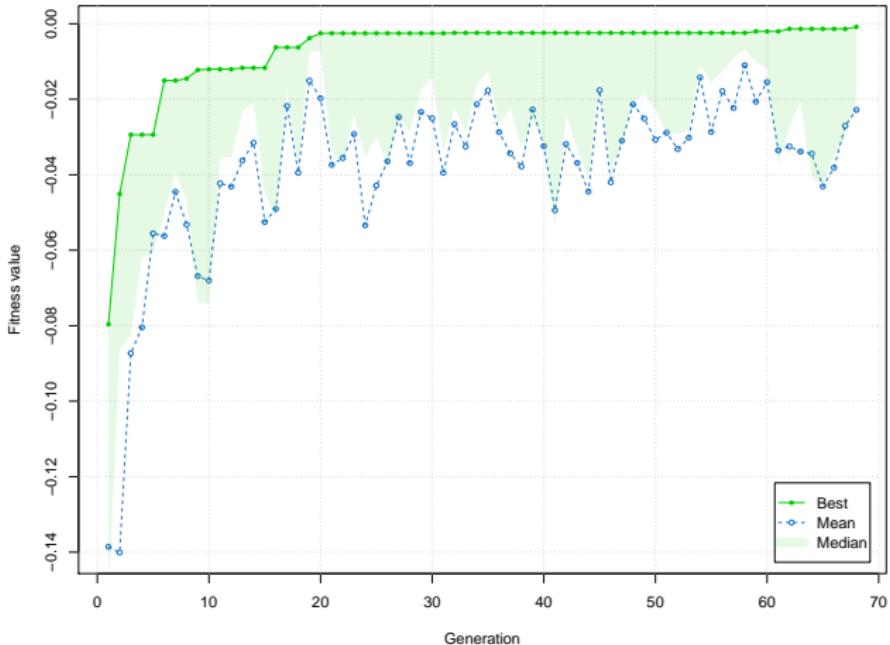
New series generation



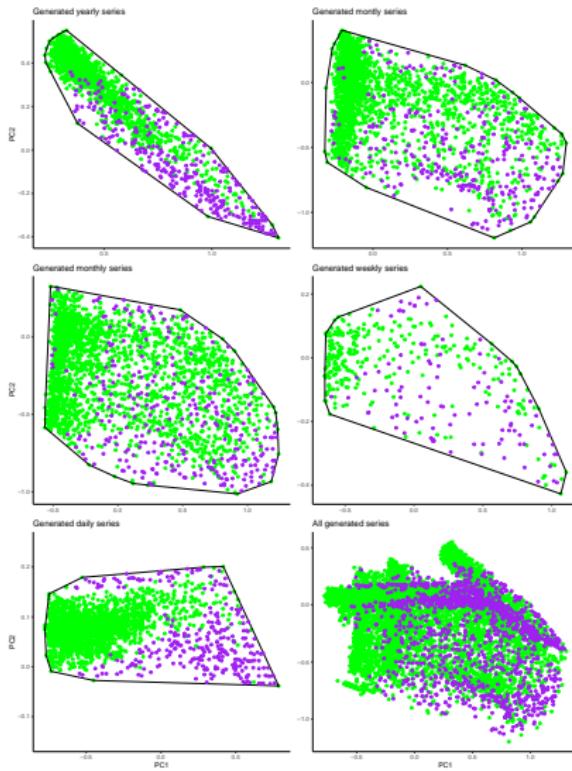
Generated example



Optimization process



All generated series



SMAPE of each model

Most acceptable model

Model\Class	Yearly	Quarterly	Monthly	Weekly	Daily
Naive	204 9%	161 7%	112 5%	39 10%	90 4%
Seasonal Naive	—	232 10%	266 12%	39 10%	230 10%
RW with drift	333 14%	339 15%	271 12%	75 19%	595 26%
SES	112 5%	89 3%	86 4%	19 5%	88 4%
ETS	311 14%	288 13%	328 14%	24 6%	56 2%
ARIMA	366 16%	443 19%	466 20%	57 15%	247 12%
Theta	166 7%	127 6%	100 4%	11 3%	152 7%
TBATS	444 19%	288 13%	323 14%	40 10%	181 8%
Neural net	348 15%	127 6%	345 15%	82 21%	655 29%
Total	2284	2297	2297	386	2294

Minimal SMAPE

Model\Class	Yearly		Quarterly		Monthly		Weekly		Daily	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Naive	0.732	0.637	0.469	0.467	0.541	0.418	0.533	0.417	0.550	0.540
Seasonal Naive	—	—	0.646	0.482	0.615	0.452	0.759	0.541	0.838	0.566
RW with drift	0.248	0.334	0.320	0.301	0.452	0.420	0.510	0.394	0.337	0.310
SES	0.369	0.482	0.341	0.339	0.462	0.422	0.441	0.467	0.349	0.421
ETS	0.126	0.173	0.301	0.326	0.410	0.399	0.298	0.382	0.286	0.314
ARIMA	0.238	0.374	0.309	0.326	0.408	0.383	0.412	0.372	0.388	0.420
Theta	0.406	0.500	0.639	0.501	0.729	0.511	0.730	0.498	0.784	0.618
TBATS	0.233	0.343	0.312	0.358	0.438	0.429	0.424	0.437	0.486	0.459
Neural Net	0.454	0.511	0.493	0.430	0.509	0.425	0.683	0.473	0.605	0.474

Thank you!

