

# Diego Antognini, PhD

## Researcher in Machine Learning & Natural Language Processing

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7 years of research experience in natural language processing, machine learning, and recommendation systems. Focusing on enhancing large multimodal models through iterative feedback and refinement. Worked on aligning large language models, building retrieval-augmented LLM systems, and developing efficient models for low-resource settings. Experienced in designing explainable models that generate personalized and actionable textual explanations. Supervised 70+ B/M.Sc. projects.

## Skills

<b>Research Interests</b>	Generative AI, LLM alignment, multimodal, iterative refinement, efficient ML, NLP, conversational recommendation.
<b>Program Committee</b>	NeurIPS, ICLR, ICML, ACL, EMNLP, NAACL, EACL, SIGIR, RecSys. <u>Journals</u> : ACL Rolling Review, ACM Computing.
<b>Languages &amp; Libraries</b>	<u>Efficient</u> : Python, PyTorch, Tensorflow, transformers, ONNX, Spark, Bash, SQL. <u>Prior Experience</u> : C++, CUDA, Java.
<b>Technologies</b>	GNU/Linux, Git, Poetry, Docker, Kubernetes, Openshift, API design, Redis, Elasticsearch, Milvus vector database.

## Experience

### Research Engineer

Jan. 2024 - present

- Advancing multimodal generative AI by focusing on large multimodal models and enhancing them through iterative feedback and refinement.

### Google Research

Zürich, Switzerland

### Research Scientist

May 2022 - Jan. 2024

- Publications: **6 papers in AI & ML leading venues**: 3 conference, 1 workshop, 1 demo, 1 under review at TMLR. Patents: **5 patents that are filed**.
- Implemented new methods for aligning large language models to convert natural language questions into SQL queries for massive databases.
- Designed methods to adapt and personalize LLMs to users, using parameter-efficient fine-tuning methods. To be integrated into *IBM Watsonx.ai*.
- Developed tiny, low-latency models with high performance and throughput. Created a term extractor for technical domains and reduced latency by 10x on CPU while performing similarly to BERT. Built a term encoder matching sentence encoders in quality, yet 5x smaller and 10x faster.
- Deployed models of 1MB and 2ms latency used in *IBM Deep Search* to extract terms in real time from scientific documents and patents.
- Built a distributed system to generate QA pairs from large corpora using LLMs and a retrieval-augmented LLM system to answer users' questions.

### IBM Research

Zürich, Switzerland

### Module Head, Lecturer, and Supervisor for M.Sc. Theses in NLP

Feb. 2022 - present

- Designing and teaching the course of computational language technologies and deep learning for NLP to 160+ M.Sc. students.
- Supervised 10 M.Sc. theses in NLP with companies in the areas of medicine, law, politics, insurances, banks, media, and data visualization.

### Lucerne University of Applied Sciences

Lucerne, Switzerland

### Consultant and Expert for B.Sc. and M.Eng. Theses in ML

June 2015 - present

- Giving talks on a wide range of deep learning topics and offering machine learning consulting services for applied research in industrial projects.
- Assessed 30+ B.Sc./M.Eng. theses in the areas of autonomous drones & driving, algorithmic optimization with GPUs, computer vision, and NLP.

### HE-ARC – University of Applied Sciences

Neuchâtel, Switzerland

### Visiting Researcher in Prof. Julian McAuley's ML Lab

Jul. 2021 - Nov. 2021

- Published an unsupervised critiquing method for generative language models to help users rewrite cooking recipes to satisfy dietary restrictions.

### UCSD – University of California San Diego

San Diego, CA, U.S.A.

### Research and Teaching Assistant

May 2017 - Mar. 2022

- Assisted in teaching intelligent agents (M.Sc.), introduction to natural language processing (M.Sc.), and artificial intelligence courses (B.Sc.).
- Supervised 30+ B./M.Sc. semester projects & theses. Worked with the data analytics & AI research team in Swisscom (led by Dr. Claudiu Musat).

### EPFL – Swiss Federal Institute of Technology in Lausanne

Lausanne, Switzerland

## Education

### Ph.D. in Computer Science

Sep. 2017 - Mar. 2022

- Publications: **15 papers in AI & ML leading venues**: 8 conference, 6 workshop, 1 demo. Advisor: Prof. Boi Faltings, head of the AI laboratory.
- Implemented the **first PyTorch graph attention network, starred and forked on Github 3.3k+** with 10k views per month.
- Thesis 📄: Textual Explanations and Critiques in Recommendation Systems. I solved two challenges: generating textual explanations and making them actionable. My thesis focused on generative AI, explainability, and conversational recommendation. **Fastest to graduate in the AI lab**.

### EPFL – Swiss Federal Institute of Technology in Lausanne

Lausanne, Switzerland

### M.Sc. in Computer Science

Sep. 2014 - Apr. 2017

- Specialization: NLP, AI, ML, and distributed systems (GPA: 5.5/6.0). It includes an extra year of 62 ECTS credits to be accepted in the program.
- Thesis: From Relation Extraction to Knowledge Graphs. Built a model that extracts terms and concepts from large corpora and classifies the semantic relationship between them. It outperformed state-of-the-art models by 0.9 F1-score in the relation-classification task of SemEval-2010.

### EPFL – Swiss Federal Institute of Technology in Lausanne

Lausanne, Switzerland

### B.Sc. in Computer Science










Sep. 2011 - Aug. 2014

- Major: software engineering (GPA 5.6/6.0). Thesis: Computing Brain Neuronal Maps. Developed a multi-GPUs algorithm to compute an accurate 3D real-time rendering of the brain's electromagnetic activities. Reduced the computation time from 20h to 700ms (faster by a factor of 100,000).

### HE-ARC – University of Applied Sciences

Neuchâtel, Switzerland

## Publications (selected)

<b>Assistive Recipe Editing through Critiquing</b>  Diego Antognini, Shuyang Li, Boi Faltings, Julian McAuley	EACL 2023
<b>pNLP-Mixer: an Efficient all-MLP Architecture for Language</b>  Francesco Fusco, Damian Pascual, Peter Staar, <u>Diego Antognini</u>	ACL 2023
<b>Extracting Text Representations for Terms and Phrases in Technical Domains</b>  Francesco Fusco* and <u>Diego Antognini</u> * (equal contribution)	ACL 2023
<b>Unsupervised Term Extraction for Highly Technical Domains</b>  Francesco Fusco, Peter Staar, <u>Diego Antognini</u>	EMNLP 2022
<b>Fast Critiquing with Self-Supervision for VAE-based Recommender Systems</b>  <u>Diego Antognini</u> and Boi Faltings	RecSys 2021
<b>Interacting with Explanations through Critiquing</b>  <u>Diego Antognini</u> , Claudiu Musat, Boi Faltings	IJCAI 2021
<b>Rationalization through Concepts</b>  <u>Diego Antognini</u> and Boi Faltings	ACL 2021
<b>Multi-Dimensional Explanation of Target Variables from Documents</b>  <u>Diego Antognini</u> , Claudiu Musat, Boi Faltings	AAAI 2021
<b>Addressing Fairness in Classification with a Model-Agnostic Multi-Objective Algorithm</b>  Kirtan Padh, <u>Diego Antognini</u> , Emma L. Glaude, Boi Faltings, Claudiu Musat	UAI 2021

## Talks (selected)

<b>Conversational Critiquing: From Recommender Systems to Text Generation</b> • Google Research, Zürich, Switzerland.	2023 Host: Dr. Claudiu Musat
<b>Efficient Machine Learning in Low-Resource and Highly-Specific Domains</b> • MIT-IBM Watson, Cambridge, MA, U.S.A. • Swiss Text Analytics Conference 2023, Neuchâtel, Switzerland.	Host: Dr. Leonid Karlinsky Keynote
<b>Textual Explanations and Critiques in Recommendation Systems</b> • EPFL – Swiss Federal Institute of Technology in Lausanne, Switzerland.	2022 Host: Prof. Boi Faltings
<b>Interacting with Explanations through Critiquing</b> • University of Toronto, Online. • Swisscom AI, Lausanne, Switzerland. • IJCAI 2021, Online.	2021 Host: Prof. Scott Sanner Host: Dr. Claudiu Musat
<b>Fast Critiquing with Self-Supervision for VAE-based Recommender Systems</b> • RecSys 2021, Online.	
<b>Rationalization through Concepts</b> • ACL 2021, Online.	
<b>T-RECS: a Recommender Generating Explanations and Integrating Critiquing</b> • ECAI 2020, Online.	2020
<b>Multi-Dimensional Explanation of Ratings from Reviews (Multi-Dimensional Rationalization)</b> • University of Zürich & NLP Meetup, Zürich, Switzerland. • Swisscom AI, Lausanne, Switzerland. • AAAI 2021, Online.	Host: Dr. Kornelia Papp Host: Dr. Claudiu Musat
<b>Learning to Create Sentence Semantic Relation Graphs for Multi-Document Summarization</b> • EMNLP 2019, Hong-Kong.	2019
<b>From Relation Extraction to Knowledge Graphs</b> • University of Applied Sciences, Neuchâtel, Switzerland. • EPFL – Swiss Federal Institute of Technology in Lausanne, Switzerland. • NLP Meetup, Zürich, Switzerland.	2017 Host: Pr. Hatem Ghorbel Host: Dr. J.-C. Chappelier Host: Dr. Kornelia Papp

## Honors & Awards

- 2023 **First plateau (i.e., 4 patents) invention achievement award**, IBM, Yorktown Heights, NY, U.S.A.
- 2023 **First patent application invention achievement award**, IBM, Yorktown Heights, NY, U.S.A.
- 2018 **First prize in the IARPA Geopolitical Forecasting Challenge 2018**, macro-economics category, Washington, DC, U.S.A.
- 2014 **Excellent B.Sc. thesis award**, University of Applied Sciences, Neuchâtel, Switzerland.
- 2013 **Excelling B.Sc. student award**, University of Applied Sciences, Neuchâtel, Switzerland.

## Interests

In my spare time, I ride motorbikes, dance salsa, drive boats, and paddle on beautiful Swiss lakes. I go to the gym regularly. I love reading and immersing myself in a wide range of subjects, such as leadership, communication, and finance. I have traveled to 30 countries and six continents.