Alexander V. Belikov

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EDUCATION

Ph.D. in Physics, University of Chicago, IL, 2011
M.S. in Applied Mathematics and Physics (summa cum laude),
Moscow Institute of Physics and Technology, Russia, 2005
B.S. in Applied Mathematics and Physics (summa cum laude),
Moscow Institute of Physics and Technology, Russia, 2003

EXPERIENCE

Head of Data Science Nov. 2019 - present
Hello Watt, Paris, France

- Establishing partnership between product, operational and dev teams to organize dataflows to address data-centric and modeling needs.
- Creating and supporting business intelligence processes.
- Providing technical mentorship to data scientists and guiding technical thinking.
- Leading development of novel machine learning models, supervised and unsupervised (primarily for energy disaggregation).
- Knowledge dissemination: publications in academic journals, blogs.

Postdoctoral fellow Jan. 2016 - Oct. 2019
University of Chicago, Knowledge Lab

- Model of agent evolution on a graph using Seq2Seq methods (LSTM, pytorch), that predicts the state of the graph, the evolution of individual agents and can be used to identify clusters of agents and events.
- Developed a model of the validity of claims in biological literature (with its AUCs up to 0.8), and subsequently a model for prediction of the gene-gene interaction sign up to AUC of 0.76. Defined novel network features.

Quantitative researcher Aug. 2015 - Jan. 2016
Barclays Capital, Equity Derivatives Group, New York

- Introduced an effective method for estimating portfolio sensitivities between trading days that accounts for the change of the volatility surface (C++, deployed in production).
- Implemented new types of contracts: options on volatility control indexes.

Quantitative researcher Jun. 2014 - Aug. 2015
JP Morgan Chase, Model Review and Development, New York

- Developed models of mortgage defaults using regularized logistic regression and decision trees (python, scikit-learn).
- Implemented the rating migration model (loan default estimation) used for the Comprehensive Capital Analysis and Review (CCAR) of the wholesale portfolio (python, deployed in production).

Postdoctoral researcher Oct. 2011 - Nov. 2013
Institut d'Astrophysique de Paris

- Predicted the cosmological annihilating signal for a contracted (due to supermassive black holes) dark matter density. Demonstrated that the spectral properties of the annihilation signal can be used to differentiate dark matter from astrophysical signals.

PhD candidate/Research Assistant Oct. 2005 - Sept. 2011
University of Chicago

- Discovered the connection between the winding angle of random curves appearing in the scaling limit of critical two-dimensional systems and the properties of local operators of conformal field theory.
- Predicted the diffuse gamma-ray background from annihilating leptohilic dark matter and estimated the impact of annihilating dark matter during the reonization epoch (developed a C++ library for estimating cosmological dark matter signals).
- Found semi-analytical solutions for a non-linear PDE in the DGP modified gravity theory.

SIDE PROJECTS

- Created a state-of-the-art model of career transitions (state space with partial order) using MPNN ideas.
- Developed a novel technique for additive mixture modeling (signal/background separation) based on bayesian neural networks.
- Developed a framework for signal extraction from market analyst reports using network measures.
- Developed an academic knowledge graph tool, based on ad hoc relation extraction and language-model inspired entity linking.
- Developed a python package that manages the logic of data (tables, json-like) transformation and loading into graph databases (ArangoDB, Neo4j).

RELEVANT SKILLS

Linear models, graphical models, decision trees, ensemble methods, random forest, SVM, regularization, optimal transport.
RNN, LSTM, GNN, MPNN.
Python (pandas, scikit-learn, pytorch, spacy, pymc3, networkx, igraph, pyro, nltk), C++, R, Spark, Haskell, Java. SQL, mongoDB, SPARQL, ArangoDB, neo4j.
Git, bash.

PUBLIC SPEAKING

More than 30 presentations at conferences and seminars.
Organizer of journal clubs at the Institute of Astrophysics in Paris, Knowledge Lab at the University of Chicago, Hello Watt.

PROFESSIONAL INTERESTS

Natural language processing: NER, relation extraction, embedding, summarization. Graph neural networks, message passing, variational methods. Knowledge graphs.

LANGUAGES

English, Russian (native), French (fluent), Italian (beginner)

PUBLICATIONS

A co-author of more than 20 publications in refereed journals, including a piece in Nature Machine Intelligence titled “Prediction of robust scientific facts from literature”. 700+ citations as of 2022.