Vladimir Khismatullin

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Education

Duke University **Aug 2023 – May 2025**
Masters of Science in Economics and Computation; ***GPA: 3.9/4.0*** *Durham, NC*

Lomonosov Moscow State University **Sep 2019 – Jun 2023**
B.S. in Applied Mathematics and Computer Science; Graduated with Honors; ***GPA: 4.9/5.0*** *Moscow, Russia*

Work Experience

Leveraging LLMs to Identify Herd-Like Behavior in Social Media **Jan 2024 – Present**
Research Assistant *Duke Fuqua School of Business*

- Fine-tuned an LLM using multiple datasets and pre-trained models from Hugging Face, achieving a four-fold increase in classification stability, resulting in 97% classification stability and 92% topic accuracy.
- Designed a data pipeline to scrape several news platforms, integrating the data into a large language model to improve the understanding of 44 distinct topics and classify three types of binary signals.
- Implemented temporal topic models that predicted herd behavior one week in advance with 82% accuracy. Employed Granger causality tests to investigate dependencies between the topics and types of signals.

Interpretable Latent Representations for Multivariate Time Series **Sep 2022 – May 2023**
Research Assistant *Lomonosov Moscow State University, Russia*

- Proposed a considerable improvement to several augmentation algorithms by assuming dependencies within projections, resulting in an average 3% improvement in classification accuracy for algorithms trained on transformed data.
- Researched state-of-the-art autoencoder architectures for time series, neural network disentanglement paradigms and interpretability estimation frameworks. Combined them to introduce interpretable latent time series representations.
- Designed a novel autoencoder architecture, improving reconstruction quality by 12% over baseline models.
- Applied the proposed models using PyTorch to generate representative samples of financial and human activity time series. Implemented statistical methods for interpretability evaluation, quantifying relative capabilities of the models.

Projects

Multi-Asset IV Surface Estimation **Feb 2025 – Apr 2025**

- Built an encoder-based architecture to efficiently derive implied volatility for millions of values at a time. Used a conditional encoder-learning approach to estimate multi-asset implied volatility surface for 20 liquid option chains.
- Improved robustness by adding bid-ask proportional jittering to the option price series, addressing missing data.
- Processed 500GB worth of proprietary minute-level option quotes data using PySpark. Achieved a Sharpe of 1.6 using mean reversion to the historical correlation.

Biased-Belief Equilibrium in Finite Dynamic Games with Stochastic Private States **Dec 2024 – Feb 2025**

- Adopted the biased-belief framework developed for non-stochastic games to stochastic games with private information, inspired by the game of Texas No-limit Hold'em.
- Proved the existence of perfect Bayesian equilibrium under the linearity of perceived state condition, deriving a closed-form analytical solution in pure strategies along the way.
- Accelerated numerical simulations by rewriting the model code for GPU using Cupy, effortlessly reducing the average computation time four-fold. Numerical simulations uncovered a fractal-like structure in player strategies.

Leadership

Assistant in Several Machine Learning Courses | *Python, NumPy, Git, C, Bash* **Sep 2022 – May 2023**

- Designed Python and NumPy coding competitions with automated testing using Bash scripts and cloud computing.
- Developed and presented a series of lectures on Bayesian modeling, matrix differentiation, NLP and DL for sequences.
- Presented several papers on Deep Learning models for time series generation, signal detection and temporal data.

Technical Skills

Programming Languages: Python, C, C++, SQL
Data Analysis Tools: Pytorch, Hugging Face, NumPy, Cupy, Polars, PySpark, Pandas, Scipy, Scikit-learn
Other Tools: PostgreSQL, Hadoop, Git, Bash, Microsoft Excel