# Ashudeep Singh

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## Education

**2015-present**    **Ph.D. Computer Science**, *Cornell University*, Ithaca, NY.
Advisor: Thorsten Joachims
Relevant Courses: Machine Learning Theory, Advanced topics in Machine Learning, Design and Analysis of Algorithms
Grade Point Average: 4.00

**2010–2015**    **B.Tech.-M.Tech. Dual Degree**, *Indian Institute of Technology Kanpur*, India.
M.Tech. Cumulative Performance Index (CPI)– 10/10
B.Tech. Cumulative Performance Index (CPI)– 9.6/10

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## Awards and Achievements

**2015**    **Ranked first** in the M.Tech. batch of 108 students graduating in 2015.

**2011–2015**    Awarded **Academic Excellence Award** for outstanding academic achievements at IIT Kanpur for four consecutive years.

**2010–2014**    Awarded **CBSE Merit Scholarship** for Professional Studies by Central Board of Secondary Education, India.

**2012**    Recipient of **Summer Undergraduate Research Grant for Excellence (SURGE)**, granted by Dean Resource Planning and Generation, IIT Kanpur.

**2010**    Awarded the **Certificate of Merit** in English for being in the top 0.1% students in the country for All India Senior School Certificate Examination.

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## Publications

Tobias Schnabel, Adith Swaminathan, Ashudeep Singh, Navin Chandak, Thorsten Joachims. **"Recommendations as Treatments: Debiasing Learning and Evaluation"** In Proceedings of The International Conference on Machine Learning (ICML), 2016. [pdf]

David Adamson, Akash Bharadwaj, Ashudeep Singh, Colin Ashe, David Yaron, Carolyn P. Rosé. **"Predicting Student Learning from Conversational Cues"**. In Proceedings of 12th International Conference of Intelligent Tutoring Systems (ITS), Honolulu, HI, USA, June, 2014. [pdf]

David Adamson, Divyanshu Bhartiya, Biman Gujral, Radhika Kedia, Ashudeep Singh, Carolyn P. Rosé. **"Automatically Generating Discussion Questions"**. In Proceedings of 16th International Conference of Artificial Intelligence in Education (AIED), Memphis, TN, USA, July, 2013. [pdf]

## Research Internships

**May–August 2016**  **Microsoft Research Lab**, *New York City, NY*.
**"Contextual Bandits for Personalization in fitness tracking applications"**
*Research internship project mentored by **John Langford**(MSR NYC) and **Ryen White**(Microsoft Health Intelligence and MSR Redmond)*
The work was aimed to frame the task of providing reminders and notifications to users in Microsoft Health app service as a Contextual Bandits problem, so as to personalize these messages to optimize user's health and fitness.
- We used user's demographics and current health and fitness statistics as the context and calculated rewards based on the change in health and fitness measurements of the user per day.
- Worked with a state of the art decision service called Multi-world testing (MWT) to serve as the interface between the Microsoft Health and the app. The service is based on Vowpal Wabbit and returns the ranking of a set of messages to be shown to the user that maximizes the rewards.

**May–July 2014**  **Cornell University**, *Ithaca, NY*.
**"Using Preference Data to Embed documents in Metric spaces"**
*Research Project mentored by **Prof. Thorsten Joachims**(Cornell University)*
The work is aimed at using human interaction signals to embed documents onto a low dimensional space. The data used is click-logs for user sessions on `arxiv.org`. We also try to embed the user sessions into the same space to facilitate its application in document recommendations and personalized search.
- Used **Logistic Markov Embedding** (LME) approach after decomposing user-sessions into first order markov chains. Utilised the feasible set information due to presentation and introduced a de-biasing feature vector to the model to **overcome the *bias*** because of presentation and browsing behavior.
- The embeddings perform **much better than traditional n-gram models** on predicting user clicks and also learn an intuitive low-dimensional space representation without using any text features.
- Currently working on **embedding user-sessions** onto the same metric space to represent user's intent and hence provide better recommendations and search results.

**May–July 2013**  **Carnegie Mellon University**, *Pittsburgh, PA*.
**"A Computational Model for Quantitative Discourse Analysis in a Collaborative Learning Setting"**  [report][paper]
*Research Project mentored by **Prof. Carolyn P. Rosé** (Language Technologies Institute, CMU)*
We aimed to identify quantitative metrics that can be used to discriminate between successful and unsuccessful groups involved in a collaborative learning task, using text based chat transcripts.

**Dec. 2012**  **Internship Programme in Technology Supported Education**, *Winter School, Bangalore*.
**"Question Generation for Discussion Facilitation"**  [report][paper]
*Research Project mentored by **Prof. Carolyn P. Rosé** (Language Technologies Institute, CMU)*
The motivation of the work was to encourage discussion and reasoning amongst students in a class through an intelligent tutoring system which generates questions that initiate discussion over a certain text.

**May–July 2012**  **Summer Undergraduate Research Grant for Excellence (SURGE)**, *IIT Kanpur*.
**"Logic Studio: Automatic Problem Generation in Propositional Logic"**  [report]
*Research Project mentored by **Dr. Sumit Gulwani** (Microsoft Research, Redmond).*
The project comprised of generating deduction problems, hints and solutions to problems in Propositional Logic, which was part of a larger project which aims at building an Intelligent Tutor for Logic Course.

## Selected Projects

**Ongoing**  **Debiasing learning from human interactions**.
*Project with Thorsten Joachims*
Using importance weighting methods to derive unbiased and consistent estimators to learn embeddings from user interaction data like clicks. Working with observational data such as clicks on `arXiv.org` to learn embeddings of research articles.

**Ongoing**  **Conversational Modeling with an adversarial reward generator**.
*Joint project with Dipendra Misra (Cornell) and Yoav Artzi (Cornell)*          [github]
Using ideas similar to a Generative Adversarial Learning (GAN) to train a chatbot neural network from chatlog dataset using Imitation Learning. We use the predictions of the discriminators as the rewards to do policy gradient updates for the chatbot network

## Teaching

○ **Teaching Assistant** for **CS4786: Machine Learning for Data Science**          **(Spring 2016)**
Faculty Instructor: Prof. Karthik Sridharan (Cornell University)
○ **Teaching Assistant** for **CS4780/5780 : Machine Learning for Intelligent Systems**     **(Fall 2015)**
Faculty Instructor: Prof. Kilian Weinberger (Cornell University)
○ **Teaching Assistant** for **CS679–Machine Learning for Vision**          **(Spring 2015)**
Faculty Instructor: Prof. Vinay P. Namboodiri (IIT Kanpur)
○ **Tutor (Graduate Student Instructor)** for **ESC101–Fundamentals of Computing**     **(Fall 2014)**
Faculty Instructor: Prof. Amey Karkare (IIT Kanpur)

## Skill Set

○ **Programming Languages** – C++, Python, C#, Lua
○ **Web Development** – HTML, CSS, PHP, JavaScript
○ **Other Tools** – Tensorflow, Torch, Shell Scripting, Matlab, SQL, Octave, LaTeX

## Positions of Responsibility and Extra Curricular Activities

○ Coordinated the PhD Visit Day 2016 for Cornell Computer Science Department as the **Visit Day Czar** with other czars, department staff and volunteers.          **(2016)**
○ **Student Guide, Counselling Service, IIT Kanpur**          **(2011–12)**
*Guided freshmen for a year to adjust to the campus environment.*
○ **Academic Mentor, Counselling Service, IIT Kanpur**          **(2011–12)**
*Conducted remedial classes for subjects like Fundamentals of Computing & Mathematics-I,II*
○ **Link Student, Counselling Service, IIT Kanpur**          **(2012–13)**
*Responsible for helping two academically deficient students.*
○ **Member of Hall Executive Committee**, Hall 9, IIT Kanpur          **(2011–12)**
○ **Secretary, Hospitality Cell**, Techkriti 2011          **(2011)**.