Matej Jusup

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Highlights

Co-developed the first LLM that plays chess at the world champion level at Google DeepMind.
Gemini Chess Gem: goo.gle/ChessChamp.

Designed a scalable probabilistic decision-making model for safe real-time multi-agent fleet control.
Demonstrated coordination of 10,000+ autonomous vehicles with sub-second planning latency.

PhD with 5 years of industry experience, including a leadership position.
Proven ability to drive innovative research from conception to deployment with expertise in AI, ML and Data Science.

Silver medalist at the Croatian junior (under 20 years) chess championship.
On www.chess.com 99.999th percentile among over 100 million registered users.

Education

PhD in Artificial Intelligence — Zurich, Switzerland
ETH Zurich — *Sep 2020 – Oct 2025*

Key Contribution: Operating a fleet of tens of thousands of agents in real time while satisfying safety constraints.

Thesis: Safe and Scalable Ride-Sourcing Vehicle Rebalancing: A Constrained Mean-Field RL Approach

Supervisors: Prof. Francesco Corman and Prof. Andreas Krause

Research Area: Reinforcement Learning, Multi-Agent Systems, Sequential Decision Making, Data-Driven Algorithms

MSc in Mathematical Statistics — Zagreb, Croatia
University of Zagreb — *Oct 2013 – Feb 2017*

Supervisor: Prof. Marko Vrdoljak

Distinction: Graduated with honors.

Visiting Student — Bielefeld, Germany
University of Bielefeld — *Sep 2015 – Jul 2016*

Research Visit: Two semesters funded by Erasmus+ during which I wrote my MSc thesis.

Host: Prof. Andreas Dress

BSc in Mathematics — Zagreb, Croatia
University of Zagreb — *Oct 2010 – Jul 2013*

Work Experience

Student Researcher — Zurich, Switzerland
Google DeepMind — Gemini Post-Training Team — *Apr 2024 - Sep 2024*

Key Contribution: The first LLM that plays chess at the grandmaster level using human-comparable planning efficiency.

Hosts: Eric Malmi and Aliaksei Severyn

Publication: First co-author of a spotlight paper at ICML 2025 — https://arxiv.org/abs/2412.12119

Planning with LLMs: Enhanced LLMs with search-based planning techniques to improve multi-step reasoning.

Asynchronous MCTS: Introduced dynamic virtual counts to balance exploration–exploitation with few simulations.

Prompt Engineering: Assisted in designing board-game prompts and test-time internal search linearization.

Technology Stack: Python, Transformer Pre-Training, Supervised Fine-Tuning, Tree-Search Methods

Senior Machine Learning Researcher — Zagreb & Cambridge
Cantab Predictive Intelligence (tech startup) — *Mar 2019 - Jul 2020*

Key Contribution: Lead a team of four researchers on a few projects running in parallel.

Behavioral Credit Scoring: Gradient-boosting model for default risk, achieving a market-leading Gini of 75%.

AI-Driven Marketing: Boosted heart drug sales by 10% via data-driven A/B-tested campaign for pharma client.

Personalized Newsletter: Built a hybrid recommender (content-based + collaborative); 1.5% CTR in PoC.

Delivery Delay Estimation: Predicted COVID-era mall delays using ARIMA and supervised learning.

Technology Stack: Python, PyTorch, PySpark, Databricks, Statsmodels, AWS/Azure, Sklearn, Numpy, Pandas, Git

Machine Learning Researcher Budapest, Hungary
Morgan Stanley *Oct 2017 - Feb 2019*

Key Contribution: Built scalable models for risk, liquidity, and trade execution in financial systems.

Systemic Risk Model: Built a parallel hill climber heuristic, solving the problem in 3 minutes, averaging 5% from optimal.

Cash Traceability System: Developed a real-time uncollateralized debt tracker from daily data feeds.

E-Trading Limits Calibration: Tuned model to block high-risk trades via statistical analysis of client behavior.

Listed Derivatives Liquidity: Developed a PoC liquidation model driven by intraday futures data.

Technology Stack: Python, CPLEX, OR-Tools, Q/kdb+, PyQ, SQL, Pandas

Software Engineer New York, London & Budapest
Morgan Stanley *Aug 2016 - Sep 2017*

Annual Grad Program: Participated in a 15-week program for 50 globally selected students.

Margin Calculator Microservice: Implemented and unit-tested features for NYSE and HGK stock exchanges.

Technology Stack: Java, C++, Spring Beans, JUnit

Selected Publications

1. J. Schultz*, J. Adamek*, M. Jusup* et al. (2024), *Mastering Board Games by External and Internal Planning with Language Models*, ICML 2025 (* = equal contribution) — **spotlight**
2. M. Jusup et al. (2023), *Safe Model-Based Multi-Agent Mean-Field Reinforcement Learning*, AAMAS 2024 — **oral**
3. M. Jusup et al., *Scalable Ride-Sourcing Vehicle Rebalancing with Service Accessibility Guarantee: A Constrained Mean-Field Reinforcement Learning Approach*, arXiv preprint

Selected Talks

CroAI (invited) Zagreb, Croatia
Superhuman Planning with LLMs — click for description *June 2025*

ZurichNLP (invited) Zurich, Switzerland
Mastering Board Games with Language Models — click for slides *Feb 2025*

Google DeepMind Booth at NeurIPS (invited) Vancouver, Canada
Mastering Chess with Language Models *Dec 2024*

AAMAS 2024 (conference) Auckland, New Zealand
Safe Model-Based Multi-Agent Mean-Field Reinforcement Learning *May 2024*

ETH Zurich AI Center (invited) Zurich, Switzerland
A Vehicle Repositioning Using a Safe Mean-Field Reinforcement Learning *Sep 2023*

Programming Skills

Advanced: Python **Minor Experience:** TensorFlow · SQL · Java · C · R · Matlab

Work Experience: CLI · PyTorch · PySpark · Q/kdb+ · C++ **VCS & Cloud:** Git · Databricks · AWS · Azure

Core Packages: Numpy · Sklearn · Pandas · SciPy · Statsmodels · CPLEX · OR-Tools · PyQ · Matplotlib · Plotly

Languages

English: Professional working proficiency **Croatian:** Native speaker **German:** Basic