UNIVERSITÀ DI TRENTO
Dipartimento di Matematica

DOTTORATO

CYCLE 34th
ORAL DEFENCE OF THE PHD THESIS

Tuesday 7 June 2022 – at 2:30 pm
Seminar room "-1"

The event will take place in presence and online through the ZOOM platform.
To get the access codes please contact the secretary office

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PhD Student in Mathematics

Robust estimators in the presence of cell-wise and case-wise contamination

Abstract:
Estimation and inference in statistics are based on observations and assumptions about the underlying phenomenon under study. It is known that the presence of outliers can greatly affect the classical estimation methods since they are very sensitive to departures from the assumptions. In the last decades several solutions to face this problem have been developed, leading Robust statistics to be an extreme active area of research. In this thesis, we consider three robust inference problems in multivariate location and scale estimation in settings where robust procedures are missing or need improvements.
At first, we consider the problem of multivariate estimation taking into account not only the classical Huber-Tukey Contamination Model but also the Independent Contamination Model. We propose a filtering procedure based on statistical depth functions which is able to detect both case-wise and cell-wise outliers replacing them by missing values. Then, it is combined with a robust estimator which is able to deal with missing values. We prove that the resulting filters are consistent under the assumed model and that it is robust in presence of outliers. Then, we investigate the estimation of multivariate location and scale in a non-Euclidean setup. In particular, we consider observations that lie on a multivariate torus, a setting which lacks robust alternatives. We propose two robust estimation methods based on the weighted likelihood technique for wrapped distributions, with an application to the wrapped normal distribution. Finally, we explore the estimation task for linear mixed models given their importance and utility in several application domains. We propose an estimation procedure based on the Density Power Divergences family in case of independent but not identically distributed observations. We show that, under appropriate assumptions, the estimates are consistent and asymptotically normal distributed as well as they show robustness properties. We propose how to choose the "optimal" member in the Density Power Divergence family as a trade-off between efficiency and robustness.

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CONTATTI
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