

Guy Baruch, PHD

Data Science and Engineering Freelance/Consultant

Netanya, Israel, Phone 0545-916100, Mail: guy.baruch@icloud.com,

Skills and interests

Applied Mathematics, Machine Learning (large & small data), Data Mining, **Recommender Systems**, big-data engineering, **Tensor Factorization**, Predictive Analytics, AdTech, MedTech, MarketTech, Mortgages, Numerics, PDEs, Physics, High Performance Computing, CUDA, Constraint Solving.

ML, platforms and SW skills:

- **Supervised learning:** XGBoost/GBDT, Random Forest, GLM, SVM, **Collaborative Filtering**. Deep Learning.
- **Unsupervised learning:** PCA, LDA, GMM/kmeans, HMM, LSTM, **Matrix and Tensor Factorization**, NLP, Deep Learning: Autoencoders, RNNs, CNNs, seq2seq. TensorFlow/Keras or PyTorch.
- **Anomaly Detection:** Isolation Forest.
- **Big data platforms:** AWS, Azure, GCP. NoSQL DBs (Bigtable/HBase, MongoDB), Athena. Spark-ml.
- **Small data platforms:** SkLearn. Weka. Some R. MySQL. Matlab.
- Apache toolset: **Hadoop/mapreduce, Spark(Py+Scala)**, Pig, Hive, Vowpal Wabbit, ...
- **GPGPU, CUDA**, high-performance computing. Vanilla CUDA and thrust.
- Languages: **Python, Java, Scala, C++**, UNIX toolkit.

Industry Experience

18-current: **Data Science & Engineering Freelance/Consultant**. Services include problem formulation, exploratory and predictive analytics, evaluation and up to working production pipeline.

- **Mortgage** default rates and loan portfolio evaluation.
- **MarTech** (email optimization, CTR, CVR, market health, etc.).
- **E-commerce:** Costumer conversion rate(s), operational optimization, system design.

15-17: **Sr. Data Scientist**, Startup. Sole owner of data science in a predictive medicine startup. **Owner & Authority of all predictive-analytics stages**, from exploratory work through feature extraction, training and evaluation to deployment and integration with other subsystems. **Suggested and incorporated new algorithms with significant improvements 3 weeks after joining the firm.**

15-15: **Founder**, Virtual Drimia. Key idea was to reuse methods from an old industry (HW verification) to a new one (data engineering).

13-15: **Researcher**, Yahoo Labs.

- **Science: Found novel scalable tensor-completion model** for three-way Collaborative Filtering in between the PARAFAC and the Tucker models. The key assumption is that latent factors of three-way relations are non-commuting, an **intuition from quark physics**. The model scales like PARAFAC but outperforms it statistically. Published Preprint.

- **Engineering/Data Science:** work on native ads Click Through Rate (CTR) prediction. **Initiated, designed and implemented a large-scale predictor** which selects the most frequent and significant User-Ad-Placement feature combinations, resulting in a **reduction of 10^5** in the number of selected feature combinations, while still improving metrics.

12-13: **Data Scientist**, AdiMap. Built CTR prediction and ads optimization.

11-12: Software Engineer, Google. targeting discovery and optimization for AdSense advertisers.

- Produced quality (relevance) improvements through click-through rate calibration.
 - Drove all stages from proposal to production-changes launch.
- **Novel exploration goal and mining procedure** to increase advertiser ROI.

97-00: Algorithmic and coding work for Verisity (now Cadence), at the area of constraint-solving.

- **Significant savings** in verification engineers (users) time:
 - **Invented prototyped and developed** new generation-order debugger - removing major user bottleneck.
 - Initiated a **key selling point** of a major release - a full-fledged generation debugger.
- Owned and developed generation static-analysis to achieve runtime performance gains.

Education and postdoctoral research

10-11: **CalTech Postdoc**. Calculated sonar & radar scattering from industrial geometric shapes. Improved high-order surface representation for integral equation solution.

05-10: **PhD in applied Mathematics**, Tel-Aviv University. Advisor: Prof. Gadi Fibich.

- For the first time ever, discovered new solutions of the nonlinear Helmholtz equation (showing existence). Novel modeling of nonparaxial optical phenomena.
- Published 9 papers in leading numerical, physical and analytical journals such as SIAM J. Appl. Math., J. of Comp. Phys, Physica D and Nonlinearity.
- Best student paper award, Nonlinear Waves, Beijing 2008.

01-04: **MSc in Physics**, Weizmann Institute of Science.

95-98: BSc in Mathematics and Computer-Science (cum laude), Tel-Aviv University.

94-95: Mathematics and Computer-Science studies in the Open University.

Patents

- V. Lagoon, G. Baruch, "*A METHOD FOR PROVIDING BITWISE CONSTRAINTS FOR TEST GENERATION*", USPTO Patent #6,918,076.
- E. Benoudiz, G. Baruch, "*SYSTEM AND METHOD FOR VISUAL DEBUGGING OF CONSTRAINT SYSTEMS*", USPTO Patent #7,281,241.

Teaching/Leadership experience

05-09: **Graduate teaching assistant**, Tel Aviv University: Calculus and Numerical Analysis to many audiences (biology, management, engineering, physics and math).

Honors and Awards

08: Best student-paper, “Nonlinear Waves – Theory and Application” conference, Beijing, 2008.

07/08 + 08/09: Rector’s Award for academic excellence in PhD studies, Tel-Aviv University.

07/08: Shimshon Bass award for academic excellence in PhD studies, Tel-Aviv University.

06/07: Dean’s Award for academic excellence in PhD studies, Tel-Aviv University.

98: BSc with honors (cum laude), Tel-Aviv University.

94/95: Excellence scholarship (Math&CS), the Open University, during combat military service.