Resume of Dimitar Gueorguiev, PhD

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Github: https://github.com/dimitarpg13/personal/

Professional Summary

Dimitar Gueorguiev is an Engineer / Data Scientist with over 18 years of experience in algorithm design and mathematical modeling, software development with object-oriented design, including multi-process and multi-threaded application design, numerical methods, performance analysis and testing. He has in-depth experience in parallel processing of large datasets, numerical algorithms.

- Object oriented design
- Python, C++ v11, v14, Boost, STL
- Multi-process, multi-threaded application design
- Windows, Linux, MacOS, Unix (Solaris, HP-UX, Dell Unix, AIX), Yellow Dog Linux for PS3, FreeBSD
- Performance analysis and tuning
- Version control and continuous integration (git, github, bitbucket, svn, cvs)
- Numerical Methods, Simulation & Modeling
- Relational Databases and key-value stores (PostgreSQL, Redis, RocksDB, SQLite3)
- Compilers: clang, MSVC, gcc

Education

Ph.D., Aerospace & Mechanical Engineering, Boston University, 2001, Best Student Paper Award at the 136th meeting of Acoustical Society of America; John J. and Helen Carey Fitzgerald Award for outstanding research in the Department of Aerospace and Mechanical Engineering, College of Engineering, Boston University, 1999
B.S. Applied Mathematics and Informatics, Technical University of Sofia, 1995
M.S., Mechanical Engineering, Technical University of Sofia, 1994

Professional Experience

Nike, Boston, MA
Lead Machine Learning Engineer *Project: Generative AI/Image Processing* *June 2024-present*
Researches various Semantic Segmentation and Diffusion algorithms and models for Image Processing tasks relevant to the goals of GenAI group.

Lead Data Scientist *Project: Fulfillment Optimization* *September 2019 – May 2024*
Since January 2020 performed complete refactoring and worked on introducing new objectives and features of the adversarial reinforcement learning algorithm for fulfillment optimization. For the purpose used various optimization techniques, reformulated the algorithm as Mixed Integer Problem by linearization of the original objective function which introduced multi-fold speedup of the core algorithm. The algorithm is executed in AWS EKS service for product fulfillment at Nike and serves for fulfilling Nike Digital orders throughout North America. Worked on introducing new ML Demand prediction service into the Fulfillment Optimization AWS solution and incorporated its predictions into the Fulfillment optimization engine. Integrated external REST API services with the Fulfillment Optimization Engine thereby providing live inputs and asynchronously via lambda functions to the core algorithms of the engine. Worked on enhancing the *Celect* Machine Learning pipelines with new features such as metadata logging service to database and entity creation parser. Researched various algorithms for optimal inventory placement and simulation framework for predicting peak inventory positions. Participated in the Fulfillment algorithm redesign using ε-constraint method which replaced the weighted objectives method for scalarization. Looked into various reinforcement learning Policy Gradient algorithms such as PPO, applying those to Deployment Optimization and Fulfillment Optimization problems. For the purpose used the `gymnasium`

environment and `stable-baselines3` library. Researched various algorithms for Root Cause Analysis using Bayesian inference and Probabilistic Temporal Logic.
Technology: Python, pandas, numpy, networkx, pyspark/graphx, scikit-learn, or-tools, gurobi, coin-or/cbc, AWS EKS, AWS Lambda, Postgres, Redis

Celect Inc (acquired by Nike), Boston, MA
Senior Data Science Engineer, February 2019 – August 2019
Project: Demand Forecaster
From February 2019 worked on the development of a new frequency domain forecaster which predicts future trends and seasonal/cyclical events in datasets from retail/fashion industry. For the purpose have developed a super-resolution algorithm which poses the problem as a convex optimization problem in frequency domain and solves it using FFT relaxation technique.
Technology: Linux, MacOS, C++ v11, or-tools, Python, scikit-learn, numpy, pandas

Qlik Tech, Newton, MA October 2015 – January 2019
Senior Software Engineer
Project: Qlik Big Data Index
From June 2017 until 2019 worked on productizing the Qlik Big Data Index (*BDI*) engine which already passed the prototyping phase. Worked on the indexing algorithms and moving of column indexlets within the *BDI* engine and preparing them for consumption by the BDI Query Executor. The *BDI* engine reads the symbols from the data sources in Parquet format and stores the compressed symbols using *FarmHash* and *Roaring* compression in *RocksDB* instance configured in a cluster environment. The *BDI* engine is a proprietary distributed in-memory column store, running in Linux cluster which augments the standard Qlik Engine in processing very large Qlik applications in AWS Cloud settings and on premise.

Project: Qlik Centralized Logging Service
From November 2015 to May 2017 worked on Centralized Logging service storing metrics from the Qlik Engine and other services into a Postgres DB instance. For the purpose employed Log4Net library executing in multithreaded and multi-process environment using .NET thread pools.
Also worked on defining Qlik Engine performance metrics and exporting them from the *Qlik Engine* to the *Qlik Repository service*. For the purpose, instrumented the *Qlik Engine* scheduler to measure with configurable degree of accuracy the time *Qix Requests* spend executing on a thread, waiting in a wait queue, and waiting on monitors.
Technology: Linux, MacOS, Windows; C++ v14, C++ v11, C#, JavaScript, Perl, Python

EMC Corp, Hopkinton, MA February 2001 – October 2015
Principal Software Engineer

Project: Workload Planner
From June 2013 to October 2015 participated in the design and implementation of *WorkloadPlanner*. *WorkloadPlanner* is a simulation module integrated in the *Unisphere for VMAX* software product. *WorkloadPlanner* simulates the performance of the target array by calculating its component utilizations and back-end response times. Designed the component simulation models of CPUs / physical and logical cores, Infiniband Fabric, I/O boards, disks and I/O ports which developed and validated in Java. *WorkloadPlanner* FAST model is a constrained optimization solver written in Java, used to decide if the incoming workload can be accommodated on the existing target array pools with respect to performance and capacity without violating the storage group *SLO*s and the storage pool *SLE* response times and is used in order to estimate the available headroom on the storage array back end.

Project: Tier Advisor

From July 2009 to May 2013 participated in the research & development of *TierAdvisor*. *TierAdvisor* was a multi-threaded, object-oriented, software application, written in C# and C++, which simulated the performance impact of Fully Automated Storage Tiering (*FAST*) on a generic EMC storage system in terms of disk utilization, response time as well as relative price. Researched various analytical techniques such as the *Wavelet Transform Modulus Maxima* and *Histogram Method* as means of obtaining approximation for sub-LUN skew for various workload mixtures. Worked on the next gen of *TierAdvisor* compute engine which was *SQLite* extension module simulating the work of the *FAST* subsystem residing entirely inside *SQLite* database.

Project: SymmMerge
From January 2003 to August 2009 participated in the design, implementation, maintenance and support of *SymmMerge*. *SymmMerge* was multithreaded performance simulation tool with object-oriented design, written in C++ and later rewritten in C#. *SymmMerge* estimates the performance of EMC *Symmetrix* storage array based on supplied configuration information and workload trace data using queueing network utilization model.
Technology: *Windows, Unix, Linux: C++98, C, C#, Java, Matlab*

Dept. of Aerospace and Mechanical Engineering, Boston University, Boston, MA
September 1998 – January 2001
Graduate Research Assistant
Developed high frequency FEM model for the vibrations of MEMS resonator with high Q factor, using 2D solid elements. The studied resonators had single- and double-periodic structures which create regions with localized energy in certain frequency ranges thereby yielding high Q factor. The 2D mesh of finite elements was determined by using the quarter wavelength rule. Using these FEM models there were developed a series of realistic designs with various lengths and different geometries and were manufactured using the existing MUMPs technology at Boston University.

Publications
Analysis of Floquet wave generation and propagation in a plate with multiple arrays of line attachments, Dimitar Gueorguiev, James G. McDaniel, Pierre DuPont, and Leopold Felsen, Journal of Sound and Vibration, 234(5),819-840
Simplified dispersion relations for Floquet waves in a plate with multiple arrays of attachments, Dimitar Gueorguiev, James G. McDaniel, Pierre DuPont, 1999 ASME Design Engineering Technical Conferences September 12-15, Las Vegas, Nevada