

Alex Cecchetto

Curriculum Vitae

Department of Statistical Sciences
University of Padova

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🌐 alexcecchetto.github.io 🔗 [alexcecchetto](https://github.com/alexcecchetto)

I am a PhD student in Statistics at the University of Padova and currently a visiting researcher at the University of Melbourne. My research focuses on the development and implementation of statistical models for high-dimensional genomic data, with emphasis on single-cell RNA sequencing and spatial transcriptomics. Methodologically, the focus is on regression, clustering, and dimensionality reduction using both frequentist and Bayesian approaches. I have a strong interest in computational statistics, with a focus on optimizing algorithmic efficiency and exploring GPU implementations to enhance performance and scalability.

Education

- Oct 23 - present: **PhD, Statistical Sciences**, *University of Padova, Department of Statistical Sciences*, Padova, Italy.
Thesis: "Latent structure modeling in spatial transcriptomics data"
Advisors: Davide Risso, Francesco Denti.
- Nov 19 - Mar 22: **M.Sc.in Statistical Sciences**, *University of Padova, Department of Statistical Sciences*, Padova, Italy.
Thesis: "Risk Factor and Survival Analysis for Patients with von Hippel-Lindau Disease".
Advisor: Bruno Scarpa.
Final grade: 110/110 cum laude
- Oct 16 - Nov 19: **B.Sc.in Statistics for Technology and Sciences**, *University of Padova, Department of Statistical Sciences*, Padova, Italy.
Thesis: "Validation of Gaussian mixture models for the analysis of whole sky gamma-ray intensity map".
Advisor: Alessandra R. Brazzale.

Visiting Research Experiences

- Sep 25 - Present: **University of Melbourne**, *Melbourne*, Australia, Visiting Research Scholar.
Designed and implemented a computationally efficient SGD-based inference algorithm for RUVIII-NB, improving scalability in single-cell RNA-seq normalization (supervised by Prof. Agus Salim).

Work Experience

- Apr 22 - Oct 23 **Consultant**, *Qintesi S.p.A.*, Milan, Italy.
 - Built and maintained databases for major insurance companies and corporate clients.
 - Contributed to internal projects within the Analytics and Data Platform Unit, developing machine learning models to support data-driven decision-making.
 - Tech stack: Google Cloud Platform (GCP), Python, SAP, SQL, ABAP.
- Mar 2022 - Present **Research collaboration**, *IoV*, Padova, Italy.
Ongoing collaboration with the research team that provided the data for my thesis (Istituto Oncologico del Veneto), contributing to multiple projects on genetic diseases.

Publications

In Conference Proceedings

- 2025 Alex Cecchetto and Davide Risso. Latent structure modeling in spatial transcriptomics data: Comparing two matrix factorization approaches. In *Scientific Meeting of the Italian Statistical Society*, pages 169–174. Springer, 2025.

Working papers/Manuscript in preparations

- 2026+ **Cecchetto, A.**, Denti, F., & Risso, D. *Clustering Gene Expressions Based on Spatial Latent Traits*. In preparation.
Bayesian framework for spatial transcriptomics by modeling smooth spatial expression surfaces via splines with flexible basis functions, combining low-rank latent structure and probabilistic clustering; implemented in NumPyro with GPU-accelerated stochastic variational inference for scalable inference on high-dimensional data.
- 2026+ **Cecchetto, A.**, Denti, F., & Risso, D. *Scalable Bayesian model-based clustering for single-cell RNA-seq via generalized matrix factorization*. In preparation.
Develops a Bayesian framework that unifies generalized matrix factorization and finite-mixture clustering in a latent low-dimensional space, with GPU-accelerated variational inference for scalability to large, sparse count data.
- 2026+ **Cecchetto, A.**, & Salim, A. *RUV-SGD-NB: normalization of single cell RNA-seq data*. In preparation.
Developing a computationally efficient stochastic gradient descent (SGD) inference algorithm for RUV-III-NB, enabling scalable removal of unwanted variation from both cell embeddings and gene-level counts in single-cell RNA-seq.

Teaching

Academic Year 2025/2026

- Teach. Assist. + **Metodi statistici per big data**, *University of Padova*, 18h, Ita.
BSc in Statistics for Technology and Sciences (Tutor)

Academic Year 2024/2025

- Teach. Assist. **Statistical Learning, mod A**, *University of Padova*, 30h, Eng.
MSc in Data Science (Tutor)
- Teach. Assist. **Modelli statistici applicati**, *University of Padova*, 10h, Ita.
BSc in Statistics for Technology and Sciences (Tutor)

Presentations

Talks

- 12 Jun 2025 *Generalized Matrix Factorization: A Flexible Framework for Spatially-Resolved Omics Data*. Lab Meeting, Department of Biology, University of Padova (UniPD), Padova, Italy.
- 31 Oct 2024 *High-Dimensional Omics Data: From Sequencing to Insight*. Lab Meeting, Department of Biology, University of Padova (UniPD), Padova, Italy.

Posters

- 17 Sep 2025 *Latent Structure Modeling in Spatial Transcriptomics Data*. EuroBioC 2025, Barcelona, Spain.
- 28 May 2025 *Generalized Matrix Factorization: A Flexible Framework for Spatially-Resolved Omics Data*. Bioinference, Bardonecchia, Italy.
- 7 Apr 2025 *Generalized Matrix Factorization: A Flexible Framework for Spatially-Resolved Omics Data*. Data Science for Health and Biology, Milan, Italy.

Awards & Grant

- 2025 **Travel Support**, *European Bioconductor Conference 2025*, Barcelona, Spain.
Selected as the recipient of Travel Support funds for a Poster Presentation.
- 2025 **Travel Support**, *BioInference conference 2025*, Bardonecchia, Italy.
Selected as the recipient of Travel Support funds for a Poster Presentation.

2022 **Stat Data Camp Scholarship**, *University of Padova, Department of Statistical Sciences, Brixen, Italy.*

Attendance to Courses, Schools, Workshops, and Seminars

- Dec 2025 **Melbourne Integrative Genomics Symposium**, *University of Melbourne, MIG, Melbourne, Australia.*
- Jul 2025 **CSAMA**, *Bioconductor, Brixen, Italy.*
One-week intensive summer school on Biological Data Science
- Apr 2025 **Natural Language Processing: dai BoW ai Transformers**, *Department of Statistical Sciences, University of Padova, Padova, Italy.*
- Sep 2024 **Short Course on Graphical Models**, *Department of Statistical Sciences, University of Padova, Padova, Italy.*
- Jul 2024 **Specialist Course: Replicability crisis in science**, *Department of Statistical Sciences, University of Padova, Padova, Italy.*
held by Prof. Giovanni Parmeggiani & Prof. Branden Fitelson
- Jun 2024 **Kalman Filter and State Space Models**, *Department of Statistical Sciences, University of Padova, Padova, Italy.*
held by Prof. Siem J. Koopman
- May 2024 **Bayesian Data Analysis and Computation**, *Department of Statistical Sciences, University of Padova, Padova, Italy.*
held by Prof. Brunero Liseo & Prof. Andrea Tancredi
- July 2022 **Stat Data Camp**, *Department of Statistical Sciences, University of Padova, Brixen, Italy.*

Computer skills

Languages	R, Python, C++, Rcpp, SQL, L ^A T _E X, SAS
ML/Scientific Computing	PyTorch, NumPyro, NumPy, SciPy, pandas, scikit-learn
Data Platforms & Databases	GCP, SAP, ABAP, MySQL, PostgreSQL, BigQuery
Tools	Git/GitHub, Linux/Unix, Bash, Docker
HPC	SLURM, GPU computing, distributed computing
Reproducibility	Conda, renv, Quarto

Languages

Italian	Native Speaker
English	Fluent