Yiye Jiang

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Education

December 2022: Institut de Mathématiques de Bordeaux, France
Thesis title: *Statistical analysis of spatio-temporal and multi-dimensional data from a network of sensors.*
Supervisors: Jérémie BIGOT, Sofian MAABOUT
Funding : MESRI

November 2018: Université de Bordeaux, France
M.Sc. in Modelling of Images and Signals 162.163/200 Mention *très bien*

December 2018: Xiamen Universiy, China
M.Sc. in Probability and Mathematical Statistics

July 2015: Xiamen Universiy, China
B.Ec. in Financial Mathematics

July 2015: Xiamen Universiy, China
B.Sc. in Mathematics and Applied Mathematics

Research articles

1. Y. Jiang. Wasserstein multivariate autoregressive models and its application in graph learning from distributional time series. arXiv preprint arXiv: 2207.05442. 2022. Submitted to Electronic Journal of Statistics.

   This work concerns the modelling of a collection of distributional time series, $\boldsymbol{\mu}_t^i \in \mathcal{P}(\mathbb{R}), i = 1, \ldots, N, t \in \mathrm{Z}$. We would like to infer a graph which characterises the dependency structure of these series. To this end, we extended the classical vector auto-regressive model which is a central tool in time series analysis to describe the dependency of a collection of scalar time series. To deal with the complex and non-Euclidean nature of distributional data, we rely on the statistics in Wasserstein space. The developed tools thus not only made a significant contribution in the community of graph learning, but also have been the first work which considered multiple covariates in Wasserstein regressive models given the non-trivial difficulties lifting from univariate to multivariate case.

2. Y. Jiang, J. Bigot & S. Maabout. Online graph topology learning from matrix-valued time series. arXiv preprint arXiv:2107.08020. 2021. Submitted to Computational Statistics & Data Analysis.

   This work is motivated by the graph learning from a collection of vectorial time series in the online fashion. To this end, we first extended the vector auto-regressive model to the matrix-variate auto-regressive model by relying on the Kronecker sum and its interpretation of Cartesian product graph. Secondly, we focused on the estimation method. Especially in high dimension, we proposed a novel Lasso type which distinguishes with the structure constraint and the l_1 regularization only on a subset of parameters. We then derived its homotopy algorithm. This derivation is non-trivial and in particular can be applied to other structure and partial sparsity designs. Since in online setting, the detrending step is forbidden, by contrast raw time series is usually not stationary as assumed by auto-regressive models. Therefore, in this final step, we augmented the auto-regressive model by incorporating periodic trends, and then adapted the previously derived algorithms. The combination of all these contributions provided the realistic online graph learning algorithms which can be applied directly on raw time series.

3. Y. Jiang, J. Bigot & S. Maabout. Sensor selection on graphs via data-driven node sub-sampling in network time series. arXiv preprint arXiv:2004.11815. 2020.

In this work, we are inspired by understanding the predictability of the data observed on different nodes in a network. We proposed the approaches to evaluate moreover rank the predictability of nodes with respect to the linear, kernel, and neural network predictors. The derived rankings serve as data-driven strategies for sensor selection. In this setting, the presence of historical data has significantly improved the reconstruction performance. In particular, the sensor selection based on the neural networks as a reconstruction method is innovative, which is far from the existing approaches.

4. Y. Jiang, J. Bigot, E. Provenzi. Commutativity of spatiochromatic covariance matrices in natural image statistics. *Mathematics in Engineering*. 2020, 2(2): 313-339. *This work is conducted in the context of the Master* 2 *internship at Institut de Mathématiques de Bordeaux.*

5. Y. Jiang, G Vergara-Hermosilla. Machine learning-based modelling and forecasting of covid-19 under the temporally varying public intervention in the Chilean context. Hal preprint arXiv: hal-03680677. 2022.

   This work concerns the empirical studies of the cumulative daily reported cases in Chile by considering the machine learning tools together with the classical epidemiological models.

Reports

F. Coppini, Y. Jiang, S. Tabti. Predictive models on 1D signals in a small-data environment. Hal: hal-03211100. 2020. *This report is the result of work during the Semaine d'Études Mathématiques et Entreprises, where* 4 *teams of PhD students were dedicated to solve the problems proposed by the partner companies.*

Talks

October 2022: Seminar of Image Optimisation and Probability (IOP) team, Institut de Mathématiques de Bordeaux, Bordeaux

August 2022: Journées MAS 2022, Rouen

October 2021: Colloque des jeunes Probabilistes et Statisticiens 2021, île d'Oléron

Teaching

September 2022 - June 2022: Temporary teaching-research position (ATER) à l'Université de Bordeaux (160h)

- Chargée de TD en Fonctions de plusieurs variables L2.

- Chargée de TD en Outils mathématiques L1.

- Chargée de TD en Algèbre linéaire L1.

February 2022 - July 2022: ATER à l'Université de Bordeaux (96h)

- Chargée de TD en Algèbre linéaire L1.

- Chargée de TP en Statistique nonparamétrique M1.

- Supervision of the project *Algorithmes stochastiques pour la régression logistique* and jury member in the module *Données Massives* M2.

November 2020 - March 2021: Supervision of the research internship of a Master 2 student in Applied Mathematics and Statistics (with main supervisor: Jérémie Bigot), at Université de Bordeaux. *Weekly video meetings as well as the various exchanges by email.*