DAVID KARAPETYAN

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SUMMARY

Machine learning scientist and applied mathematician with two years industry experience in algorithms, machine learning, and model validation. Full-stack experience designing a time series forecasting and analytics engine from scratch using Python and C++. One year managerial experience overseeing a team of three machine learning engineers.

EDUCATION

University of Notre Dame   **2007–2012**
- **Ph.D**, Mathematics. 3.97 GPA   Notre Dame, IN
- Thesis: *Non-uniform dependence and well-posedness for the hyperelastic rod equation*
- Awarded the **Schmitt Fellowship**. Full scholarship.

University of California, Berkeley   **2000–2004**
- **B.S.**, Mathematics and **B.A.**, English Literature.   Berkeley, CA
- Awarded the **Regents Scholarship**. Full scholarship.

EXPERIENCE

Fellow   **Sep 2016–Feb 2017**
Insight Data Science   New York, NY

- Implemented an application that takes data from a client, Good Shepherd, and extracts the most important features driving matriculation into their LifeLink college access and success program.
- Extracted features via recursive feature elimination using a series of Random Forests cross-validated by ROC-AUC score.
- Built interactive visual analytics for the client to help identify the types of students that stay in the program, and who go on to stay in college, after the critical features have been identified.
- Predicted probablity that new students would go on to graduate, given data on the student's background, and identified primary factors of success and failure for each individual student. Models used were **lasso regression**, **random forests**, and **logistic regression**, with confidence intervals constructed either via bootstrapping or tests using **statsmodels**.
- App deployed via Heroku, with code utilizing Flask, Bokeh, and Twitter Bootstrap.

Head Machine Learning Engineer   **June 2015–Sep 2016**
Rudin Management   New York, NY

- Designed and implemented a **machine learning forecasting and analytics engine** for Rudin Management's non-commercial buildings.
- Improved upon the startup and rampdown classification accuracy of the previous existing model, as well as the regression predictions of electricity usage, water usage, steam usage, and occupancy by reducing the mean generalization errors and variance of the errors.
- Implemented using **parallel programming in Python** with an emphasis on **functional programming**, in order to process and predict states for many buildings at once.
- Set **Pandas** Dataframes as the central data-structure of the suite (almost all functions return a dataframe). Generated using queries to local **SQL**, **MongoDB** databases, and **HDF5** files.
- Applied **Scikit-learn** in order to build an ensemble model, where cross-validated scores between different model predictions was used to prune models from the ensemble over time. Experience with **Random Forests**, **Gradient Boosted Trees**, **Regression**, **SARIMAX**, and **SVM**.
- Results include less heat being used in the winter, and cooling in summer, amounting to roughly $2,000,000 - $3,000,000 in savings, per building, for Rudin.

Quantitative Analyst   **June 2014–June 2015**
Ernst & Young   New York, NY

- Developed Class Model forecasting module in **R**. Used **ARIMA regression on macroeconomic scenarios** (base, adverse, or severely adverse) and position data to forecast and plot any input banks PPNR, Provision, Capital and other variables with respect to time.
- Provided valuation and advanced financial modeling expertise to institutional clients in regards to complex securities including equity and foreign exchange options, rates swaptions, and related embedded derivative instruments.

- Analyzed **Monte Carlo and Finite Difference models** to determine fair value of client instruments for accounting purposes.
- Designed and performed **stress-tests** for investment bank clients pricing models for **CCAR** purposes. Evaluated the impact on **PV and option Greeks** of clients portfolio of equity and foreign exchange exotic instruments under adverse and severely adverse market scenarios.
- Provided data analysis of trade desk definitions and descriptions, and reported anomalies to client. Trades included **forex USD and G10 pairs, G10 and emerging market pairs, trades with long and short expiry, Asian options, barriers**, and a variety of others.

Visiting Assistant Professor   **July 2012–June 2014**
University of Rochester   Rochester, NY

- Researcher of partial differential equations, with an emphasis on nonlinear evolution equations.
- Taught courses on Numerical Analysis, Linear Algebra, Differential Equations, and Financial Mathematics.
- Developed **numerical simulations in C++** to gain intuition about whether certain equations are well-posed or ill-posed for rough initial data.
- Publications list with doctoral thesis available upon request.

Research Associate   **May 2006–May 2007**
Battelle   Arlington, VA

- Conducted research for Pentagon sponsored projects in biowarfare.
- Specifically, researched the analytic hierarcy process and used it to devise a **classification** system that ranked biochemicals by overall tactical effectiveness, given data on their features.

Research Associate   **Aug 2004–Aug 2005**
Institute for Defense Analyses   Alexandria, VA

- Conducted research for Pentagon sponsored and privately sponsored projects.
- Applied k-**Nearest Neighbor regression** and **logistic regression** to analyze existing data on high occupancy toll lanes in the Los Angeles, San Diego, and Chicago metro areas.

TECHNICAL SKILLS

- Python (full SciPy stack, Flask), R, C/C++, SQL, LaTeX, Git, MongoDB, HDF5, Debian/Ubuntu, FreeBSD

AWARDS AND EXTRAS

- Chess Expert chessdryad.com/articles/mi/article_165.htm
- Music composition https://soundcloud.com/davidkarapetyan
- Awarded the **Regents Scholarship**. Full scholarship at UC Berkeley.
- Awarded the **Schmitt Fellowship**. Full scholarship at Notre Dame.
- Finalist for Shaheen award for top graduate student at Notre Dame.