# DAVID KARAPETYAN

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## EXPERIENCE

**Head Data Scientist** — Prescriptive Data, New York City, NY — **June 2015–Present**

• Leading team that is designing and implementing a **machine learning forecasting and analytics engine** for energy usage in commercial and non-commercial buildings for Rudin Management, a leading real estate developer in NYC.
• Using weather and other proprietary covariates, engine forecasts: optimal building start-up-time, ramp-down-time, daily building steam usage, daily electricity usage, occupancy, and others.
• Greatly improved upon building predictions made by a team of Columbia University Ph.D and masters degree statisticians (a three year project that was ultimately rejected) based upon a number of different metrics, including: classification cross-validation accuracy, random forest out-of-bag scores, mean and variance of residuals, max/min residuals, and others.
• Using weather and other proprietary covariates, engine forecasts: optimal building start-up-time, ramp-down-time, daily building steam usage, daily electricity usage, and occupancy.
• Implementation uses **parallel programming in Python**, with modules including **scikit-learn, pandas, matplotlib, statsmodels** and **numpy**. Data is stored in and read from **SQL**, **MongoDB**, and **HDF5** dataframes.
• Models used for the forecasting include **Random Forests**, **Gradient Boosted Trees**, **ARIMA(X)**, **SARIMA(X)**, and **SVM**.

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

• 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.
• Provide 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 severely adverse market scenarios.
• Provide data analysis of trade desk definitions and descriptions, and report 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** — University of Rochester, Rochester, NY — **July 2012–July 2014**

• Researcher of partial differential equations, in particular nonlinear evolution equations.
• Publications list with doctoral thesis at http://davidkarapetyan.com/pdfs/publications.pdf
• Developed **numerical simulations in C++** to gain intuition about whether certain equations are well-posed or ill-posed for rough initial data.
• Code included Doolittle factorizations and **finite difference schemes with spline interpolation**.
• Taught courses on Numerical Analysis, Calculus, Topology, Applied Mathematics, Linear Algebra, Differential Equations, and Financial Mathematics.

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

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

## EDUCATION

**University of Notre Dame**
• **Ph.D**, Mathematics **Aug 2007–May 2012**
Thesis: *On the well-posedness of the hyperelastic rod equation*
• Awarded the **Schmitt Presidential Fellowship**. Full scholarship.

**University of California, Berkeley**
• **B.S.**, Mathematics and **B.A.**, English Literature. **Aug 2000–May 2004**
• Awarded the **Regents Scholarship**. Full scholarship.
• Nominee for ND Shaheen Graduate School Award for top student.

## TECHNICAL SKILLS

• Languages: Python (full SciPy stack, Flask), Scala, R, C/C++, HTML5, Bash, LaTeX.
• Operating Systems: Unix (Debian/Ubuntu, FreeBSD, OS X) , Windows (XP, Vista, 7)

## HONORS, AWARDS, AND EXTRACURRICULAR ACTIVITIES

• Chess Expert `http://www.chessdryad.com/articles/mi/article_165.htm`