

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

ETH Zurich

Zurich, Switzerland

Sep 2020 – Now

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

University of Zagreb

Zagreb, Croatia

Oct 2013 – Feb 2017

SUPERVISOR: Prof. Marko Vrdoljak

DISTINCTION: Graduated with honors.

Visiting Student

University of Bielefeld

Bielefeld, Germany

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

University of Zagreb

Zagreb, Croatia

Oct 2010 – Jul 2013

WORK EXPERIENCE

Student Researcher

Google DeepMind — Gemini Post-Training Team

Zurich, Switzerland

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 Data Scientist

Cantab Predictive Intelligence (tech startup)

Zagreb & Cambridge

Mar 2019 – Jul 2020

Key Contribution: Led 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

Data Scientist
Morgan Stanley

Budapest, Hungary
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
Morgan Stanley

New York, London & Budapest
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 HKG 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)
Superhuman Planning with LLMs — click for description

Zagreb, Croatia
June 2025

ZurichNLP (invited)
Mastering Board Games with Language Models — click for slides

Zurich, Switzerland
Feb 2025

Google DeepMind Booth at NeurIPS (invited)
Mastering Chess with Language Models

Vancouver, Canada
Dec 2024

AAMAS 2024 (conference)
Safe Model-Based Multi-Agent Mean-Field Reinforcement Learning

Auckland, New Zealand
May 2024

ETH Zurich AI Center (invited)
A Vehicle Repositioning Using a Safe Mean-Field Reinforcement Learning

Zurich, Switzerland
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