Soel Micheletti

Curriculum vitae

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Education

2022-2023	**Harvard University**, *Visiting Graduate Student.*
	Research on causal inference for multi-omics data integration.
2020-2022	**ETH Zurich**, *MSc. Data Science.*
	Focus on Machine Learning and algorithms.
2017-2020	**ETH Zurich**, *BSc. Computer Science.*
	With honours, top 15%.

Scientific Experience

Spring 2022	**AI Center Project in Machine Learning Research**, *ETH Zurich*

Analysis and open source implementation of a simple algorithm for Bivariate Causal Discovery via Conditional Divergence.

Fall 2021	**Research in Data Science:** ***Unravelling Stroke Recovery***, *Joint research with the Lucerne Canton Hospital*

Applied a well-known algorithm (GLasso) to estimate undirected graphical models and give insights on how different recovery categories influence each other; implemented a recurrent neural network to predict recovery patterns.

Spring 2021	**3D Hand Pose Recognition**

Implemented an Encoder-Decoder architecture in Pytorch to efficiently predict heat-maps of the joints.

Fall 2020	**Inference from Medical Data**

- Designed a complete classification pipeline on a MRI dataset (imputation, outlier detection, feature engineering, selection and tuning of the best algorithms to stack in the final model).
- Developed robust algorithms to handle highly imbalanced datasets.

Spring 2020	**Thesis on Evolutionary Algorithms**

- Formally proved results about the performance of evolutionary/ genetic algorithms on relevant benchmark functions.
- MATLAB simulations to interpret the results and propose better performing variants of the algorithm.

2016-2017 **Research on Stochastic Simulation**

- Designed a Monte Carlo algorithm to estimate the area of geographical surfaces and implemented a GUI in Java for end-users.
- Special prize *Odd Fellows* and nominated best project in Computer Science at the 2018 Taiwan International Science Fair.

Work Experience

2022 **Software Engineering Intern**, *Ergon Informatik*, Zurich, Switzerland.

- Re-designed and implemented the server's caching architecture to replace the old solution, reducing the latency by 150% on a sample benchmark.
- Implemented the backend in Java, tested with JUnit, and deployed using Docker containers.
- Used Agile methodologies to structure the team's work.
- Extended the frontend dashboard of the testing platform to support scanning of QR codes (Angular).

2019-2022 **Teacher Assistant**, *ETH Zurich*

See dedicated section.

2016 **Web Developer**, *Wonews SA.* , Locarno, Switzerland

- Part-time job during my high-school studies.
- Developed the company's website using JavaScript.

Selection of Awards, Achievement, and Honours

2021 **Distinguished delegate at the NMUN conference**, *New York*, USA.

Recognized to the top 20% candidates based on team-work attitude, diplomatic capabilities, and quality of the proposed solution.

2018 **First prize in Computer Science**, *Taiwan International Science Fair*, Taipei.

2017 **Valedictorian**, *Liceo Cantonale di Locarno*.

Awards: best student of the year, best bilingual matura, Deutsche Bank award.

2017 **Special Prize *Odd Fellows***, *National Competition of Schweizer Jugend Forscht*, Bern, Switzerland.

Recognized to the top STEM projects in the most prestigious scientific fair for high school students in Switzerland.

Teaching

Parallel to my studies, I was highly involved in teaching. As Albert Einstein said, *"If you can't explain it simply, you don't understand it well enough."* Teaching pushed me to think to fundamental concepts and explain them as clearly as possible, which ultimately made me understand the topics even better. In many cases, teaching assistants pick their favorite course and stick to it over the years. I did it differently, working on multiple areas: from Theoretical Computer Science to Software Engineering, and also a bit of Computer Networks.

Spring 2022	**Computer Networks**, *ETH Zurich*
	Graded exercise submissions for about 300 students.
Fall 2021	**Algorithms and Data Structures: intensive course**, *ETH Zurich*
	Wrote a script containing the whole scope of the course; held a week of intensive sessions to assist the students in the exam preparation, providing them intuitive explanations of algorithms and tricks to perform well.
Fall 2021	**Algorithms and Data Structures**, *ETH Zurich*
	Held weekly exercise sessions for about 20 students; graded their exercise sheets; answered the students' questions in the online chat during lectures.
Spring 2021	**Computer Networks**, *ETH Zurich*
	Graded exercise submissions for about 300 students; preparation of the project regarding the implementation of the Rapid Spanning Tree Protocol (RSTP); answered questions in the online chat during lectures.
Spring 2021	**Algorithms and Probability**, *ETH Zurich*
	Held weekly exercise sessions for about 20 students; graded exercise sheets; prepared quizzes and mini-tests covering the course content.
Fall 2020	**Algorithms and Data Structures**, *ETH Zurich*
	Held weekly exercise sessions for about 20 students; graded exercise sheets; answered questions in the online chat during lectures.
Spring 2020	**Algorithms and Probability: intensive course**, *ETH Zurich*
	Wrote a script containing the whole scope of the course; held a week of intensive sessions to assist the students in the exam preparation, providing them intuitive explanations of algorithms and tricks to perform well.
Spring 2020	**Parallel Programming**, *ETH Zurich*
	Held weekly exercise sessions for about 20 students; helped the students implementing algorithms in Java; wrote the script for the course.
Fall 2019	**Algorithms and Data Structures**, *ETH Zurich*
	Held weekly exercise sessions for about 20 students; graded exercise sheets; answered questions in the online chat during lectures.
2013-2021	**Mentored 30+ high-school students in Maths, Physics and Chemistry classes.**

Talks

2022	Adam Bloniarz et al., Lasso Adjustments of Treatment Effect Estimated in Randomized Experiments, Biostatistics Department JC, Harvard University.
2022	Organizer and speaker at the IT Data Science Event by the Swiss Study Foundation.
2021	Francisco Ruiz et al., SHOPPER: a probabilistic model of consumer choice with substitutes and complements, *Advanced Topics in Machine Learning and Data Science Seminar*, ETH Zurich.
2019	Naeemul Hassan et al., Toward Automated Fact-Checking: Detecting Check-worthy Factual Claims by ClaimBuster, *Seminar on Media Innovation* at ETH Zurich.

2018	Presented my high school project RANDOM NUMBER GENERATORS AND THEIR APPLICATIONS IN COMPUTER SCIENCE WITH THE MONTE CARLO METHOD at the Taiwan International Science Fair.
2017	Presented my high school project RANDOM NUMBER GENERATORS AND THEIR APPLICATIONS IN COMPUTER SCIENCE WITH THE MONTE CARLO METHOD at the National Competition by Schweizer Jugend Forscht.

Graduate Coursework

ETH Zurich	Advanced Machine Learning; Algorithms Lab; Big Data; Computational Statistics; Data Analytics for Non-Life Insurance Pricing; Financial Economics; High Dimensional Statistics; Information Theory; Machine Perception; Optimization for Data Science; Reinsurance Analytics; Statistical Modeling.

Undergraduate Coursework

ETH Zurich	Algorithms and Data Structures; Algorithms and Probability; Algorithms, Probability and Computing; Analysis I-II; Complex Analysis; Computer Networks; Computer Systems; Data Modelling and Databases; Design of Digital Circuits; Discovering Management; Discrete Mathematics; Functional Programming and Formal Methods; Introduction to Machine Learning; Information Security; Introduction to Neuroinformatics; Introduction to Programming; Linear Algebra; Numerical Methods for CSE; Parallel Programming; Probability and Statistics; Systems Programming and Computer Architecture; Theoretical Computer Science; Visual Computing.

Technical Skills

Languages:	Python, C++, R, Java, Haskell
Frameworks:	PyTorch (Lightning), Scikit-learn, Pandas, Keras, Eigen, BGL, CGAL, ...
Algorithms:	Knowledge of Dynamic Programming, Graph Algorithms (Shortest Paths, Minimum Spanning Trees, Matching, Coloring, Flows in Networks, Min Cuts, ...), Geometric Algorithms (Delaunay Triangulation, Convex Hulls, Smallest Enclosing Circle, Point Location, Voronoi Diagrams, ...), Linear Programming, skilled in designing Randomized Algorithms, ...
Big Data:	SQL, Hadoop, Spark, NoSQL, MongoDB, MapReduce, JSONiq, Neo4j, ...
Maths:	Solid foundations in linear algebra, probability, statistics, calculus, and optimization.

Swiss Study Foundation

The Swiss Study Foundation supports excellent students and postgraduates at universities and technical colleges who due to their personality, creativity and intellectual skills are in a position to contribute to science, business, culture and politics. The Foundation's mission is to promote young people who are willing and capable of assuming leading positions in all sectors of society. Since 2018 I am a proud member of the Swiss Study Foundation, that offered me highly valuable learning experiences complementary to my studies, together with diverse networking opportunities with people from various backgrounds. Here a list of selected events I attended and organized:

2022 **IT Data Science (co-organizer)**: introduction to fundamental topics in Data Science and Machine Learning (pipeline of a Data Science project, main ideas of supervised learning, bias-variance trade-off) and presentation of classical Deep Learning material (GANs, transfer learning, transformers).

2021 **Story telling camp:** presentation of different techniques to tell a story in an engaging way and prepared a "Pecha Kucha" presentation about my first solo travel experience.

2021 **NMUN:** negotiations about the Illicit Trade of Small Arms and Light Weapons in behalf of Madagascar at the NMUN event held in New York.

2020 **The Art of Debating:** introduction to the competitive form of British Parliamentary Debating. Theoretical sessions with the former European champion and a team tournament event.

2019 **IT Life Science:** introduction to genetics and talks about CRISPR/Cas9.

2019 **IT Personal Management:** discussions and ideas about life design.

Languages

English (proficient); **German** (fluent); **Italian** (mother tongue); **French** (basic knowledge); **Spanish** (elementary knowledge).

Others

2020 **Mentoring**

Welcome event for new ETH Student.

2016-2018 **Participant of the TV debating show *Linea Rossa***

- Linea Rossa was a popular TV show at RSI (the official television broadcaster in Ticino).
- Participated in weekly discussions and debates about various topics (politics, fake news, social media, university, dating apps, ...)