

Krishnakumar Mayuram Ravikumar

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(Permanent Resident (Green Card) - Visa sponsorship NOT required)

Computational scientist with experience in multi-dimensional data handling, modeling, simulation, visualization, and software implementation, looking for a challenging career in data analytics.

Key words: Python, Matplotlib, Pandas, Scikit-learn, Linux, Statistical Modeling, K-means Clustering, Markov Chain, Time Series, Regression Analysis, Monte Carlo simulation

Experience

Chief Scientist, Protein Architects (Startup Company), 2015–present.

- **Co-founded the startup company** with three professors from UC Davis developing synthetic protein based alternatives to antibodies.
- National Science Foundation ICORPS *Entrepreneurial Lead* - conducted more than 100 customer interviews to identify and validate customer-market fit for the technology.

Postdoctoral Scholar, Department of Physics, 2014–present.
University of California, Davis, CA.

- Performed large-scale **bio-molecular simulations** on CPU/GPU (Graphical Processing Unit) computer clusters in **linux environment** to design protein surfaces which form nano-wires.
- Used **biased sampling** techniques to understand the mechanism of protein binding events.
- Mentored undergraduate students in learning linux command-line environment, Fourier analysis, and Molecular Dynamics simulation techniques.

Postdoctoral Scholar, Center for Proteomics and Bioinformatics, 2011–2014.
Case Western Reserve University, Cleveland, OH.

- Developed a **reduced dimensional model** to obtain 100 fold reduction in computational time for studying protein-protein interactions (Highlighted as the cover article in *Biophysical Journal*).
- Implemented *Kabsch algorithm* to align two 3-dimensional data sets based on **Least Squares fitting** which allows accurate determination of similarity between the data sets.
- Implemented a **machine learning K-means clustering** algorithm which learns the number of clusters in a data set automatically to group data sets based on similarity.
- Developed a modified **weighted distance measure** between two data sets which helps in effective clustering based on the geometric 3-dimensional orientation of two proteins.
- Implemented *Dijkstra's algorithm* to find the shortest path around obstructions between two atoms in a protein.
- Used **constrained optimization** using *Sequential Least Squares Programming* to estimate the dominant protein structure data set in an unknown sum of a collection of data sets.

Graduate Research Assistant, Department of Biomedical Engineering, 2005–2011.
Texas A&M University, College Station, TX.

- Developed novel 4-dimensional **grid-based visualization scheme** to analyze the average properties of water around proteins.
- Maintained a custom built 40-node linux based computer cluster in the lab - OS installation, auto backup, software updates.

Projects & Software Implementations

- Long-term **Stock Move Prediction** based on time series of daily stock close values using **Fourier Series based cyclic trend** analysis.
- **Android app – Swaras**: (> 20000 downloads with a rating of 4.2) Implemented a **Markov Chain based pattern matching algorithm** to serve as a teaching tool for Indian classical music students.
- Implemented a modified **K-means clustering** algorithm in FORTRAN for clustering proteins based on their structural similarity using a custom distance measure.
- **Published a software** in C (**Fast-SAXS-pro**) to compute the theoretical X-ray scattering data for bio-molecules using a custom model after experimental validation.

Skills

- **Data Handling**: Python (SciPy, NumPy, Pandas, Scikit-learn), MATLAB, SQL, R
- **Scripting**: BASH, AWK
- **Visualization**: Mayavi, Python-Matplotlib
- **OS**: Linux/Unix
- **Languages and Libraries**: C, FORTRAN (BLAS, LAPACK)

Education

Ph.D. Biomedical Engineering, <i>Texas A&M University, College Station, TX</i> ,	2011.
M.S. Biomedical Engineering, <i>Texas A&M University, College Station, TX</i> ,	2008.
B.E. Mechanical Engineering, <i>University of Madras, India</i> ,	2004.

Selected Research Publications

Authored **14 peer-reviewed journal articles** in reputed scientific journals (> **120 citations**).

- **K M Ravikumar**, W Huang & S Yang, Fast-SAXS-pro: A unified approach to computing SAXS profiles of DNA, RNA, protein, and their complexes *J Chem. Phys.* 2013, 138 (2), 024112. **Fast-SAXS-pro web server**
- **K M Ravikumar**, W Huang & S Yang, Coarse-grained simulations of protein-protein association: An energy landscape perspective *Biophys. J.* 2012, 103, 1–9. **Front-cover article**
- W Huang, **K M Ravikumar** & S Yang, Cross-talk between the ligand- and DNA-binding domains of estrogen receptor *Proteins* 2013, 81 (11), 1900–1909. **Back-cover article**
- **K M Ravikumar** & W Hwang, Role of hydration shell in the self-assembly of collagens and amyloid steric zipper filaments *J. Am. Chem. Soc.* 2011, 133 (30), 11766–11773.
- **K M Ravikumar** & W Hwang, Region-specific role of water in collagen unwinding and assembly. *Proteins*, 2008, 72, 1320–1332.

Lectures & Speaking Engagements

- Lectured advanced graduate class on *Statistical Mechanics* for PhD students (80 mins).
- Lectured a class of 60 physics undergraduate students on *Thermodynamics* (80 mins).
- Lectured a class of 120 physics undergraduate students on *Vectors* (80 mins).
- Presented talks and posters in scientific conferences (Biophysical Society Meeting–2008, 2010, 2013, Biomedical Engineering Society Meeting–2009, Society of Engineering Science–2007, ASME-Nanoengineering for Medicine and Biology–2010).
- Volunteer Tutor - Math tutoring on weekends at Cuyahoga Community College, Cleveland (East Campus) on Calculus and Algebra.