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Programme and Book of Abstracts

UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

SIS Società Italiana di Statistica

Fondazione CARIPLO
TUTE SERVARE MUNIFICE DONARE · 1816

Scientific Programme

Contributed Session – Model-based Clustering II
Chair: Riccardo Rastelli — **Room 201**

Silvia Dallari, **Edoardo Redivo** and Cinzia Viroli
A Latent Editing Mixture Model for Microclustering DNA Reads

Elisa Muratore, Riccardo Gallotti and Claudio Agostinelli
Contrasting disinformation: A mixture of Hawkes Processes for the identification of coordinated inauthentic behaviour

Zsuzsa Bakk and **Rosa Fabbricatore**
A two-step estimation framework for Latent Class Item Response Theory models with DIF and multidimensionality

Hung Tong, Antonio Punzo and Cristina Tortora
Cluster-wise multivariate linear regression with random covariates under missing-at-random data

Ekaterina Ksiunova, Sandra De Iaco, Veronica Distefano and Monica Palma
A Non-homogeneous Poisson Point Process Approach for Femicide Analysis in Italy

18:25-20:00 Guided Tour of Milan City Center (Meeting point: Via Festa del Perdono, 3)

18:30-19:30 IFCS Council Meeting

20:00 Conference Dinner - Cortile del '700 (Aperitif) & Cortile del Filarete (Dinner) Ca' Granda (Univ. Milano, Via Festa del Perdono, 7)

A Non-homogeneous Poisson Point Process Approach for Femicide Analysis in Italy

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The phenomenon of femicide is a truly pandemic issue in modern society and requires complex analysis. The problem of gender-based violence and femicide is currently reported by the media, as well as by researchers in various scientific fields of knowledge. The statistical survey on femicide in Italy is essential for the development of effective policies aimed at preventing this crime and protecting women who suffer violence. Recent literature on gender-based violence and femicide employs a multifaceted methodological framework. Driven by the challenge of quantifying its latent nature a Bayesian hierarchical model based on a compound Poisson distribution was proposed to analyze official police reports of violence against women while explicitly accounting for the under-reporting mechanism [9]. Other studies applied Social Network Analysis leverages bipartite graphs and QuaBiMo algorithms to uncover relational criminal patterns between perpetrators and motives [6]. The supervised Machine Learning and Natural Language Processing - specifically BERT algorithms were used to perform sentiment and emotion analysis of social media Big Data [3]. Italy has recently demonstrated advances in the regulatory framework under law No. 181 of December 2, 2025 [5]. Through the analysis of pre-enactment data this study identifies the spatial hotspot and structural profiles that the new legislation must address. To do this there have been combined open data arising from different sources: the Observatory on the Phenomenon of Violence against Women created by the Regional Council of Campania [7] (from 2018 to 2023) and the Observatory NUDM (*Non Una Di Meno) [8] in Italy (from 2020 to 2025). As part of the data pre-processing procedures, the FemminicidioItalia.info [4] platform was employed to cross-reference and validate the accuracy of the victims' ages and the exact dates of death. The following variables were obtained to reveal the real situation with femicides in Italy: method of murder, macro-regions, city, geographical coordinates of death place, province, date of death, day of the week, holidays, year, month, victim's nationality, alleged perpetrator (relationship with victim), victim's disability, disability description from media, alleged perpetrator's nationality, alleged perpetrator's age, alleged perpetrator's suicide, alleged perpetrator's occupation, alleged perpetrator's criminal record. Driven by the spatial, temporal, and descriptive structure of the available dataset, a marked spatio-temporal point process framework has been adopted [2]. This approach describes the process of discrete events with several characteristics in

a continuous space-time domain. Following the hierarchical Bayesian approach, the methodology consists in representing the intensity as a finite mixture of exponential family components. The Bayesian modeling and decision theory for non-homogeneous Poisson point processes for the estimation of parameters [1] has been used for the case study of the femicides. The model has been generalized to include the temporal structure of the component parameters. In this case the intensity surface of femicides in some regions in Northern Italy during the selected period 2020-2022 has been estimated. The application of this method helps to capture the high intensity components. In particular, the analysis indicates that neighborhoods in urban areas contain large femicides clusters. The next step could be to integrate the socio-demographic information such as economic instability, privacy concerns as well as education level in order to evaluate the phenomenon not only as an effect of gender-power unbalance.

References

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