Konstantin Sidorov

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Profile

I am an AI professional with 4 years of industrial experience and a track record of rapid learning across various domains and technologies. I have completed a Bachelor's in Software Engineering with distinction, after which I completed an MSc in Mathematics with distinction at the Moscow Institute of Physics and Technology. Currently, I am making a career change toward AI research at a PhD program with TU Delft.

Work experience

TU Delft, Delft, Netherlands – *PhD candidate*

January 2023 — present

Working on a project on explainable combinatorial optimization under the supervision of Dr. Emir Demirović, Prof.Dr. Mathijs de Weerdt, and Dr.ir. Gonçalo Correia.

X5 Group, Moscow, Russia – *Senior Data Scientist*

November 2021 — December 2022

Participated in the development of the analytics platform for the transport division of X5 Group, the largest Russian retailer. Key highlights:

- Refactored the report generation engine, which eliminated multiple inconsistencies in the resulting reports and improved the loading time by an order of magnitude. The updated engine also resulted in a simpler source code, which allowed the development team to expedite the shipment of the new features.
- Designed a probabilistic model of the relation between the vehicle repairs and their mileages. This model laid the foundation for the demo widget displaying the planned repair budget.
- Developed a statistical model for vehicle fuel usage during its trip and prototyped a widget for detecting abnormal behavior of vehicles and their drivers/
- Improved the loading speed of the dashboard by 15 times
- Halved the application data pipeline runtime while correcting multiple data consistency errors

Adeptik Plus OOO, Astrakhan, Russia – *Algorithmic Software Engineer*

July 2018 — November 2021

Designed algorithms for applied combinatorial optimization in various domains, including last-mile logistics and production planning. Most notable accomplishments in this position:

- Automated the dispatching of field employees for ICL Services, which helped to reduce the time to reaction by 4 times and push the SLA compliance rate to 99.5%
- Developed a system for scheduling deliveries for a local bakery, halving their vehicle maintenance costs

Education

Moscow Institute of Physics and Technology – *MSc in Mathematics*

September 2020 — July 2022, GPA 4.81 / 5.00, with distinction

Completed a research-based Master's program "Modern Combinatorics".

Thesis: "On the distribution of degrees of random hypergraphs under structural constraints" (supervisor: Maksim Zhukovskii):

- Derived an asymptotic approximation for the number of hypergraphs satisfying given local and structural constraints
- Proved a local limit theorem for the vector of degrees of a random hypergraph
- (WIP) Preparing the paper "The sandwich conjecture for r-uniform d-regular hypergraphs is true if $d = \omega(r^4n^2\log^6 n)$" which uses these results to show that random factors in large hypergraphs can be approximated by a binomial model.

Astrakhan State University – *Bachelor in Software Engineering*

September 2016 — July 2020, GPA 4.95 / 5.00, with distinction

Thesis: "Information & analytical system of supply chain optimization for logistics of petroleum products" (supervisor: Denis Zholobov):

- Solved a case study from a large Russian oil company: how to make a mid-term plan for moving the oil products from oil refineries to gas stations maximizing revenue, while balancing limited resources and warehouse policies?
- Designed an efficient linear programming model for this supply chain, which provided the optimal delivery schedule and the sensitivity information for the storage facilities
- Implemented a web application for running the optimization model on the data from ERP with Google OR-Tools and generating reports/graphs from the constructed solution

Aside from the thesis, another highlight project of my Bachelor's is a reverse image search engine for the university's news office. It allowed users to find news stories related to a person by sending their picture to the Telegram bot.

Yandex School of Data Analysis, Moscow – *Big Data track*

September 2017 — June 2019, GPA 4.92 / 5.00

Completed a two-year data analysis program by Yandex, the largest Russian tech company. This program included both theory-focused coursework (e.g., "Convex Optimization", "Applied Statistics in Machine Learning" or "Bayesian Methods in Machine Learning") and courses heavily relying on programming toolkits ("Advanced Deep Learning" or "Big Data Machine Learning").

Conferences & presentations

EURO 2021 (31st European Conference on Operational Research)

July 2021

- Gave a talk "Selecting algorithm portfolio for mixed-integer programming without problem instance information"
- Described an efficient way to select a pool of well-performing SCIP configurations for an instance of a mixed-integer linear programming problem

- The selection mechanism was an RNN ranking model, which used the logs of the first few iterations (i.e., presolver & cut statistics) of the default SCIP solver as its input – in particular, it did not use any problem features in the inputs

Miscellaneous projects

Google Summer of Code

Participated in two editions of Google Summer of Code, a student program focused on open-source development:

- In GSoC '17 I worked on implementing augmented RNNs in mlpack, a C++ machine learning library. As a result, I authored two merged PRs (one, two) with useful infrastructure for training neural models (obviously, with a focus on RNNs).
- GSoC '21 provided me with an opportunity to work on the codebase of LLVM. During the project, I implemented a module for evaluating and adding IR parameters in the compiled kernel (GPU execution unit). This, in particular, is helpful for designing ML models for automatic selection of runtime parameters (e.g., grid size).

Battle of Bots

Participated in two board game AI competitions hosted by HackerEarth:

- September 2015, Battle Of Bots #1 was a competition of Isola engines. My engine finished 4th out of 301 (Top 2%) and involved alpha-beta pruning with transposition table and null-move heuristic.
- January 2016, IndiaHacks: Bot Challenge was a competition of Game of Amazons engines. My engine finished 15th out of 173 (Top 10%) and implemented an alpha-beta search with a neural network as a static evaluation function. The neural network used the (slightly) preprocessed board state as input features and tuned its values from self-play.

Language skills

I am a native Russian and a fluent English speaker (IELTS 8.0 / 9.0).