Method Description

General Information

Type of Entry (*Academic, Practitioner, Researcher, Student*)	**Academic**
First Name	**Gianluca**
Last Name	**Bontempi**
Country	**Belgium**
Type of Affiliation (*University, Company-Organization, Individual*)	**University**
Affiliation	**ULB, Université Libre de Bruxelles, Machine Learning Group, mlg.ulb.ac.be**

Team Members (*if applicable*):

1st Member	
First Name	Gianluca
Last Name	Bontempi
Country	Belgium
Affiliation	ULB, MLG
2nd Member	
First Name	
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Country	
Affiliation	

Information about the method utilized

Name of Method	**AMAR (All Methods Are Right)**
Type of Method (*Statistical, Machine Learning, Combination, Other*)	**Combination**
Short Description (up to 200 words)	The method consists in an extensive grid search in a large space of different learning algorithms, multi-step-ahead strategies, hyperparameters, embedding orders, dummy variables, preprocessing strategies (differentiation and detrending). A concise non-executable pseudo-code in R syntax is contained in the file *pseudo.R* The learning algorithms taken into consideration are 1. Linear (L), 2. Random Forest (RF) with the number of trees as hyperparameter 3. Lazy Learning (LL), [2] with the max number of neighbors as hyperparameter 4. 4Theta (4T, code of the organizers) 5. Univariate temporal fitting (U). The multi-step-ahead strategies taken into consideration are: 1. Iterated 2. Directed 3. MIMO [1,3] The size of the hyperparameters is controlled by the variable C in the code The embedding order ranges in [1,4].

	Two differentiation strategies are considered: None, Differences A dummy variable mechanism is considered to detect seasonality. Once the space exploration is performed, the 5 best models in terms of normalized mean squared error and normalized cost (average of smape and mase) are selected. The normalization is done with respect to the naïve predictor. Once the best model configurations are stored, the method computes for each series a number of continuations on the basis of the best 10 models (5 best NMSE and 5 best SMAPE). The distribution of the continuations is used to compute the median (final prediction) and the confidence intervals [1] G. Bontempi and S. Ben Taieb. Conditionally dependent strategies for multiple-step-ahead prediction in local learning. International Journal of Forecasting, 27(3):689–699, 2011. [2] M. Birattari, G. Bontempi, and H. Bersini. Lazy learning meets the recursive least-squares algorithm. In M. S. Kearns, S. A. Solla, and D. A. Cohn, editors, NIPS 11, pages 375–381, Cambridge, 1999. MIT Press. [3] S. Ben Taieb, A. Sorjamaa, and G. Bontempi. Multiple-output modeling for multi-step-ahead time series forecasting. Neurocomputing, 73(10):1950–1957, 2010.

Extended Description:

Apart from the textural description, please consider including an informative flowchart to help researchers better understand the exact steps followed for generating the forecasts. Please also try to clarify any assumptions made, the initialization and parameterization process used, etc., to facilitate reproducibility and replicability.