

# Matej Jusup

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## DOCTORAL RESEARCHER

- **ETH Zurich, Institute for Transport Planning and Systems** Zurich, Switzerland  
*PhD* Sep 2020 – present  
THESIS TITLE: Safe Multi-Agent Reinforcement Learning with Applications in Real-Time Railway Rescheduling  
SUPERVISORS: Prof. Dr. Francesco Corman and Prof. Dr. Andreas Krause

## PUBLICATIONS

1. V. Tkachuk, S.A. Bakhtiari, J. Kirschner, M. Jusup, I. Bogunovic, C. Szepesvari (2023), Efficient Planning in Combinatorial Action Spaces with Applications to Cooperative Multi-Agent Reinforcement Learning, Artificial Intelligence and Statistics 2023
2. M. Jusup, J. Kirschner, T. Birchler, S. Curi, I. Bogunovic, A. Krause, F. Corman (2022), Real-time railway (re-) scheduling without human-expert knowledge, 22nd Swiss Transport Research Conference (STRC 2022)
3. M. Jusup, A. Trivella, F. Corman (2021), A review of real-time railway and metro rescheduling models using learning algorithms, In 30th International Joint Conference on Artificial Intelligence (IJCAI-21)

## TALKS AT CONFERENCES AND WORKSHOPS

- **Workshop on Stochastic Modelling and Monte Carlo Tree Search (invited)** TUM Munich, Germany  
*Neural-MCTS – A step towards train routing and scheduling without human expert knowledge?* October 2022
- **STRC 2022 – 22st Swiss Transport Research Conference** Monte Verità, Switzerland  
*Real-time railway (re-) scheduling without human-expert knowledge* May 2022
- **STRC 2021 – 21st Swiss Transport Research Conference** Monte Verità, Switzerland  
Sep 2021
- **IJCAI 2021 – RL for Intelligent Transportation Systems Workshop** Montreal, Canada  
*A Review of Real-time Railway and Metro Rescheduling Models using Learning Algorithms* Aug 2021
- **DevArena – software development conference (invited)** Zagreb, Croatia  
*Machine Learning - From Idea to Production* Oct 2019

## EDUCATION

- **University of Zagreb, Department of Mathematics** Zagreb, Croatia  
*MSc in Mathematical Statistics; graduated with honours* Oct 2013 – Feb 2017
- **University of Bielefeld** Bielefeld, Germany  
*Erasmus exchange student* Sep 2015 – Jul 2016
- **University of Zagreb, Department of Mathematics** Zagreb, Croatia  
*BSc in Mathematics* Oct 2010 – Jul 2013  
RELEVANT COURSES: Advanced probability | Mathematical statistics | Applied statistics | Stochastic processes | Markov chains | Time-series analysis | Numerical analysis | Operations research | Linear and convex optimization | Data structures and algorithms

## MASTER THESIS

- **Network Optimization in Railway Transport Planning**  
*Thesis link*  
SUPERVISORS: Prof. Dr. Sc. Marko Vrdoljak | Prof. Dr. Sc. Andreas Dress  
SUMMARY: In-depth theoretical discussion of the approaches for representing and solving railway timetabling problem for a single-line network

## EXPERIENCE

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- **Cantab Predictive Intelligence** Zagreb, Croatia  
*Senior Data Scientist - team leader* Mar 2019 - Jul 2020  
  
**Behavioural Credit Scoring:** Developing the model for assessing consumer's default risk  
**ML-Driven Marketing Plan:** Increased sales and patient share of a newly launched hearth disease drug for one of the leading pharmaceutical companies  
**E-Commerce Recommender System:** Recommending products to potential as well as active shoppers  
**Delivery Delay Estimation:** Estimating delivery delays for shopping malls during COVID-19 pandemic  
**Personalized Newsletter Recommender System:** Developed for a private equity fund
- **Morgan Stanley** Budapest, Hungary  
*Data Scientist* Oct 2017 - Mar 2019  
  
**Systemic Risk Model Execution Efficiency:** Improved the execution time of a mixed-integer convex programming model used for better understanding of the risk structure  
**E-Trading Execution Limits Calibration:** Examined e-trading clients and calibrated a model which blocks real-time executions in case of a high risk  
**Treasury Department Cash Traceability:** Built uncollateralized debt tracking system  
**Listed Derivatives Liquidity:** Created proof of concept for data-driven liquidation model based on intraday futures trading  
  
*Software Developer* Budapest, Hungary  
Dec 2016 - Oct 2017  
  
*Technology Analyst Program* New York & London  
Aug 2016 - Dec 2016
- **University of Zagreb, Department of Mathematics** Zagreb, Croatia  
*Junior Teaching Assistant - Euclidean Spaces* Oct 2013 - Mar 2014

## PROGRAMMING SKILLS

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**Advanced:** Python **Basic:** Java | JavaScript | C | R | Matlab  
**Intermediate:** PySpark | Q/kdb+ | C++ **VCS & Other:** AWS | MS Azure | Git | SQL

## LANGUAGES

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

## INTERESTS AND AWARDS

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**Chess:** Silver medalist at individual Croatian junior (under 20 years) championship in 2011  
Current ELO rating around 2250