## Contents

Pr	eface	XIX
1	Plenary Sessions	1
1.1	Citizen data, and citizen science: a challenge for official statistics. Monica Pratesi	2
2	Specialized Sessions	8
<b>2.1</b> 2.1.1	A glimpse of new data and methods for analysing a rapidly changing population The diffusion of new family patterns in Italy: An update. Arnstein Aassve, Letizia Mencarini, Elena Pirani and Daniele Vignoli	<b>9</b> 10
2.1.2		16
<b>2.2</b> 2.2.1	Advances in ecological modelling A Bayesian joint model for exploring zero-inflated bivariate marine litter data. Sara Martino, Crescenza Calculli and Porzia Maiorano	<b>22</b> 23
<b>2.3</b> 2.3.1	Advances in environmental statistics Bayesian small area models for investigating spatial heterogeneity and factors affecting the amount of solid waste in Italy. <i>Crescenza Calculli and Serena Arima</i>	<b>29</b> 30
2.3.2	A spatial regression model for for predicting abundance of lichen functional groups. Pasquale Valentini, Francesca Fortuna, Tonio Di Battista and Paolo Giordani	36
<b>2.4</b> 2.4.1	Advances in preference and ordinal data theoretical improvements and applications Boosting for ranking data: an extension to item weighting. Alessandro Albano, Mariangela Sciandra and Antonella Plaia	<b>42</b> 43
2.4.2	-	49

2.5	Business system innovation, competitiveness, productivity and internationalization	55
2.5.1	An analysis of the dynamics of the competitiveness for some European Countries. Andrea Marletta, Mauro Mussini and Mariangela Zenga	56
2.5.2	National innovation system and economic performance in EU. An analysis using composite indicators. Alessandro Zeli	62
<b>2.6</b> 2.6.1	Challenges for observational studies in modern biomedicine Data integration: a Statistical view. <i>Pier Luigi Conti</i>	<b>68</b> 69
2.6.2	Exploring patients' profile from COVID-19 case series data: beyond standard statistical approaches. Chiara Brombin, Federica Cugnata, Pietro E. Cippà, Alessandro Ceschi, Paolo Ferrari and Clelia di Serio	75
2.6.3	On the statistics for some pivotal anti-COVID-19 vaccine trials. Mauro Gasparini	81
2.7	Data Science for Industry 4.0 (ENBIS)	87
2.7.1	Sample selection from a given dataset to validate machine learning models. Bertrand looss	88
2.7.2	Reliable data-drive modelling and optimisation of a batch reactor using bootstrap aggregated deep belief network Changhao Zhu and Jie Zhang	orks.94
2.8	Integration of survey with alternative sources of data	100
2.8.1	A parametric empirical likelihood approach to data matching under nonignorable sampling and nonresponse. Daniela Marella and Danny Pieffermann	101
2.8.2	Survey data integration for regression analysis using model calibration.	107
2.8.3	Latent Mixed Markov Models for the Production of Population Census Data on Employment. Danila Filipponi, Ugo Guarnera and Roberta Varriale	112
2.9	Media, social media and demographic behaviours	118
2.9.1	Monitoring the Numbers of European Migrants in the United Kingdom using Facebook Data. Francesco Rampazzo, Jakub Bijak, Agnese Vitali, Ingmar Weber and Emilio Zagheni	119
2.10	New developments in ensemble methods for classification	125
2.10.1	An alternative approach for nowcasting economic activity during COVID-19 times. Alessandro Spelta and Paolo Pagnottoni	126
2.10.2	Assessing the number of groups in consensus clustering by pivotal methods. Roberta Pappadà, Francesco Pauli and Nicola Torelli	132
2.10.3	Clustering of data recorded by Distributed Acoustic Sensors to identify vehicle passage and typology. Antonio Balzanella and Stefania Nacchia	138
2.11	New developments in latent variable models	144
2.11.1	A Hidden Markov Model for Variable Selection with Missing Values. Fulvia Pennoni, Francesco Bartolucci, and Silvia Pandolfi	145
2.11.2	Comparison between Different Likelihood Based Estimation Methods in Latent Variable Models for Categorical Data. Silvia Bianconcini and Silvia Cagnone	151
2.11.3	A Comparison of Estimation Methods for the Rasch Model. Alexander Robitzsch	157

<b>2.12</b> 2.12.1	New issues on multivariate and univariate quantile regression Directional M-quantile regression for multivariate dependent outcomes. Luca Merlo, Lea Petrella and Nikos Tzavidis	<b>163</b> 164
<b>2.13</b> 2.13.1	Semi-parametric and non-parametric latent class analysis Stepwise Estimation of Multilevel Latent Class Models. Zsuzsa Bakk, Roberto di Mari, Jennifer Oser and Jouni Kuha	<b>170</b> 171
2.13.2	Distance learning, stress and career-related anxiety during the Covid-19 pandemic: a students perspective analysis. Alfonso Iodice D'Enza, Maria Iannario, Rosaria Romano	177
2.13.3	A Tempered Expectation-Maximization Algorithm for Latent Class Model Estimation. Luca Brusa, Francesco Bartolucci and Fulvia Pennoni	183
2.14	Statistics for finance high frequency data, large dimension and networks	189
2.14.1	The Italian debt not-so-flash crash. Maria Flora and Roberto Reno'	190
3	Solicited Sessions	197
3.1	Advances in social indicators research and latent variables modelling in social sciences	198
3.1.1	A composite indicator to measure frailty using administrative healthcare data. Margherita Silan, Rachele Brocco and Giovanna Boccuzzo	199
3.1.2	Clusters of contracting authorities over time: an analysis of their behaviour based on procurement red flags. Simone Del Sarto, Paolo Coppola and Matteo Troia	205
3.1.3	An Application of Temporal Poset on Human Development Index Data. Leonardo Salvatore Alaimo, Filomena Maggino and Emiliano Seri	211
3.1.4	The SDGs System: a longitudinal analysis through PLS-PM. Rosanna Cataldo, Maria Gabriella Grassia and Laura Antonucci	217
3.2	Changes in the life course and social inequality	223
3.2.1	Heterogeneous Income Dynamics: Unemployment Consequences in Germany and the US. Raffaele Grotti	224
3.2.2	In-work poverty in Germany and in the US: The role of parity progression. Emanuela Struffolino and Zachary Van Winkle Z.	230
3.2.3	Parenthood, education and social stratification. An analysis of female occupational careers in Italy. Gabriele Ballarino and Stefano Cantalini	236
3.3	Composition in the Data Science Era	242
3.3.1	Can we Ignore the Compositional Nature of Compositional Data by using Deep Learning Aproaches? Matthias Templ	243
3.3.2	Principal balances for three-way compositions. Violetta Simonacci	249
3.3.3	Robust Regression for Compositional Data and its Application in the Context of SDG. Valentin Todorov and Fatemah Algallaf	255

3.4	Evaluation of undercoverage for censuses and administrative data	261
3.4.1	Spatially balanced indirect sampling to estimate the coverage of the agricultural census. Federica Piersimoni, Francesco Pantalone and Roberto Benedetti	262
3.4.2	Next Census in Israel: Strategy, Estimation and Evaluation. Danny Pfeffermann	268
3.4.3	Administrative data for population counts estimations in Italian Population Census. Antonella Bernadini, Angela Chieppa, Nicola Cibella and Fabrizio Solari	274
3.4.4	LFS non response indicators for population register overcoverage estimation. Lorella Di Consiglio, Stefano Falorsi	279
3.5	Excesses and rare events in complex systems	285
3.5.1	Space-time extreme rainfall simulation under a geostatistical approach. Gianmarco Callegher, Carlo Gaetan, Noemie Le Carrer and Ilaria Prosdocimi	286
3.6	Hierarchical forecasting and forecast combination	292
3.6.1	Density calibration with consistent scoring functions. Roberto Casarin and and Francesco Ravazzolo	293
3.6.2	Forecasting combination of hierarchical time series: a novel method with an application to CoVid-19. <i>Livio Fenga</i>	298
3.7	Household surveys for policy analysis	304
3.7.1	Did the policy responses to COVID-19 protect Italian households' incomes? Evidence from survey and administrative data. Maria Teresa Monteduro, Dalila De Rosa and Chiara Subrizi	305
3.8	Learning analytics methods and applications	311
3.8.1	Open-Source Automated Test Assembly: the Challenges of Large-Sized Models. Giada Spaccapanico Proietti	312
3.8.2	How Much Tutoring Activities May Improve Academic Careers of At-Risk Students? An Evaluation Study. Marta Cannistra, Tommaso Agasisti, Anna Maria Paganoni and Chiara Masci	318
3.8.3	Composite—based Segmentation Trees to Model Learners' performance. Cristina Davino and Giuseppe Lamberti	324
3.8.4	Test-taking Effort in INVALSI Assessments. Chiara Sacco	330
3.9	Light methods for hard problems	336
3.9.1	Fast Divide-and-Conquer Strategies to Solve Spatial Big Data Problems. Michele Peruzzi	337
3.9.2	Application of hierarchical matrices in spatial statistics. Anastasiia Gorshechnikova and Carlo Gaetan	343
3.10	Management and statistics in search for a common ground (AIDEA)	349
3.10.1	Customer Segmentation: it's time to make a change. Fabrizio Laurini, Beatrice Luceri and Sabrina Latusi	350
3.10.2	Multivariate prediction models: Altman's ZScore and CNDCEC's sectoral indicators. Alessandro Danovi, Alberto Falini and Massimo Postiglione	356
3.10.3	Comparing Entrepreneurship and Perceived Quality of Life in the European Smart Cities: a "Posetic" Approac Lara Penco, Enrico Ivaldi and Andrea Ciacci	ch. 362

3.10.4	The Relationship between Business Economics and Statistics: Taking Stock and Ways Forward. Amedeo Pugliese	368
3.11	Mathematical methods and tools for finance and insurance (AMASES)	373
3.11.1	On the valuation of the initiation option in a GLWB variable annuity. Anna Rita Bacinello and Pietro Millossovich	374
3.11.2	Modern design of life annuities in view of longevity and pandemics. Annamaria Olivieri	380
3.11.3	Risk Management from Finance to Production Planning: An Assembly-to-Order Case Study. Paolo Brandimarte, Edoardo Fadda and Alberto Gennaro	386
3.11.4	Some probability distortion functions in behavioral portfolio selection. Diana Barro, Marco Corazza and Martina Nardonthors	392
3.12	Multiple system estimation	398
3.12.1	Multiple Systems Estimation in the Presence of Censored Cells. Ruth King, Oscar Rodriguez de Rivera Ortega and Rachel McCrea	399
3.12.2	Bayesian population size estimation by repeated identifications of units. A semi-parametric mixture model approach. <i>Tiziana Tuoto, Davide Di Cecco and Andrea Tancredi</i>	405
3.13	Network sampling and estimation	411
3.13.1	Targeted random walk sampling. Li-Chun Zhang	412
3.13.2	Estimation of poverty measures in Respondent-driven sampling. María del Mar Rueda, Ismael Sànchez-Borrego and Héctor Mullo	418
3.13.3	Sampling Networked Data for Semi-Supervised Learning Algorithms. Simone Di Zio, Lara Fontanella, Francesco Pantalone and Federica Piersimoni	423
3.13.4	A sequential adaptive sampling scheme for rare populations with a network structure. <i>Emilia Rocco</i>	429
3.14	New perspectives on multidimensional child poverty	435
3.14.1	Estimating uncertainty for child poverty indicators: The Case of Mediterranean Countries. Ilaria Benedetti, Federico Crescenzi and Riccardo De Santis	436
3.14.2	Child poverty and government social spending in the European Union during the economic crisis. Angeles Sánchez and María Navarro	442
3.14.3	The Children's Worlds Study: New perspectives on children's deprivation research. <i>Caterina Giusti and Antoanneta Potsi</i>	448
3.14.4	The impact of different definition of "households with children" on deprivation measures: the case of Italy. Laura Neri and Francesca Gagliardi	454
3.15	Perspectives in social network analysis applications	460
3.15.1	A comparison of student mobility flows in Eramus and Erasmus+ among countries. Kristijan Breznik, Giancarlo Ragozini and Marialuisa Restaino	461
3.15.2	Network-based approach for the analysis of LexisNexis news database. Carla Galluccio and Alessandra Petrucci	467
3.15.3	A multiplex network approach to study Italian Students' Mobility. Ilaria Primerano, Francesco Santelli and Cristian Usala	473
3.15.4	Ego-centered Support Networks:a Cross-national European Comparison. Emanuela Furfaro, Elvira Pelle, Giulia Rivellini and Susanna Zaccarin	479

<b>3.16</b> 3.16.1	Statistical analysis of energy data Machine learning models for electricity price forecasting. Silvia Golia, Luigi Grossi, Matteo Pelagatti	<b>485</b> 486
3.16.2	The impact of hydroelectric storage in the Italian power market. Filippo Beltrami	492
3.16.3	Jumps and cojumps in electricity price forecasting. Peru Muniain, Aitor Ciarreta and Ainhoa Zarraga	498
<b>3.17</b> 3.17.1	Statistical methods and models for the analysis of sports data Football analytics: a Higher-Order PLS-SEM approach to evaluate players' performance. Mattia Cefis and Maurizio Carpita	<b>507</b> 508
3.17.2	Bayesian regularized regression of football tracking data through structured factor models. Lorenzo Schiavon and Antonio Canale	514
3.17.3	A dynamic matrix-variate model for clustering time series with multiple sources of variation. Mattia Stival	520
3.17.4	Evaluating football players' performances using on-the-ball data. David Dandolo	526
3.18	The social and demographic consequences of international migration in Western societies	532
3.18.1	Employment and job satisfaction of immigrants: the case of Campania (Italy). Alessio Buonomo, Stefania Capecchi, Francesca Di Iorio and Salvatore Strozza	533
3.18.2	Social stratification of migrants in Italy: class reproduction and social mobility from origin to destination. Giorgio Piccitto, Maurizio Avola and Nazareno Panichella	539
3.19	Well-being, healthcare, integration measurements and indicators (SIEDS)	545
3.19.1	A Composite Index of Economic Well-being for the European Union Countries. Andrea Cutillo, Matteo Mazziotta and Adriano Pareto	546
3.19.2	Poverty orderings and TIP curves: an application to the Italian regions. Francesco M. Chelli, Mariateresa Ciommi and Chiara Gigliarano	552
4	Contributed Sessions	558
4.1	Advances in clinical trials	559
4.1.1	Quantitative depth-based [18F]FMCH-avid lesion profiling in prostate cancer treatment. Lara Cavinato, Alessandra Ragni, Francesca leva, Martina Sollini, Francesco Bartoli and Paola A. Erba	560
4.1.2	Modelling longitudinal latent toxicity profiles evolution in osteosarcoma patients. Marta Spreafico, Francesca leva and Marta Fiocco	566
4.1.3	Information borrowing in phase II basket trials: a comparison of different designs. Marco Novelli	572
4.1.4	Q-learning Estimation Techniques for Dynamic Treatment Regime. Simone Bogni, Debora Slanzi and Matteo Borrotti	578
4.1.5	Sample Size Computation for Competing Risks Survival Data in GS-Design. Mohammad Anamul Haque and Giuliana Cortese	584

4.2	Advances in neural networks	590
4.2.1	Linear models vs Neural Network: predicting Italian SMEs default. Lisa Crosato, Caterina Liberati and Marco Repetto	591
4.2.2	Network estimation via elastic net penalty for heavy-tailed data. Davide Bernardini, Sandra Paterlini and Emanuele Taufer	596
4.2.3	Neural Network for statistical process control of a multiple stream process with an application to HVAC systems in passenger rail vehicles. <i>Gianluca Sposito, Antonio Lepore, Biagio Palumbo and Giuseppe Giannini</i>	602
4.2.4	Forecasting air quality by using ANNs. Annalina Sarra, Adelia Evangelista, Tonio Di Battista and Francesco Bucci	608
4.3	Advances in statistical methods	614
4.3.1	Robustness of Fractional Factorial Designs through Circuits. Roberto Fontana and Fabio Rapallo	615
4.3.2	Multi-objective optimal allocations for experimental studies with binary outcome. Alessandro Baldi Antognini, Rosamarie Frieri, Marco Novelli and Maroussa Zagoraiou	621
4.3.3	Analysis of three-way data: an extension of the STATIS method. Laura Bocci and Donatella Vicari	627
4.3.4	KL-optimum designs to discriminate models with different variance function. Alessandro Lanteri, Samantha Leorato and Chiara Tommasi	633
4.3.5	Riemannian optimization on the space of covariance matrices. Jacopo Schiavon, Mauro Bernardi and Antonio Canale	639
4.4	Advances in statistical methods and inference	645
4.4.1	Estimation of Dirichlet Distribution Parameters with Modified Score Functions. Vincenzo Gioia and Euloge Clovis Kenne Pagui	646
4.4.2	Confidence distributions for predictive tail probabilities. Giovanni Fonseca, Federica Giummolè and Paolo Vidoni	652
4.4.3	Impact of sample size on stochastic ordering tests: a simulation study. Rosa Arboretti, Riccardo Ceccato, Luca Pegoraro and Luigi Salmaso	658
4.4.4	On testing the significance of a mode. Federico Ferraccioli and Giovanna Menardi	664
4.4.5	Hommel BH: an adaptive Benjamini-Hochberg procedure using Hommel's estimator for the number of true hypotheses. Chiara G. Magnani and Aldo Solari	670
4.5	Advances in statistical models	676
4.5.1	Specification Curve Analysis: Visualising the risk of model misspecification in COVID-19 data. Venera Tomaselli, Giulio Giacomo Cantone and Vincenzo Miracula	677
4.5.2	Semiparametric Variational Inference for Bayesian Quantile Regression. Cristian Castiglione and Mauro Bernardi	683
4.5.3	Searching for a source of difference in undirected graphical models for count data – an empirical study. Federico Agostinis, Monica Chiogna, Vera Djordjilovíc, Luna Pianesi and Chiara Romualdi	689
4.5.4	Snipped robust inference in mixed linear models. Antonio Lucadamo, Luca Greco, Pietro Amenta and Anna Crisci	695

4.6	Advances in time series	701
4.6.1	A spatio-temporal model for events on road networks: an application to ambulance interventions in Milan. Andrea Gilardi and Riccardo Borgoni and Jorge Mateu	702
4.6.2	Forecasting electricity demand of individual customers via additive stacking. Christian Capezza, Biagio Palumbo, Yannig Goude, Simon N. Wood and Matteo Fasiolo	708
4.6.3	Hierarchical Forecast Reconciliation on Italian Covid-19 data. Andrea Marcocchia, Serena Arima and Pierpaolo Brutti	714
4.6.4	Link between Threshold ARMA and tdARMA models. Guy Mélard and Marcella Niglio	720
4.7	Bayesian nonparametrics	726
4.7.1	Bayesian nonparametric prediction: from species to features. Lorenzo Masoero, Federico Camerlenghi, Stefano Favaro and Tamara Broderick	727
4.7.2	A framework for filtering in hidden Markov models with normalized random measures. Filippo Ascolani, Antonio Lijoi, Igor Prünster and Matteo Ruggiero	733
4.7.3	On the convex combination of a Dirichlet process with a diffuse probability measure. Federico Camerlenghi, Riccardo Corradin and Andrea Ongaro	739
4.7.4	Detection of neural activity in calcium imaging data via Bayesian mixture models. Laura D'Angelo, Antonio Canale, Zhaoxia Yu and Michele Guindani	745
4.8	Clustering for complex data	751
4.8.1	Clustering categorical data via Hamming distance. Edoardo Filippi-Mazzola, Raffaele Argiento and Lucia Paci	752
4.8.2	Penalized model-based clustering for three-way data structures. Andrea Cappozzo, Alessandro Casa, and Michael Fop	758
4.8.3	Does Milan have a smart mobility? A clustering analysis approach. Nicola Cornali, Matteo Seminati, Paolo Maranzano and Paola M. Chiodini	764
4.8.4	A Fuzzy clustering approach for textual data. Irene Cozzolino, Maria Brigida Ferraro and Peter Winker	770
4.8.5	Valid Double-Dipping via Permutation-Based Closed Testing. Anna Vesely, Livio Finos, Jelle J. Goeman and Angela Andreella	776
4.9	Data science for complex data	782
4.9.1	Text mining on large corpora using Taltac4: An explorative analysis of the USPTO patents database. Pasquale Pavone, Arianna Martinelli and Federico Tamagni	783
4.9.2	Emotion pattern detection on facial videos using functional statistics. Rongjiao Ji, Alessandra Micheletti, Natasa Krklec Jerinkic and Zoranka Desnica	789
4.9.3	The spread of contagion on Twitter: identification of communities analysing data from the first wave of the COVID-19 epidemic. Gianni Andreozzi, Salvatore Pirri, Giuseppe Turchetti and Valentina Lorenzoni	795
4.9.4	Composition-on-Function Regression Model for the Remote Analysis of Near-Earth Asteroids. Mara S. Bernardi, Matteo Fontana, Alessandra Menafoglio, Alessandro Pisello, Massimiliano Porreca, Diego Perugini and Simone Vantini	801
4.9.5	Determinants of football coach dismissal in Italian League Serie A. Francesco Porro, Marialuisa Restaino, Juan Eloy Ruiz-Castro and Mariangela Zenga	805
4.10	Data science for unstructured data	810
4.10.1	Identification and modeling of stop activities at the destination from GPS tracking data. Nicoletta D'Angelo, Giada Adelfio, Antonino Abbruzzo and Mauro Ferrante	811

4.10.2	A generalization of derangement. Maurizio Maravalle and Ciro Marziliano	817
4.10.3	Analysis of clickstream data with mixture hidden markov models. Furio Urso, Antonino Abbruzzo and Maria Francesca Cracolici	823
4.10.4	Using Google Scholar to measure the credibility of preprints in the COVID-19 Open Research Dataset (CORD-19). Manlio Migliorati, Maurizio Carpita, Eugenio Brentari	829
4.10.5	Mobile phone use while driving: a Structural Equation Model to analyze the Behavior behind the wheel. Carlo Cavicchia and Pasquale Sarnacchiaro	835
4.11	Demographic analysis	841
4.11.1	Life expectancy in the districts of Taranto. Stefano Cervellera, Carlo Cusatelli and Massimiliano Giacalone	842
4.11.2	Family size and Human Capital in Italy: a micro-territorial analysis. Gabriele Ruiu, Marco Breschi and Alessio Fornasin	848
4.11.3	Estimate age-specific fertility rates from summary demographic measures. An Indirect Model Levering on Deep Neural Network. Andrea Nigri	854
4.11.4	Patterns in the relation between causes of death and gross domestic product. Andrea Nigri and Federico Crescenzi	860
4.11.5	Locally sparse functional regression with an application to mortality data. Mauro Bernardi, Antonio Canale, Marco Stefanucci	866
4.12	Environmental statistics	871
4.12.1	A Distribution-Free Approach for Detecting Radioxenon Anomalous Concentrations. Michele Scagliarini, Rosanna Gualdi, Giuseppe Ottaviano, Antonietta Rizzo and Franca Padoani	872
4.12.2	Ecosud Car, a novel approach for the predictive control of the territory. Giacomo Iula, Massimo Dimo, Saverio Gianluca Crisafulli, Marco Vito Calciano, Vito Santarcangelo and Massimiliano Giacalone	878
4.12.3	Effect of ties on the empirical copula methods for weather forecasting. Elisa Perrone, Fabrizio Durante and Irene Schicker	884
4.12.4	Spatio-temporal regression with differential penalization for the reconstruction of partially observed signals. Eleonora Arnone and Laura M. Sangalli	890
4.12.5	Sea Surface Temperature Effects on the Mediterranean Marine Ecosystem: a Semiparametric Model Approa Claudio Rubino, Giacomo Milisenda, Antonino Abbruzzo, Giada Adelfio, Mar Bosch-Belmar, Francesco Colloca, Manfredi Di Lorenzo and Vita Gancitano	ch. 895
4.13	Functional data analysis	901
4.13.1	Remote Analysis of Chapas Stops in Maputo from GPS data: a Functional Data Analysis Approach. Agostino Torti, Davide Ranieri and Simone Vantini	902
4.13.2	A Conformal approach for functional data prediction. Jacopo Diquigiovanni, Matteo Fontana and Simone Vantini	907
4.13.3	Block testing in covariance and precision matrices for functional data analysis. Marie Morvan, Alessia Pini, Madison Giacofci and Valerie Monbet	911
4.13.4	Analysing contributions of ages and causes of death to gender gap in life expectancy using functional data analysis. Alessandro Feraldi, Virginia Zarulli, Stefano Mazzuco and Cristina Giudici	917
4.13.5	Supervised classification of ECG curves via a combined use of functional data analysis and random forest to identify patients affected by heart disease. <i>Fabrizio Maturo and Rosanna Verde</i>	923

4.14	Mixture models	929
4.14.1	Alternative parameterizations for regression models with constrained multivariate responses. Roberto Ascari, Agnese Maria Di Brisco, Sonia Migliorati and Andrea Ongaro	930
4.14.2	Spatially dependent mixture models with a random number of components. Matteo Gianella, Mario Beraha and Alessandra Guglielmi	936
4.14.3	Finite mixtures of regression models for longitudinal data. Marco Altò and Roberto Rocci	942
4.14.4	Mixtures of regressions for size estimation of heterogeneous populations. Gianmarco Caruso	948
4.14.5	Finite mixtures of regressions with random covariates using multivariate skewed distributions. Salvatore D. Tomarchio, Michael P.B. Gallaugher, Antonio Punzo and Paul D. McNicholas	954
4.15	New applications of regression models	960
4.15.1	The Shapley-Lorenz decomposition approach to mitigate cyber risks. Paolo Giudici and Emanuela Raffinetti	960
4.15.2	A spatially adaptive estimator for the function-on-function linear regression model with application to the Swedish Mortality dataset. Fabio Centofanti, Antonio Lepore, Alessandra Menafoglio, Biagio Palumbo and Simone Vantini	967
4.15.3	POSetR: a new computationally efficient R package for partially ordered data. Alberto Arcagni, Alessandro Avellone and Marco Fattore	972
4.15.4	Multi Split Conformal Prediction. Aldo Solari and Vera Djordjilović	978
4.15.5	Changes in the consumption of fruits and vegetables among university students during master courses: an analysis of data automatically collected from cashier transactions. Valentina Lorenzoni, Giuseppe Turchetti and Lucio Masserini	984
4.16	New challenges in clustering and classification techniques	990
4.16.1	A Dynamic Stochastic Block Model with infinite communities. Roberto Casarin and Ovielt Baltodano Lòpez	991
4.16.2	Cross-Subject EEG Channel Selection for the Detection of Predisposition to Alcoholism. Michela Carlotta Massi and Francesca leva	997
4.16.3	Some Issues on the Parameter Selection in the Spectral Methods for Clustering. <i>Cinzia Di Nuzzo and Salvatore Ingrassia</i>	1003
4.16.4	The link-match tale: new microdata from unit level association. Riccardo D'Alberto, Meri Raggi and Daniela Cocchi	1009
4.17	New developments in Bayesian methods	1015
4.17.1	Spatio-temporal analysis of the Covid-19 spread in Italy by Bayesian hierarchical models. Nicoletta D'Angelo, Giada Adelfio and Antonino Abbruzzo	1016
4.17.2	Modelling of accumulation curves through Weibull survival functions. Alessandro Zito, Tommaso Rigon and David B. Dunson	1021
4.17.3	Model fitting and Bayesian inference via power expectation propagation. Emanuele Degani, Luca Maestrini and Mauro Bernardi	1026
4.17.4	Bayesian quantile estimation in deconvolution. Catia Scricciolo	1032
4.17.5	Bayesian inference for discretely observed non-homogeneous Markov processes. Rosario Barone and Andrea Tancredi	1038

<b>4.18</b> 4.18.1	New developments in composite indicators applications Building composite indicators in the functional domain: a suggestion for an evolutionary HDI. Francesca Fortuna, Alessia Naccarato and Silvia Terzi	<b>1044</b> 1045
4.18.2	Small Area Estimation of Inequality Measures via Simplex Regression. Silvia De Nicolò, Maria Rosaria Ferrante and Silvia Pacei	1051
4.18.3	Relational Well-Being and Poverty in Italy Benessere relazionale e povertà in Italia. Elena Dalla Chiara and Federico Perali	1057
4.18.4	A composite indicator to assess sustainability of agriculture in European Union countries. Alessandro Magrini and Francesca Giambona	1063
4.18.5	Interval-Based Composite Indicators with a Triplex Representation: A Measure of the Potential Demand for the "Ristori" Decree in Italy. Carlo Drago	1069
4.19	New developments in GLM theory and applications	1075
4.19.1	Variational inference for the smoothing distribution in dynamic probit models. Augusto Fasano and Giovanni Rebaudo	1076
4.19.2	Interpretability and interaction learning for logistic regression models. Nicola Rares Franco, Michela Carlotta Massi, Francesca leva and Anna Maria Paganoni	1082
4.19.3	Entropy estimation for binary data with dependence structures. Linda Altieri and Daniela Cocchi	1088
4.19.4	A Comparison of Some Estimation Methods for the Three-Parameter Logistic Model. Michela Battauz and Ruggero Bellio	1094
4.19.5	A statistical model to identify the price determinations: the case of Airbnb. Giulia Contu, Luca Frigau, Gian Paolo Zammarchi and Francesco Mola	1100
4.20	New developments in social statistics analysis	1106
4.20.1	Data-based Evaluation of Political Agents Against Goals Scheduling. Giulio D'Epifanio	1107
4.20.2	Local heterogeneities in population growth and decline. A spatial analysis for Italian municipalities. Federico Benassi, Annalisa Busetta, Gerardo Gallo and Manuela Stranges	1113
4.20.3	The assessment of environmental and income inequalities. Michele Costa	1119
4.20.4	Household financial fragility across Europe. Marianna Brunetti, Elena Giarda and Costanza Torricelli	1125
4.20.5	Refugees' perception of their new life in Germany. Daria Mendola and Anna Maria Parroco	1131
4.21	New perspectives in clinical trials	1137
4.21.1	Improved maximum likelihood estimator in relative risk regression. Euloge C. Kenne Pagui, Francesco Pozza and Alessandra Salvan	1138
4.21.2	Development and validation of a clinical risk score to predict the risk of SARS-CoV-2 infection. Laura Savaré, Valentina Orlando and Giovanni Corrao	1144
4.21.3	Functional representation of potassium trajectories for dynamic monitoring of Heart Failure patients. Caterina Gregorio, Giulia Barbati1 and Francesca leva	1150
4.21.4	Effect of lung transplantation on the survival of patients with cystic fibrosis: IMaCh contribution to registry da Cristina Giudici, Nicolas Brouard and Gil Bellis	ata. 1156
4.21.5	Categories and Clusters to investigate Similarities in Diabetic Kidney Disease Patients. Veropica Distefano, Maria Manpope, Claudio Silvestri and Irene Poli	1162

4.22	New perspectives in models for multivariate dependency	1168
4.22.1	Parsimonious modelling of spectroscopy data via a Bayesian latent variables approach. Alessandro Casa, Tom F. O'Callaghan and Thomas Brendan Mur	1169
4.22.2	Bias reduction in the equicorrelated multivariate normal. Elena Bortolato and Euloge Clovis Kenne Pagui	1175
4.22.3	Some results on identifiable parameters that cannot be identified from data. <i>Christian Hennig</i>	1181
4.23	Novel approaches for official statistics	1187
4.23.1	Web data collection: profiles of respondents to the Italian Population Census. Elena Grimaccia, Gerardo Gallo, Alessia Naccarato, Novella Cecconi and Alessandro Fratoni	1188
4.23.2	Trusted Smart Surveys: architectural and methodological challenges at a glance. Mauro Bruno, Francesca Inglese and Giuseppina Ruocco	1194
4.23.3	On bias correction in small area estimation: An M-quantile approach. Gaia Bertarelli, Francesco Schirripa Spagnolo, Raymond Chambers and David Haziza	1200
4.23.4	The address component of the Statistical Base Register of Territorial Entities. Davide Fardelli, Enrico Orsini and Andrea Pagano	1206
4.23.5	A well-being municipal indicator using census data: first results. Massimo Esposito	1212
4.24	Prior distribution for Bayesian analysis	1218
4.24.1	On the dependence structure in Bayesian nonparametric priors. Filippo Ascolani, Beatrice Franzolini, Antonio Lijoi, and Igor Prünster	1219
4.24.2	Anisotropic determinantal point processes and their application in Bayesian mixtures. Lorenzo Ghilotti, Mario Beraha and Alessandra Guglielmi	1226
4.24.3	Bayesian Screening of Covariates in Linear Regression Models Using Correlation Thresholds. Ioannis Ntzoufras and Roberta Paroli	1232
4.25	Recent advances in clustering methods	1238
4.25.1	Biclustering longitudinal trajectories through a model-based approach. Francesca Martella, Marco Alfò and Maria Francesca Marino	1239
4.25.2	Monitoring tools for robust estimation of Cluster Weighted models. Andrea Cappozzo and Francesca Greselin	1245
4.25.3	Co-clustering Models for Spatial Transciptomics: Analysis of a Human Brain Tissue Sample. Andrea Sottosanti and Davide Risso	1251
4.25.4	Graph nodes clustering: a comparison between algorithms. Ilaria Bombelli	1257
4.26	Social demography	1263
4.26.1	Childcare among migrants: a comparison between Italy and France. Eleonora Trappolini, Elisa Barbiano di Belgiojoso, Stefania Maria Lorenza Rimoldi and Laura Terzera	1264
4.26.2	Employment Uncertainty and Fertility in Italy: The Role of Union Formation. Giammarco Alderotti, Valentina Tocchioni and Alessandra De Rose	1270
4.26.3	Determinants of union dissolution in Italy: Do children matter? Valentina Tocchioni, Daniele Vignoli, Eleonora Meli and Bruno Arpino	1276
4.26.4	Working schedules and fathers' time with children: A Sequence Analysis. Annalisa Donno and Maria Letizia Tanturri	1282
4.26.5	Correlates of the non-use of contraception among female university students in Italy. Annalisa Busetta, Alessandra De Rose and Daniele Vignoli	1288

4.27	Social indicators applications and methods	1294
4.27.1	A logistic regression model for predicting child language performance. Andrea Briglia, Massimo Mucciardi and Giovanni Pirrotta	1295
4.27.2	Subject-specific measures of interrater agreement for ordinal scales. Giuseppe Bove	1301
4.27.3	A Tucker3 method application on adjusted-PMRs for the study of work-related mortality. Vittoria Carolina Malpassuti, Vittoria La Serra and Stefania Massari	1307
4.27.4	Two case-mix adjusted indices for nursing home performance evaluation. Giorgio E. Montanari and Marco Doretti	1313
4.27.5	The ultrametric covariance model for modelling teachers' job satisfaction. Carlo Cavicchia, Maurizio Vichi and Giorgia Zaccaria	1319
4.28	Some recent developments in compositional data analysis	1325
4.28.1	A Robust Approach to Microbiome-Based Classification Problems. Gianna Serafina Monti and Peter Filzmoser	1326
4.28.2	What is a convex set in compositional data analysis? Jordi Saperas i Riera, Josep Antoni Martín Fernández	1332
4.28.3	Compositional Analysis on the Functional Distribution of Extended Income. Elena Dalla Chiara and Federico Perali	1338
4.28.4	Evaluating seasonal-induced changes in river chemistry using Principal Balances. Caterina Gozzi and Antonella Buccianti	1344
4.28.5	Compositional Data Techniques for the Analysis of the Ragweed Allergy. Gianna S. Monti, Maira Bonini, Valentina Ceriotti, Matteo Pelagatti and Claudio M. Ortolani	1350
4.29	Spatial data analysis	1356
4.29.1	Spatial multilevel mixed effects modeling for earthquake insurance losses in New Zealand. F. Marta L. Di Lascio and Selene Perazzini	1357
4.29.2	Weighted distances for spatially dependent functional data. Andrea Diana, Elvira Romano, Claire Miller and Ruth O'Donnell	1363
4.29.3	Spatial modeling of childcare services in Lombardia. Emanuele Aliverti, Stefano Campostrini, Federico Caldura and Lucia Zanotto	1369
4.29.4	On the use of a composite attractiveness index for the development of sustainable tourist routes. Claudia Cappello, Sandra De Iaco, Sabrina Maggio and Monica Palma	1375
4.30	Statistical applications in education	1381
4.30.1	Does self-efficacy influence academic results? A separable-effect mediation analysis. Chiara Di Maria	1382
4.30.2	Statistics Knowledge assessment: an archetypal analysis approach. Bruno Adabbo, Rosa Fabbricatore, Alfonso Iodice D'Enza and Francesco Palumbo	1388
4.30.3	Exploring drivers for Italian university students' mobility: first evidence from AlmaLaurea data. Giovanni Boscaino and Vincenzo Giuseppe Genova	1394
4.30.4	Can Grading Policies influence the competition among Universities of different sizes? Gabriele Lombardi and Antonio Pio Distaso	1400
4.30.5	The class A journals and the Italian academic research outcomes in Statistical Sciences. Maria Maddalena Barbieri, Francesca Bassi, Antonio Irpino and Rosanna Verde	1406
4.31	Statistical methods for finance	1412
4.31.1	Hypotheses testing in mixed-frequency volatility models: a bootstrap approach. Vincenzo Candila and Lea Petrella	1413

4.31.2	Quantile Regression Forest with mixed frequency Data. Mila Andreani, Vincenzo Candila and Lea Petrella	1419
4.31.3	Higher order moments in Capital Asset Pricing Model betas. Giuseppe Arbia, Riccardo Bramante and Silvia Facchinetti	1425
4.31.4	When Does Sentiment Matter in Predicting Cryptocurrency Bubbles? Arianna Agosto and Paolo Pagnottoni	1431
4.32	Statistical methods for high dimensional data	1437
4.32.1	Virtual biopsy in action: a radiomic-based model for CALI prediction. Francesca leva, Giulia Baroni, Lara Cavinato, Chiara Masci, Guido Costa, Francesco Fiz, Arturo Chiti and Luca Viganò	1438
4.32.2	Functional alignment by the "light" approach of the von Mises-Fisher-Procrustes model. Angela Andreella and Livio Finos	1444
4.32.3	A screening procedure for high-dimensional autologistic models. Rodolfo Metulini and Francesco Giordano	1450
4.32.4	Covariate adjusted censored gaussian lasso estimator. Luigi Augugliaro, Gianluca Sottile and Veronica Vinciotti	1456
4.32.5	Ranking-Based Variable Selection for ultra-high dimensional data in GLM framework. Francesco Giordano, Marcella Niglio and Marialuisa Restaino	1462
4.33	Statistical methods in higher education	1468
4.33.1	Effects of remote teaching on students' motivation and engagement: the case of the University of Modena & Reggio Emilia. Isabella Morlini and Laura Sartori	1469
4.33.2	A random effects model for the impact of remote teaching on university students' performance. Silvia Bacci, Bruno Bertaccini, Simone Del Sarto, Leonardo Grilli and Carla Rampichini	1475
4.33.3	Multinomial semiparametric mixed-effects model for profiling engineering university students. Chiara Masci, Francesca leva and Anna Maria Paganoni	1481
4.33.4	Evaluating Italian universities: ANVUR periodic accreditation judgment versus international rankings. Angela Maria D'Uggento, Nunziata Ribecco and Vito Ricci	1487
4.33.5	Women's career discrimination in the Italian Academia in the last 20. Daniele Cuntrera, Vincenzo Falco and Massimo Attanasio	1493
4.34	Statistical methods with Bayesian networks	1499
4.34.1	Statistical Micro Matching Using Bayesian Networks. Pier Luigi Conti, Daniela Marella, Paola Vicard and Vincenzina Vitale	1500
4.34.2	Modeling school managers challenges in the pandemic era with Bayesian networks. Maria Chiara De Angelis and Flaminia Musella and Paola Vicard	1506
4.34.3	Structural learning of mixed directed acyclic graphs: a copula-based approach. Federico Castelletti	1512
4.34.4	Inference on Markov chains parameters via Large Deviations ABC. Cecilia Viscardi, Fabio Corradi, Michele Boreale and Antonietta Mira	1518
4.34.5	A propensity score approach for treatment evaluation based on Bayesian Networks. Federica Cugnata, Paola M.V. Rancoita, Pier Luigi Conti, Alberto Briganti, Clelia Di Serio, Fulvia Mecatti and Paola Vicard	1524
4.35	Statistical modelling for the analysis of contemporary societie	s 1530
4.35.1	Social Network Analysis to analyse the relationship between 'victim-author' and 'motivation' of violence against women in Italy. Alessia Forciniti	1531
4.35.2	Satisfaction and sustainability propensity among elderly bike-sharing users. Paolo Maranzano, Roberto Ascari, Paola Maddalena Chiodini and Giancarlo Manzi	1537

4.35	3 Media and Investors' Attention. Estimating analysts' ratings and sentiment of a financial column to predict abnormal returns. <i>Riccardo Ferretti and Andrea Sciandra</i>	1543
4.35	4 Predictions of regional HCE: spatial and time patterns in an ageing population framework. Laura Rizzi, Luca Grassetti, Divya Brundavanam, Alvisa Palese and Alessio Fornasin	1549
4.3	6 Surveillance methods and statistical models in the Covid-19 crisis	1555
4.36	1 The Italian Social Mood on Economy Index during the Covid-19 Crisis. Alessandra Righi and Diego Zardetto	1556
4.36	2 Modeling the first wave of the COVID-19 pandemic in the Lombardy region, Italy, by using the daily number of swabs. Claudia Furlan and Cinzia Mortarino	1562
4.36	3 Analysing the Covid-19 pandemic in Italy with the SIPRO model. Martina Amongero, Enrico Bibbona and Gianluca Mastrantonio	1568
4.36	4 Intentions of union formation and dissolution during the COVID-19 pandemic. Bruno Arpino and Daniela Bellani	1574
4.3	7 Time series methods	1580
4.37	1 Bootstrap-based score test for INAR effect. Riccardo levoli and Lucio Palazzo	1581
4.37	2 Evaluating the performance of a new picking algorithm based on the variance piecewise constant models. Nicoletta D'Angelo, Giada Adelfio, Antonino D'Alessandro and Marcello Chiodi	1587
4.37	.3 Conditional moments based time series cluster analysis. Raffaele Mattera and Germana Scepi	1593
4.37	4 On the asymptotic mean-squared prediction error for multivariate time series. Gery Andrés Díaz Rubio, Simone Giannerini, and Greta Goracci	1599
4.37	5 Spherical autoregressive change-point detection with applications. Federica Spoto, Alessia Caponera and Pierpaolo Brutti	1605
5	Posters	1611
5.1	A method for incorporating historical information in non-inferiority trials. Fulvio De Santis and Stefania Gubbiotti	1612
5.2	Optimal credible intervals under alternative loss functions. Fulvio De Santis and Stefania Gubbiotti	1618
5.3	Statistical learning for credit risk modelling. Veronica Bacino, Alessio Zoccarato, Caterina Liberati and Matteo Borrotti	1624
5.4	Evaluating heterogeneity of agreement with strong prior information. Federico M. Stefanini	1630
5.5	Analysis of the spatial interdependence of the size of endoreduplicated nuclei observed in confocal microscopy. Ivan Sciascia, Andrea Crosino, Gennaro Carotenuto and Andrea Genre	1636
5.6	A Density-Peak Approach to Clustering Graph-Structured Data. Riccardo Giubilei	1642
5.7	The employment situation of people with disabilites in Tuscany, A Survey on the workplace. Paolo Addis, Alessandra Coli and Gianfranco Francese	1648
5.8	Robustness of statistical methods for modeling paired count data using bivariate discrete distributions with general dependence structures. Marta Nai Ruscone and Dimitris Karlis	1654

6 Satellite events	1660
<ul> <li>6.1 Measuring uncertainty in key official economic statist</li> <li>6.1.1 Uncertainty in production and communication of statistics: challenges in the new data eco</li> </ul>	
Giorgio Alleva and Piero Demetrio Falorsi	
6.1.2 Uncertainty and variance estimation techniques for poverty and inequality measures from a simulation study. Riccardo De Santis, Lucio Barabesi and Gianni Betti	complex surveys: 1668
6.1.3 Pandemics and uncertainty in business cycle analysis. Jacques Anas, Monica Billio, Leonardo Carati, Gian Luigi Mazzi and Hionia Vlachou	1674
6.2 Covid-19: the urgent call for a unified statistical and demographic challenge	1680
6.2.1 Environmental epidemiology and the Covid-19 pandemics	1681
6.2.1.1 The Covid-19 outbreaks and their environment: The Valencian human behaviour. Xavier Barber, Elisa Espín, Lucia Guevara, Aurora Mula, Kristina Polotskaya and Alejandro Rabasa	1682
6.2.2 Estimation of Covid 19 prevalence	1686
6.2.2.1 Optimal spatial sampling for estimating the SARS-Cov-2 crucial parameters. <i>Piero Demetrio Falorsi and Vincenzo Nardelli</i>	1687
6.2.2.2 Survey aimed to estimate the seroprevalence of SARS-CoV-2 infection in Italian popula and regional level. Stefano Falorsi, Michele D'Alò, Claudia De Vitiis, Andrea Fasulo, Danila Filipponi, Alessio Guandalini, Frances Orietta Luzi, Enrico Orsini and Roberta Radini	1693
6.2.3 Measuring and modeling inequalities following the Covid-19 crisis	1699
6.2.3.1 COVID-19 impacts on young people's life courses: first results. Antonietta Bisceglia, Concetta Scolorato and Giancarlo Ragozini	1700
6.2.3.2 Exploring Students' Profile and Performance Before and After Covid-19 Lock-down. <i>Cristina Davino and Marco Gherghi</i>	1705
6.2.4 Nowcasting the Covid-19 outbreaks methods and applications	1711
6.2.4.1 Modeling subsequent waves of COVID-19 outbreak: A change point growth model. Luca Greco, Paolo Girardi and Laura Ventura	1712
6.2.4.2 The second wave of SARS-CoV-2 epidemic in Italy through a SIRD model. Michela Baccini and Giulia Cereda	1718
6.2.5 The impact of Covid-19 on survey methods	1724
6.2.5.1 Collecting cross-national survey data during the COVID-19 pandemic: Challenges and i data collection for the 50+ population in the Survey of Health, Ageing and Retirement i <i>Michael Bergmann, Arne Bethmann, Yuri Pettinicchi and Borsch-Supan</i>	
6.2.5.2 Adapting a Long-Term Panel Survey to Pandemic Conditions. Peter Lynn	1731
6.2.6 Young contributions in Covid-19 statistical modelling	1737
6.2.6.1 Statistical communication of COVID-19 epidemic using widely accessible interactive too Marco Mingione and Pierfrancesco Alaimo Di Loro	bls. 1738
6.2.6.2 Modelling COVID-19 evolution in Italy with an augmented SIRD model using open data <i>Vincenzo Nardelli, Giuseppe Arbia, Andrea Palladino and Luigi Giuseppe Atzeni</i>	. 1744

## XVIII