Gaurush Hiranandani

Personal Information

Current Position:	Ph.D. Student, Department of Computer Science, Univeristy of Illinois Urbana-Champaign
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Research Interests

Machine Learning, Statistical Inference, Learning to Rank, Preference Elicitation

Education and Experience

2017-Present	Ph.D. in Computer Science, University of Illinois - Urbana Champaign
	CGPA: **4.0/4.0**
2015-2017	Member of Research Staff, Big Data Experience Lab, Adobe Research, Bengaluru
	Authored **16** patents and **5** research papers at Adobe
	Transferred several technologies into Adobe Analytics and Adobe Experience Manager
2010-2015	M.Sc. (Integrated) in Mathematics and Scientific Computing, Indian Institute of Technology Kanpur
	CGPA: **9.4/10.0**
	Department Rank: **1** (out of 45 students)
	Institute Rank: **1** (out of 830 students in the years 2013-14 and 2014-15)

Awards and Honors

1. **B.D. Sanghi Gold Medal:** For best academic performance in Mathematics & Statistics Department *(2015)*

2. **S. Gupta Gold Medal:** For highest CGPA in Mathematics & Scientific Computing M.Sc.(Int.) program *(2015)*

3. **Project Proficiency Medal:** For best project in Mathematics & Scientific Computing M.Sc.(Int.) Program *(2015)*

4. **General Proficiency Medal:** For best academic performance in Mathematics & Scientific Computing program *(2015)*

5. **Academic Excellence Award:** For being among the top 7% of the batch (830 students) academically *(2013, 2014)*

Research Publications

Accepted Papers:

1. Sunav Choudhary, **Gaurush Hiranandani**, and Shiv Kumar Saini. Sparse Decomposition for Time Series Forecasting and Anomaly Detection. Accepted to *SIAM International Conference on Data Mining - SDM*, 2018.

2. **Gaurush Hiranandani**, K. Ayush, A. R. Sinha, S.V.R. Maram, C. Varsha, and P. Maneriker. Enhanced Personalized Targeting Using Augmented Reality. In *International Symposium on Mixed and Augmented Reality - ISMAR*, 2017.

3. **Gaurush Hiranandani**, Pranav Maneriker, and Harsh Jhamtani. Generating Appealing Brand Names. In *International Conference on Computational Linguistics and Intelligent Text Processing - CICLing*, 2017.

4. **Gaurush Hiranandani**, and Jean-Marc Schlenker. Small Circulant Complex Hadamard Matrices of Butson Type. In *European Journal of Combinatorics*, pp. 306-314 (50), 2016.

5. Natwar Modani, P. Maneriker, **Gaurush Hiranandani**, A. R. Sinha, Utpal, Vaishnavi S., and S. Gupta. Summarizing Multimedia Content. In *International Conference on Web Information Systems Engineering - WISE*, 2016.

6. **Gaurush Hiranandani**, and Harish Karnick. Improved Classification and Reconstruction by Introducing Independence and Randomization in DNNs. In *Digital Image Computing: Techniques and Applications - DICTA*, 2015.

Submitted Papers:

1. **Gaurush Hiranandani**, Shant Boodaghians, Ruta Mehta, and Oluwasanmi Koyejo. Eliciting Binary Performance Metrics. Submitted to *International Conference on Machine Learning - ICML*, 2018.

2. **Gaurush Hiranandani***, Raghav Somani*, Sreangsu Accharya, Oluwasanmi Koyejo. Clustered Monotone Transforms for Rating Factorization. Submitted to *Uncertainty in Artificial Intelligence - UAI*, 2018.

3. Prakhar Gupta*, **Gaurush Hiranandani***, Harvineet Singh*, Iftikhar Ahamath Burhanuddin, Zheng Wen, and Branislav Kveton. Online Diverse Recommendations from Partial Click Feedback. Submitted to *ECML-PKDD*, 2018.

PATENTS

1. **Gaurush Hiranandani**, Sai Varun Reddy Maram, Kumar Ayush, Chinnaobireddy Varsha, and Siddhant Jain. Product Recommendations Based on Augmented Reality Viewpoints. *US62/415332 (Filed in multiple countries)*.

2. **Gaurush Hiranandani**, T. Goyal, P. Bajaj, and S. Shekhar. Determination of Paywall Metrics. *US15/277,136*.

3. **Gaurush Hiranandani**, Chinnaobireddy Varsha, Sai Varun Reddy Maram, Kumar Ayush, and Atanu R. Sinha. Identifying Augmented Reality Visuals Influencing User Behavior in Virtual-Commerce Environments. *US15/433,834*.

4. **Gaurush Hiranandani**, S. K. Saini, and M. Sinha. Anomaly Detection at Coarse Granularity of Data. *US15/428,523*.

5. **Gaurush Hiranandani**, Kumar Ayush, Chinnaobireddy Varsha, and Sai Varun Reddy Maram. Creating Targeted Content Based on Detected Characteristics of an Augmented Reality Scene. *US15/454,750*.

6. **Gaurush Hiranandani**, and N. Modani. Representative Metrics for Efficient Anomaly Detection. *US15/178,403*.

7. **Gaurush Hiranandani**, Pawan Vaishnav, Aditya Jain, Moumita Sinha, and Kushal Chawla. Augmented Reality Predictions using Machine Learning. *In Filing Process*.

8. Branislav Kveton, **Gaurush Hiranandani**, Prakhar Gupta, Harvineet Singh, Iftikhar Ahamath Burhanuddin, and Zheng Wen. Online Diverse Recommendations from Partial Click Feedback. *In Filing Process*.

9. Prakhar Gupta, **Gaurush Hiranandani**, H. Singh, and S. K. Saini. End of Day Metric Projection. *US15/609,254*.

10. S. Choudhary, **Gaurush Hiranandani**, and S.K. Saini. Sparse Decomposition of Time Series. *In Filing Process*.

11. Shivani Gupta, **Gaurush Hiranandani**, Charanjit Ghai, and Anshul Agrawal. Target Audience Content Interaction Quantification. *US14/548,061 (Published)*.

12. Natwar Modani, Pranav Maneriker, **Gaurush Hiranandani**, Atanu R. Sinha, Utpal, Vaishnavi S., and Shivani Gupta. Determining Quality of a Summary of Multimedia Content. *US14/959,219 (Granted)*.

13. Shivani Gupta, Charanjit Ghai, **Gaurush Hiranandani**, and Anshul Agrawal. User Interest Learning through Hierarchical Interest Graphs. *US14/548,116 (Published)*.

14. Natwar Modani, Pranav Maneriker, **Gaurush Hiranandani**, Atanu R. Sinha, Utpal, Vaishnavi S., and Shivani Gupta. Multimedia Document Summarization. *US14/947,964 (Published)*.

15. Natwar Modani, Iftikhar Ahamath Burhanuddin, **Gaurush Hiranandani**, and Shiv Kumar Saini. Providing Personalized Alerts and Anomaly Summarization. *US15/238,208*.

16. Balaji Vasan Srinivasan, Sanket Mehta, **Gaurush Hiranandani**, Harsh Jhamtani, Natwar Modani, and Cedric Huesler. Propagation of Changes in Master Content to Variant Content. *US15/184,959*.

TEACHING AND RESPONSIBILITIES

1. *Teaching Assistant, Machine Learning (Fall 2017)*: Assisted in teaching Machine Learning to 130+ students.

2. *Internship Mentor, Adobe Research (Summer 2016)*: Mentored a team of 3 students on a project based on *Augmented Reality for Digital Marketing*. The project resulted in 3 patents and a paper accepted to *ISMAR'2017*.

3. *Internship Co-Mentor, Adobe Research (Summer 2015)*: Co-mentored a team of 3 students on a project based on *Multimedia Content Summarization*. The project resulted in 2 patents and a paper accepted to *WISE'2016*.

RELEVANT COURSES WITH GRADES

Machine Learning: Tools and Techniques (A)	Machine Learning Theory (A)
Mathematics for Machine Learning (A)	Computational Inference and Learning (A)
Probability and Statistics (A)	Regression Analysis (A)
Statistical and AI Techniques in Data Mining (A)	Time Series Analysis (A)
Non-Linear Regression (A)	Probability Theory (A)

*Equal Contribution

Selected Projects

Organisation *Aug'17 - Present*	*University of Illinois Urbana-Champaign*, USA Eliciting Binary Performance Metrics Abstract: Performance metric is important for effective supervised learning. However, many systems are simply trained to optimize default metrics. We propose a framework for automatically discovering the unknown binary performance metric from user feedback i.e. implicit preferences between classifiers. We further focus on pairwise preferences, where users provide relative feedback for pairs of classifiers. By exploiting key properties of the binary classification problem, we obtain provably query efficient strategies for eliciting linear and linear-fractional performance metrics. Outcome: Paper submitted to *ICML'18* under the guidance of **Prof. Oluwasanmi Koyejo**.
Sep'17 - Present	Clustered Monotone Transforms for Rating Factorization Abstract: Recommendation engines force raters to map their natural rating scales to an arbitrary scale. We propose CMTRF, which searches for monotonic transformations of the rating scales combined with an underlying matrix factorization model. The transformations can be generated for each user, for a cluster of users, or for all the users at once, forming the basis of the three proposed algorithms. Outcome: Paper submitted to *UAI'18* under the guidance of **Prof. Oluwasanmi Koyejo**.
Organisation *Jun'15 - Aug'17*	*Big Data Experience Lab*, Adobe Research, India Online Diverse Recommendations from Partial Click Feedback Abstract: Traditionally, analysts used to set up manual alerts on web metrics of interest, but this process is time intensive. After learning user preferences from implicit signals, online learning methods are deployed to select key but diverse metrics of interest to a particular user. With every alert being sent, the model is updated continuously resulting in convergence to a near optimal solution. Outcome: Paper submitted to ECML - Journal Track'18. Collaborated with **Dr. Branislav Kveton**.
May'16 - Aug'17	Augmented Reality based Catalogues Having Embedded Recommendations Abstract: We create a novel consumer targeting system by exploiting the rich data from Augmented Reality systems. First, we analyze consumer interactions on AR-based retail apps to identify her preferred purchase viewpoint. We then target the consumer through a personalized catalog, created by embedding recommended products in her viewpoint visual. The color and style of the embedded product are matched with the viewpoint to create recommendations and personalized text content. Outcome: Mentored the project during the summer internship program at Adobe Research. Filed 3 patents. Research paper accepted to *ISMAR'2017*. Collaborated with **Dr. Atanu R. Sinha.**
Feb'16 - Oct'17	Sparse Decomposition for Time Series Forecasting and Anomaly Detection Abstract: Existing forecasting and anomaly detection approaches assume perfect knowledge about the seasonality and/or presence of anomaly free time windows. This knowledge is unexpected by a novice analyst. Relaxing these assumptions, we propose an approach based on (a) sparse modeling of the different latent components of the time series *viz* seasonal, level, and spikes and (b) ARMA modeling for fitting the error. Outcome: Paper accepted to SDM'2018. Collaborated with **Dr. Sunav Choudhary**.
Organization *July'14 - Apr'15*	*Indian Institute of Technology Kanpur*, India Improved Classification and Reconstruction With Deep Neural Networks Abstract: We empirically show that the orthogonal L,A and B components (LAB color space) trained separately produce better reconstructions than RGB components taken together which in turn produce better reconstructions than LAB components taken together in a fully connected neural network. Further, randomization is injected into the networks whereby appropriate fusions increase accuracy. Outcome: Awarded the **Project Proficiency Medal** for the best M.Sc. project. Published the work in *DICTA'15* under the guidance of **Prof. Harish Karnick**.
Organisation *May - July 2013*	*University of Luxembourg*, Luxembourg Small circulant complex Hadamard matrices of Butson type Abstract: We study the circulant complex Hadamard matrices of order n whose entries are l^{th} roots of unity. For $n = l$ prime we prove that the only such matrix, up to equivalence, is the Fourier matrix, while for $n = p + q$, $l = pq$ with p, q distinct primes there is no such matrix. We then provide a list of equivalence classes of such matrices, for small values of n, l. Outcome: Publicaton in the *European Journal of Combinatorics* with **Prof. Jean-Marc Schlenker**.