Book of Abstracts

International Conference on Robust Statistics

ICORS 2021

20-24 September 2021

TU Wien, Austria

http://www.icors.eu/

Sponsors:

International Association for Statistical Computing (IASC)
TU Wien
Bernoulli Society

Conference Venue

The conference will be held in a hybrid form. It takes place at TU Wien, at the Campus Gusshaus, Gusshausstr. 27-29, 1040 Vienna. The lecture hall is called "Kontaktraum", and it is in the 6th floor of this building.

Registration, all coffee breaks, etc. will be in front of this lecture hall.

Important information for participants **entering a TU Wien building** (and restaurants/hotels): You must present a proof of a low epidemiological risk to the security service.

- Vaccinated: Proof of vaccination (complete immunisation) with an EU-approved vaccine against COVID-19 is required.
- Tested: Vienna has different testing offers (entry tests: PCR self-tests, gargle boxes, test lanes, pharmacies). Actually, tests are valid for 48 hours.
- Recovered: Proof is the medical confirmation of a SARS-CoV-2 infection recovered from in the last 180 days (confirmed by molecular biology), proof of neutralising antibodies (not older than 90 days) or your certificate of segregation.

The **registration desk** will be open on September 21, from 8:00 to 09:20. It will be in front of the "Kontaktraum". Late registration will be possible also on the other conference days.

On-site participants for the R Workshop can register on September 20 from 12:00-13:00 in front of the "Kontaktraum".

The on-site telephone number of the conference administrations: **+43 (1)58801 10560**.

For the **virtual participation** we will use *zoom*. Virtual participants will receive a zoom link via email a few days before the conference start. There will be separate zoom links for the workshop on September 20, and the ICORS conference from Sep. 21-24.

Guidelines for Speakers:

Talks in presence: Please, bring your presentation as pdf-file on a USB memory-stick and contact the person responsible for the conference computer *before the session starts*.

Virtual presenters: Please, test the zoom environment beforehand. In particular, test screen sharing and your audio and video devices.

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A robust smoothed approach to functional canonical correlation analysis

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In recent years, data collected in the form of functions or curves received considerable attention in fields such as chemometrics, image recognition and spectroscopy, among others. These data are known in the literature as functional data, see [3] for a complete overview. Functional data are intrinsically infinite–dimensional and, as mentioned for instance in [4], this infinite–dimensional structure is indeed a source of information. For that reason, even when recorded at a finite grid of points, functional observations should be considered as random elements of some functional space more than multivariate observations. In this manner, some of the theoretical and numerical challenges posed by the high dimensionality may be solved. This framework led to the extension of some classical multivariate analysis concepts, such as dimension reduction techniques, to the context of functional data, usually through some regularization tool.

In this talk, we will focus on functional canonical correlation analysis, where data consist of pairs of random curves and the analysis tries to identify and quantify the relation between the observed functions. Under a Gaussian model, [2] showed that the natural extension of multivariate estimators to the functional scenario fails, motivating the introduction of regularization techniques which may combine smoothing through a penalty term and/or projection of the observed curves on a finite–dimensional linear space generated by a given basis, see [1] and [3]. The classical estimators use the Pearson correlation as measure of the association between the observed functions and for that reason they are sensitive to outliers.

To provide robust estimators for the first functional canonical correlation and directions, we will introduce two families of robust consistent estimators that combine robust association and scale measures with basis expansion and/or penalizations as a regularization tool. Both families turn out to be consistent under mild assumptions. We will present the results of a numerical study that shows that, as expected, the robust method outperforms the existing classical procedure when the data are contaminated A real data example will also be presented.

Keywords: Functional Canonical Correlation Analysis, Robust estimation, Smoothing techniques.

References

[1] He, G., Müller, H. G. and Wang, J. L. (2004). Methods of canonical analysis for functional data. *Journal of Statistical Planning and Inference*, **122**, 141-159.

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Berlin.

[4] Wang, J.L., Chiou, J., Müller, H.G. (2016). Functional Data Analysis. *Annual Review of Statistics and Its Application*, **3**, 257-295.