Ezzeddine.elsai@colorado.edu **Boulder, CO 80516**
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Ezzeddine AlSai

EDUCATION

- **PhD in Mathematics** (August 2022 - Ongoing), University of Colorado Boulder
- **MA in Mathematics** (August 2021 - August 2022), University of Colorado Boulder
  - **Master's Thesis title:** Factorization Algebras from the Deformation Point of View
  - **Advisor:** Prof. Markus J Pflaum
- **BA in Mathematics** (August 2017 - May 2021), University of Colorado Boulder
  - **Minors:** Physics and Philosophy
- **Relevant Coursework:** Quantum Information, Complexity Theory, Big Data, Theoretical Machine Learning, Numerical Analysis, Algorithms, Data Structures, Machine Learning for Linguists, Probabilistic Models, Principles of Programming Languages, Mathematical Statistics, Measure-Theoretic Probability

SKILLS

- **Programming:**
  - C++, Python, Keras TensorFlow, Javascript, Flask, HTML, CSS, SQL, Git, Docker, Heroku, NumPy, SciPy
- **Data Science:**
  - Reinforcement Learning, Convolutional Neural Networks, Computer Vision,, Bayesian Statistics, Theoretical Machine Learning

WORK EXPERIENCE

- **Software Consultant** (December 2024 -February 2025), Vincere Systems, LLC:
  - Developed computer vision models for virtual hockey training products
- **Instructor** (August 2022 -Ongoing), University of Colorado Boulder
  - Instructed college Calculus 1 Fall 2023, Summer 2024, and Fall 2024
  - Set up an environment that is suited for the diverse identities and diverse learning styles
  - Sought ideas from other instructors and pedagogy literature to further develop my skills

PUBLICATIONS

- Ezzeddine El Sai, Parker Gara, Markus Pflaum, *Algebraic Machine Learning with an Application to Chemistry.* Foundations of Data Science (2024). **arXiv:2205.05795**
  - Developed a new Bayesian optimization algorithm to study chemical data using ideas from algebraic geometry
- Guofeng Deng, Ezzeddine El Sai, Trevor Manders, Peter Mayr, Poramate Nakkirt, Athena Sparks, *Sandwiches for Promise Constraint Satisfaction.* Algebra Universalis (2021). **arXiv:2003.07487**
  - A new result connected to algebra and theoretical computer science

PROJECTS

- **AlphaCheck:**
  - Checkers AI engine based on Google Brain's AlphaZero algorithm. It consists of a front-end Javascript UI, a backend Flask SocketIO server modeling the game, and a Flask server delivering the AI moves based on TensorFlow Keras. Training involved self-play using Monte Carlo Tree Search.
  - Find more information here: github.com/EzzeddineSai/AlphaCheck_frontend

TALKS

- **QFT and Yang-Mills Theory:**
  - A talk for the mathematical physics seminar at the University of Colorado Boulder: youtube.com/watch?v=9pKtzBQCZX0