Kiran Kumar

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EXPERIENCE

Doctoral Researcher, Indiana University, Bloomington, IN **August 2013 - Present**

- Measured and quantified visual attention through novel experimentation providing 4860 data points compared to 200 from traditional methods and mathematical modeling resulting in grants and publications
  - Optimized parameters of distributions with an objective function on cluster of 32 nodes
  - Compared 6 models against a baseline with objective minimization, likelihood, and stability of parameters
  - Incorporated kinematic models to smooth HMM predictions
  - Designed 6 experiments with real time presentation and multithreaded logging
  - Formulated a mathematical Kalman filter type model for predicting future trajectory with markov assumption
- Detected diachronic changes in an author's timeline aligning with significant events
  - Created dataset from New York Times articles using their API, python requests and beautiful soup libraries
  - Used coreNLP to extract features from text using dependency parsing, part of speech, and entropy methods
- Collaborated with Gaen Plancher on experiments for visual working memory using a complex span task for spatial color recall using cursor determining precision and uncertainty of recall
- Trained two assistants to design experiments and analyze data leading to an award for poster presentation
- To address privacy concerns of user activity patterns, estimated Record linkage using 40gb of data with accuracy 90 times better than random chance
- Developed an image segmentation algorithm for foreground and background regions using grid based markov random field, graphical inference proposed as max-flow was solved using ford Fulkerson on a Sparse adjacency matrix

Data science intern, SAP, Newtown Square, PA **Jan 2019- March 2019**

- Improved bottom-line for SAP on cloud contracts by predicting renewals/churn based on product usage
  - Predicted renewals/churn using Bayesian hierarchical model, logistic regression, xgboost based on usage information, and missing value imputation for customer success team
  - Performed cross validation across models and residual checks to ensure robustness of prediction
  - Cohorted data based on Line of business, geography, length of contract for accurate sampling and reducing bias
- Performed fit-gap analysis of SAP pdms to aid reliability engineering engaging architect and SME
  - Designed and developed a tool with software architect for assessment of sensor portfolio using Time series techniques
  - Determined Nyquist Rate of data for efficient store and sampling
  - Compared failure sensor signals with normal using Dynamic Time Warping estimating a feasibility of prediction
  - Cohorted different machines and time intervals to estimate noise in system and ensure robustness of prediction
- Explained prediction algorithms and generated custom visualization of results for client in manufacturing
- Gathered requirements and translated business objectives of a semiconductor client to quantifiable measures for achieving a lower bound on inventory per product per quarter by analyzing signals of supply and demand
- Key contributor to product portfolio design through presentations to senior executives of predictive scenarios explaining decisions from regression, clustering, and time series forecast
- Analyzed 10Q, 10K, and Factiva using KPIs and business segment peer benchmarking of firms

Software Engineering Intern, Plotwatt, Inc, Durham, NC **June 2011 - November 2011**

- Improved analysis by segmenting customers through a web module in rails and sql backend to tag customers with a category variable of their electrical usage patterns
- Wrote downtime recovery scripts in python to replay http data packets after reconstruction
- Enabled efficient transfer of data between memcached, sql, and S3 to reduce network traffic through python scripts,

Software Engineer, Altran Praxis, Bath, UK, Bengaluru, KA **February 2010 - July 2010**

- Validate simulation of predicted flight path trajectory in air traffic control - interim Future Area Control (iFACTS) for clearance systems to ensure timely alerts and avoid collision
- Developed specification of unique flight clearances in formal language (Z-specification)

Software Engineer, Accenture, Bengaluru, KA **June 2007 - February 2010**

- Streamlined spring batch framework to load using Cron and validated scenarios through data mined from SQL to analyze a variety of transactions automatically for a major bank
- Responsible for staffing, training and managing a team of 5 to work on Integration of spring batch framework resulting in completion of project per deadline
  - Responsible for assigns tasks, consolidating reports and communicating with client
- Identified and implemented SOAP/WSDL XML based communication protocol for API messaging streamlining claims processing in insurance application
- Received "Accenture shining star" for excellence

EDUCATION

Indiana University, Bloomington, **PhD** in ***Cognitive Science and Psychology*** **August 2019**
Title: Identifying individual differences of attentional allocation
Indiana University, Bloomington, **M.S.** in ***Computer Science*** **May 2012**
M.S. Ramaiah Institute of Technology, Bangalore, India, **B.Eng** in ***Computer Science*** **June 2007**

SKILLS

Languages: Python, Matlab, R, SQL, C++, Java
Web: HTML, Javascript, REST, Flask, apache,
Tools: scikit-learn, pandas, github, dplyr, TensorFlow, JAGS, AWS, coreNLP, Beautiful Soup
Predictive Techniques: Hidden Markov Models, Markov Decision Process, Time series analysis, Machine Learning, Experimentation, Bayesian methods, Natural Language Processing

PUBLICATIONS

- Kumar, K.N., Harding, S.M., & Shiffrin R.M. (2018). Inferring attention through cursor trajectories. Proceedings of the 39th Annual Conference of the Cognitive Science Society.
- Kumar, K. N., Chandramouli, S. H., & Shiffrin, R. M. (2015). Salience, perceptual dimensions, and the diversion of attention. *The American journal of psychology, 128(2), 253-265*

Awards

Cognitive Science Supplemental Research Fellowship

Presentations

- Kumar, K.N., Harding, S.M., & Shiffrin R.M. (2018) Continuous dynamics of cursor trajectory. 2018 Midwest Cognitive Science Conference.
- Kumar, K. N., Chandramouli, S. H., & Shiffrin, R. M. (2013) Popout Attention with two foils: linear dependence and dimensional interaction. 34th Annual Conference of the Cognitive Science Society
- Kumar, K. N., Chandramouli, S. H., & Shiffrin, R. M. (2013) Popout Attention with two foils: linear dependence and dimensional interaction. Context and Episodic Memory Symposium (CEMS)

Academic service

Reviewer for SocInfo 2016, Cogsci 2019, NIME 2019
Invited speakers, organized schedule, communicated upcoming talks through flyers/mailing lists, and moderated cognitive lunch seminar series between 2017 and 2018.
Volunteer for ASIC 2013, 2014, Cogsci 2018