

## Data and Computer Science/Data Science e Computer Science

### 1. DATI IDENTIFICATIVI DEL GRUPPO DI RICERCA

<b>Categorie ERC</b>	PE1_14, PE1_18, PE6, PE6_10, PE6_11, PE6_12, PE6_9, SH3_10
<b>Settore Scientifico Disciplinare</b>	SECS-S/01 – Statistica ING-INF/05 – Sistemi di Elaborazione delle Informazioni INF/01 – Informatica
<b>Parole Chiave (Keywords)</b>	Multivariate Data Analysis; Regression; Clustering; Symbolic Data Analysis; Distributional Data Analysis; Data Stream Mining; Functional Data Analysis; Forecasting; Spatial Prediction; Modeling and Evaluation of Complex Systems; Network Data Analysis; NLP and Text Mining; Performance and Dependability Modeling of Complex Distributed Systems; Cloud Computing and Big Data Systems Performance Evaluation; Formal Analysis of Complex Systems; Multiformalism and Multisolution Modeling Approaches; Analysis and Simulation of Massively Concurrent Systems; Performance Prediction; Networked Systems; Artificial Intelligence and Data-Driven Models; IoT Patterns and Applications;

### 2. COMPOSIZIONE E COORDINAMENTO

Responsabile Scientifico / Coordinatore:

**Nome e Cognome:** Rosanna Verde

**Qualifica:** Professore Ordinario SECS-S/01

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**Link ORCID Personale:** 0000-0002-9959-4675

Componenti del Gruppo:

1. **Rosanna Verde** – Professore Ordinario, SECS-S/01 / ORCID: 0000-0002-9959-4675
2. **Antonio Iripino** – Professore Ordinario, SECS-S/01 / ORCID 0000-0001-9293-7180
3. **Antonio Balzanella** – Professore Associato, SECS-S/01 / 0000-0001-8370-6006
4. **Mauro Iacono** – Professore Associato, ING-INF/05 / ORCID: 0000-0002-2089-975X
5. **Fiammetta Marulli** – Professore Associato, INF/01 / ORCID: 0000-0001-5226-2326
6. **Elvira Romano** – Professore Associato, SECS-S/01 / ORCID 0000-0001-8998-7099
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### 3. ATTIVITÀ SCIENTIFICA E NETWORK

#### Breve Descrizione delle linee di ricerca:

- **Analisi statistica di dati complessi e ad alta dimensionalità:** analisi multivariata, regressione, clustering, classificazione, analisi fattoriale, metodi per dati simbolici, intervallari, distribuzionali e multicategoriali.
- **Sviluppo di metodi di Data Mining e Data Stream Mining** per flussi di dati eterogenei e altamente evolutivi, in particolare dati da sensori, social media, reti di sensori e sistemi complessi distribuiti.
- **Analisi e modellizzazione funzionale e spazio-temporale:** Functional Data Analysis, clustering e previsione per dati funzionali, spatial prediction, analisi e monitoraggio di dipendenze spaziali e spazio-temporali.
- **Modellazione e valutazione di sistemi informatici complessi:** performance e dependability di sistemi distribuiti, sicuri e critici (cloud, big data, sistemi cyber-fisici, reti, architetture service-oriented, smart mobility, IoT).
- **Metodi di Intelligenza Artificiale, Cognitive Computing e modelli data-driven:** NLP e text mining, apprendimento distribuito e federato, cooperative neural networks per scenari IoT e sistemi complessi.
- **Metodologie e strumenti per Software Engineering e Information Systems:** model driven engineering, agent-based systems, approcci multiformalismo e multisoluzione alla modellazione e simulazione di sistemi massivamente concorrenti.

#### Collaborazioni Nazionali ed Internazionali:

**Nazionali:** Politecnico di Milano, Università di Napoli "Federico II", Università degli Studi di Torino, Università "Ca' Foscari" Venezia, Università degli Studi del Piemonte Orientale, Università degli Studi di Firenze

**Internazionali:** Université Paris XIII – CEREMADE (Francia), George Mason University (USA), Cracow University of Technology (Polonia), University Politehnica of Bucharest (Romania), INRIA (Francia), Universidade Federal de Pernambuco – CIN (Brasile), Universitat Jaume I, Castellón (Spagna), Universidad Complutense de Madrid (Spagna)

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### 4. PROGETTI, BREVETTI E PUBBLICAZIONI

#### Principali Progetti di Ricerca:

- BAC PNRR – “Green Growth INDicators Development and analysis GRIN-D” – Responsabile scientifico Rosanna Verde

- BAC PNRR – “MPM-4-ASE - Monitoring and Predictive Models for Assessing the Sustainability of Economic activities in Southern Italy” - Responsabile scientifico Rosanna Verde
- PRIN 2022 – “Spatio-temporal Functional Marked Point Processes for probabilistic forecasting of earthquakes”. Responsabile di Unità di Ricerca: Elvira Romano.
- PRIN PNRR 2022: “Privacy and Blockchain in Public Integrated Filing systems: a privacy-by-design-compliant, cost-effective and performance-aware reference architecture (PaB-PIF)”. Responsabile di Unità di Ricerca: Mauro Iacono
- PRIN 2022: "Smart and Safe driving assistance system for a Sustainable MOBILITY experience (S3-MOBILITY)", Responsabile dell'Unità di Ricerca: Fiammetta Marulli.
- Progetto locale "Web Artificial Intelligence for Information Literacy Dissemination – TRUTH Or Lies Sources? (WAILD TROLS)" – programma V:ALERE 2020.
- PRIN 2015: "Complex space-time modeling and functional analysis for probabilistic forecast of seismic events". Responsabile di Unità di Ricerca: Rosanna Verde

#### Principali Pubblicazioni Recenti:

**Balzanella, A., Verde, R.,** and de Carvalho, F.d.A.T. "A cluster-wise regression method for distribution-valued data." *Knowledge-Based Systems* 326 (2025): 113989. <https://doi.org/10.1016/j.knosys.2025.113989>.

**Balzanella, A.,** Fortuna, F., and Naccarato, A. "Detecting patterns in financial data through weighted time-frequency domain clustering." *Quality and Quantity* 59, no. 3 (2025): 2069–2089. <https://doi.org/10.1007/s11135-024-02000-x>.

Bobbio, A., **Campanile, L.,** Gribaudo, M., **Iacono, M., Marulli, F.,** Mastroianni, M. A cyber warfare perspective on risks related to health IoT devices and contact tracing. *Neural Computing and Applications*, 2023.

Borrata, **G., Balzanella, A., and Verde, R.** "Functional Data Regression on Distribution-Valued Data via Logarithm Derivative Quantile Transformation." *Applied Stochastic Models in Business and Industry* 41, no. 6 (2025): e70059. <https://doi.org/10.1002/asmb.70059>.

**Campanile, L., Iacono, M., Marulli, F.,** Mastroianni, M. Designing a GDPR compliant blockchain-based IoT distributed information tracking system. *Information Processing and Management*, 2021.

Cerqueti, R., D'Urso, P., **Mattera, R.** Fuzzy group fixed-effects estimation with spatial clustering. *AStA Advances in Statistical Analysis* 109(4), 721–752, 2025. <https://doi.org/10.1007/s10182-024-00522-1>.

Cerqueti, R., **Mattera, R.** Measuring unit relevance and stability in hierarchical spatio-temporal clustering. *Spatial Statistics* 66, 100880, 2025. <https://doi.org/10.1016/j.spasta.2025.100880>.

Crocetta, C., **Irpino, A.,** Antonucci, L. et al. A performance indicator and its decomposition according to the impacts of different aspects based on distributional data. *Qual Quant* 59, 2091–2110 (2025). <https://doi.org/10.1007/s11135-024-01956-0>.

de Carvalho, F.d.A.T., **Irpino, A., Verde, R., Balzanella, A.** Batch Self-Organizing Maps for Distributional Data with an Automatic Weighting of Variables and Components. *J Classif* 39, 343–375 (2022). <https://doi.org/10.1007/s00357-022-09411-1>.

Di Bonito, L.P., **Campanile, L., Iacono, M., Di Natale, F.** An explainable artificial intelligence framework to predict marine scrubbers performances. *Engineering Applications of Artificial Intelligence* 160, 111860, 2025. <https://doi.org/10.1016/j.engappai.2025.111860>.

Diana, A., **Romano, E., Irpino, A.** Distribution free prediction for geographically weighted functional regression models. *Spatial Statistics* 57, 100765, 2023. <https://doi.org/10.1016/j.spasta.2023.100765>.

Gribaudo, M., **Iacono, M.** Simulation of n-dimensional second order fluid models with custom oriented barriers. *Simulation Modelling Practice and Theory*, 2026.

Loffredo, G., **Romano, E., Maturo, F.** Random Survival Forest for Censored Functional Data. *Statistics in Medicine* 44: e10344 (2025). <https://doi.org/10.1002/sim.10344>.

Magistris, A.D., **Romano, E., Campagna, R.** Adaptive Generalized P-Splines for Functional Data: A Statistical Framework via Blockwise GSVD. *Stat Comput* 35, 203 (2025). <https://doi.org/10.1007/s11222-025-10734-3>.

**Marulli, F., Lancellotti, F., Paganini, P., Dondossola, G., Terruggia, R.** Towards a novel approach to enhance cyber security assessment of industrial energy control and distribution systems through generative adversarial networks. *Journal of High Speed Networks* 31(2), 105–122, 2025. <https://doi.org/10.1177/09266801241291401>.

Maturo, F., **Verde, R.** Combining unsupervised and supervised learning techniques for enhancing the performance of functional data classifiers. *Comput Stat* 39, 239–270 (2024). <https://doi.org/10.1007/s00180-022-01259-8>.

**Romano, E., Irpino, A., Miller, C.** "Developments in Functional Regression Model for Network Structured Data." *Environmetrics*, no. 7: e70043 (2025). <https://doi.org/10.1002/env.70043>.

Verde, L., **Marulli, F., De Fazio, R., Campanile, L., Marrone, S.** HEAR set: A lightweight acoustic parameters set to assess mental health from voice analysis. *Computers in Biology and Medicine* 182, 109021, 2024. <https://doi.org/10.1016/j.compbiomed.2024.109021>.