Xenofon Giannoulis

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Work Experience

Postdoctoral Researcher *Helmholtz Munich,DE*
Institute of Computational Neurobiology *January 2025 - now*

- Leading integrative multi-omics analyses in Alzheimer's disease using AI/ML and graph theory.
- Developing computational pipelines for harmonizing large-scale omics datasets from NIH-funded initiatives.
- Deploying interactive visualization tools using R Shiny and Neo4j graph databases (e.g., AD Atlas platform: www.adatlas.org).
- Employing network-based drug repositioning strategies to identify potential therapeutic targets in Alzheimer's disease.

Doctoral Researcher *Helmholtz Pioneer Campus,DE*
Institute of Translational Genetics *June 2020 - December 2024*

- Designed the first comprehensive catalog of mtDNA variation effects on gene expression regulation across 48 human tissues.
- Applied advanced machine learning models to uncover key insights into mitochondria-nuclear interactions.
- Created an ensemble model combining RNAseq and eQTL data, leading to the identification of key genes in biological networks.
- Replicated findings to elucidate the molecular basis of mitonuclear communication in neuropsychiatric diseases.
- Integrated diverse databases and open-source tools for cross-referencing and validating analytical findings.
- Organized two Munich School of Data Science retreats, oversaw speaker invitations and agenda management.
- Shared research insights at several highly esteemed international conferences.

Research Fellow *LMU, Munich,DE*
Data Science for Social Good | Munich Center for Machine Learning *August 2023 - September 2023*

- Collaborated with Bavaria's civil protection to create a strategy for the coverage of fire water extraction points.
- Developed an end-to-end machine learning web application, aimed at enhancing the fire brigade's efficiency during emergency.
- Integrated routing algorithms for statistical mapping and geolocation data to build a user-friendly, interactive UX map.
- Deployed the application on Amazon Web Services (AWS) using a dockerized container.
- Presented and elucidated all aspects of the project to Germany's federal parliament.

Higher Education Instructor *TUM Munich,DE*
Faculty of Medicine (ME1660) *October 2022 - March 2023*

- Participated as a tutor in lectures and provided support to students.
- Enhanced student learning by optimising the course materials and methods for the workshop in Jupyter Lab.
- Topics covered: UNIX, quality control, association testing, meta-analysis, polygenic risk scores.

Quantitative Analytics Intern *Helmholtz Munich,DE*
Institute of Translational Genomics *October 2019 - April 2020*

- Analyzed genome-wide association data from 250 patients undergoing total joint replacement surgery across four cohorts.
- Processed data obtained from three different Illumina Array Exome Sequencing Chips, created at two separate centers.
- Developed a quality control pipeline for evaluating pre-processed data, identifying biases, and ensuring accuracy during merging.
- Imputed data using Haplotype Reference Consortium on Michigan server.

Education

Technical University of Munich (TUM) - Experimental Medicine *Munich, DE*
Ph.D. / Dr.rer.nat. in School of Medicine (MGC) *December 2024*

Thessaly University - Computer Science and Biomedical Informatics *Lamia, GR*
MSc. in Informatics and Computational Biomedicine *April 2020*

Piraeus University - Department of Statistics and Insurance Science *Athens, GR*
Ptychion (4-year BSc.) in Statistics and Actuarial Science *February 2018*

Technical Skills

Statistics   Developed and optimized ML models (linear mixed models, clustering, decision trees, graph neural networks). Performed thorough data analysis, covering univariate analysis, multicollinearity checks, and outlier detection. Expert in complete statistical analysis, including correction, permutations, and hypothesis testing. Employed causal inference techniques to effectively control for confounders in observational data.

Topics   Linear Mixed Models, Interaction Effects, Clustering Algorithms, Covariate Selection, Network Analysis, Mediation Analysis, Causal Inference, Conditional Analysis, Ontology Engineering, Graph Neural Networks.

Genetics   GWAS, eQTLs, ct-iQTLs, WGS, Illumina, RNAseq, Limix, LDAK, PLINK, edgeR, ComBat-seq, Bioconductor, Variant Calling, Statistical Colocalization, Mendelian Randomization, Mediation, Pathway Analysis.

Programming   Strong data analysis and visualization skills with R working with Linux executing in Bash. Experienced in working with scalable reproducible environments, including Docker and Singularity. Familiar with style of writing Python, JavaScript, HTML, CSS, and XML commands. Certified Oracle MySQL Certified Developer (1z0-882) and proficient in Cypher Query language. Experienced linking data with Protégé and W3C semantic stack RDFs, XML, SPARQL. Emphasis on version control and documentation: Anaconda, Github, LaTeX, RMarkdown, Obsidian.

Others   SPSS, MySQL Workbench, Microsoft Access, Microsoft 365, Adobe Illustrator.

Languages   Greek (Native), English (Fluent), German (Advanced).

Milestones

May 2024
- Presented at Biology of Genomes in Cold Spring Harbor Laboratory, New York, and engaged with leading researchers and peers in the field of computational biology.

August 2023
- Awarded a research fellowship from the Department of Statistics (LMU) and the Munich Center of Machine Learning (MCML) through the Data Science for Social Good Foundation to create a machine learning solution for Bavaria's civil protection.

June 2023
- Crafted a bespoke soundtrack for *Whirled Z*, a video art installation by Susi Gelb, featured at Liste Art Fair in Basel Zurich. The soundtrack enhanced Gelb's exploration of nature and technology by blending algorithms with organic forms.

March 2021
- Led the EU-funded (STARS) initiative, creating an educational escape room for 30 institutions in four countries. Utilized design thinking and worked with schools to improve science education delivery.

June 2020
- Secured a 4-year scholarship from the Munich School of Data Science (MUDS) Ph.D. graduate program.

Upcoming Scientific Publications

Interplay between mitochondrial and nuclear DNA in gene expression regulation. biorxiv

Xenofon Giannoulis, Simon Wengert, Florin Ratajczak, Matthias Heinig, Na Cai.

Tissue-Specific mtDNA Heteroplasmy Linked to Aging and Gene Expression. biorxiv

Simon Wengert, **Xenofon Giannoulis**, Peter Kreitmaier, Holger Prokisch, Paolo Casale, Matthias Heinig, Na Cai.