

Ashudeep Singh

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| CONTACT INFORMATION | Fourth Year Undergraduate Department of Computer Science and Engineering Indian Institute of Technology Kanpur | Phone: +91 9794140033 e-mail: ashudeep@iitk.ac.in ashudeep21@gmail.com |
| RESEARCH INTERESTS | Machine Learning, Computational Linguistics | |
| EDUCATION | Indian Institute of Technology Kanpur, India <i>B.Tech. & M.Tech. Integrated in Computer Science and Engineering</i> (2010–present) <ul style="list-style-type: none">Cumulative Performance Index (CPI) of 9.7/10 All India Senior School Certificate Examination, CBSE, India <i>G.M.S.S.S., Sector-35D, Chandigarh</i> (2010) <ul style="list-style-type: none">Secured a cumulative 94.4% in the subjects– Mathematics, Physics, Chemistry, Computer Science and English. All India Secondary School Examination, CBSE, India <i>Guru Nanak Public School, Chandigarh</i> (2008) <ul style="list-style-type: none">Secured a cumulative 94.6% in the subjects– Mathematics, Science, Social Sciences, Computer Science, English, Hindi. | |
| SCHOLASTIC ACHIEVEMENTS | <ul style="list-style-type: none">Awarded Academic Excellence Award for years 2010-11 and 2011-12 for distinctive academic achievements.Awarded CBSE Merit Scholarship for Professional Studies for years 2010-14.Recipient of Summer Undergraduate Research Grant for Excellence (SURGE) 2012, granted by Dean Resource Planning and Generation, IIT Kanpur.Awarded the Certificate of Merit for being in the top 0.1% students in English Core for All India Senior School Certificate Examination, CBSE, 2010.Qualified for INChO (Indian National Chemistry Olympiad) 2010 on the basis of performance in National Standard Examination in Chemistry (NSEC 2009), conducted by TIFR, Mumbai, India.Placed in State-wide Top 1% in National Standard Examination in Physics (NSEP 2009) conducted by IAPT (Indian Association of Physics Teachers, Pune, India). | |
| PUBLICATIONS | Automatically Generating Discussion Questions with <i>David Adamson, Divyanshu Bhartiya, Biman Gujral, Radhika Kedia & Carolyn P. Rosé</i> In Proceedings of 16 th International Conference of Artificial Intelligence in Education, Memphis, TN, USA, July, 2013 | |
| INTERNSHIPS | Language Technologies Institute, Carnegie Mellon University (May–July 2013) A COMPUTATIONAL MODEL FOR QUANTITATIVE DISCOURSE ANALYSIS IN A COLLABORATIVE LEARNING SETTING <i>Research Project Mentored by Prof. Carolyn P. Rosé (Carnegie Mellon University)</i> In this work, we aimed to identify quantitative metrics that can be used to predict task success or discriminate between successful and unsuccessful groups involved in a collaborative learning task, using text based chat transcripts. <ul style="list-style-type: none">Trained a model using a set of text features to automatically mark sequences and threads in a text-based chat conversation.Defined an annotation scheme based on the sequencing/threading information of dialogues to identify knowledge flow in the conversation from speaker to speaker.Used this knowledge flow to graphically analyze the trajectory of the conversation on Confusion vs Consensus axes and hence finding patterns that define task success Winter School: Internship Programme in Technology Supported Education (Dec 2012) QUESTION GENERATION FOR DISCUSSION FACILITATION <i>Research Project Mentored by Prof. Carolyn P. Rosé (Carnegie Mellon University)</i> The motivation of the project was to encourage discussion and reasoning amongst students in a class through intelligent tutors. The major implementation was divided into two major parts- Sentence Extraction and Question Generation. <ul style="list-style-type: none">Sentence Extraction involved extracting meaningful sentences from a summary that are the best representation/abstraction of the whole chapter. We used techniques like- LSA, Tf-Idf, Cosine Similarity and Jaccard Coefficient and analyzed the results hence obtained. | |

- For Question Generation, we modified a pre-existing implementation of question generation from text to generate and rank subjective questions. For scoring and ranking questions, we used SentiWordNet Corpus.

Summer Undergraduate Research Grant for Excellence (SURGE) (May–July 2012)

LOGIC STUDIO: AUTOMATIC PROBLEM GENERATION IN PROPOSITIONAL LOGIC

Research Project Mentored by Dr. Sumit Gulwani (Microsoft Research, Redmond), Prof. Amey Karkare (IIT Kanpur) and Prof. Subhajit Roy (IIT Kanpur) at IIT Kanpur.

The project comprised of the Problem Generation component of a larger project which aims at building an Intelligent Tutor for Logic Course.

- Our work involved generating deduction problems, hints and solutions to problems in Propositional Logic.
- The three interfaces of problem generation are: from a given problem, from scratch and generating problems that use specified axioms in their solutions. It was coded in C# language.
- We exploited the truth table representations of the logical formulas for generating new valid problems similar to given ones or completely new ones.

COURSE
PROJECTS

Recommendation System for *movielens* dataset

(Sept–Nov 2013)

C771 Course Project under Prof. Harish Karnick

- Used SVD decomposition of preprocessed User-Movie Matrix to discover the latent features for users as well as movies and hence predict ratings of unseen movies for each user given their previous ratings, user demographic features and movie genre information.
- Pre-processing of User-Movie matrix was done by seeding the unknown ratings using k-NN and linear regression based prediction.
- Obtained a 5-fold cross-validation root mean square error (RMSE) of 0.828 for the dataset of 100k ratings having a standard deviation 1.12.

Semantic approach to Summarization

(July–Nov 2013)

CS498 Project under Prof. Harish Karnick

- Developed a technique to identify clusters of text segments based on semantic similarities, using FrameNet annotation.
- The input text was represented as a Semantic Role Labelled text. The clusters were constructed based on verb frame similarities, considering both verbs and arguments. Then, the summary was generated using a hand-crafted sentence generation technique to represent a cluster of verb frames as meaningful sentences.
- The summaries hence generated were evaluated by human evaluators on 4 different aspects– Information content, Grammatical Correctness, Abstractness and Expressiveness. The evaluations yielded quite good results.

Student Response Analysis using Textual Entailment

(Sept–Nov 2013)

Natural Language Processing Course Project under Prof. Amitabha Mukerjee

- Working on a 5-way classification task, recognizing the extent of correctness of a student answer given a question and a few reference answers.
- Exploring different text similarity and overlap features to train models on and also trying to use various techniques used in Recognizing Textual Entailment Challenges since 2006.

Motion Tracking using Occlusion States

(Feb–Apr 2013)

Artificial Intelligence Course Project under Prof. Amitabha Mukerjee

- Formalized a transition graph for a set of states that define occlusions in multi-object systems
- Theoretically proved the validity of transitions using the logical formulations as given in the definitions.
- Verified the transitions on real-world visual scenes and also tried mining events from a real world scene using signature transition sequences.

Compiler for Ada programming language

(Jan–Apr 2013)

Compiler Design Course Project under Prof. Sanjeev K Aggarwal

- Implemented a compiler for Ada programming language in Python with MIPS code as the target
- Basic programming constructs, support for arrays, records, nested/recursive/overloaded procedures/functions, packages, type extension, dynamic memory allocation, Polymorphism, stream I/O etc.

Books and Research Paper Database

(Mar–Apr 2013)

Principles of Database Management Systems Course Project under Prof. Harish Karnick

- Built an easily maintainable and flexible bibliographic database of Books and Research Papers, keeping in mind the dependency constraints as well as efficiency considerations.

- Added the functionality to search through the meta-data for each of these, as well as the keywords inside the texts using single/multiple search fields.
- Also added the functionality to add new and update existing entries in a record.

Extension of PintOS

(Aug–Nov 2012)

Operating Systems Course Project under Prof. Subhajit Roy

- This project aimed at providing various functionalities to Pintos, simple instructional operating system framework for the 80x86 architecture.
- Simulated and analyzed various system calls and scheduling algorithms using operating systems concepts.
- Implemented POSIX message queues that allow processes to exchange data in the form of messages.

Implementation of Address Resolution Protocol

(Oct–Nov 2012)

Computer Networks course project under Prof. Dheeraj Sanghi

- Implemented the request and reply implementation for the Address Resolution Protocol, which lies in the Link Layer of the Internet Protocol Suite.
- The major components were- *request & reply packet handling* and the *ARP cache tables*.
- The project was coded in C using Socket Programming with ~1000 LOC.

A simplified CPU

(Sept–Oct 2011)

Computer Organization Course Project under Prof. Amey Karkare

- Implemented a simplified CPU containing an ALU, a register file and a data path for R-Type instructions on a XILINX SPARTAN 3 FPGA board.
- The processor controlled the access and read/write operations on register file, and the ALU to carry out basic arithmetic operations on the registers.
- Input was fed through switches and output as 7-Segment LED Display on the FPGA. BlueSpec Verilog was used to program the FPGA.

RELEVANT COURSES TAKEN

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| - Algorithmic Information Theory | - Natural Language Processing |
| - Introduction to Game Theory | - Machine Learning |
| - Data Structures and Algorithms | - Linear Algebra |
| - Probability and Statistics | - Compiler Design |
| - Principles of Database Systems | - Algorithms II |
| - Computational Complexity | - Artificial Intelligence |
| - Operating Systems | - Principles of Programming Languages |
| - Discrete Mathematics | - Computer Networks |
| - Introduction to Mathematical Logic | - Theory of Computation |
| - Complex Algebra | - Fundamentals of Computing |
| - Programming Tools and Techniques | - Introduction to Computer Organization |

SKILL SET

- **Programming Languages**–C, C++, Java, Python, C#, R, Basic Assembly Language
- **Platforms**–Linux, Windows
- **Web Development**–HTML, CSS, PHP, JavaScript
- **Other Tools**–Shell Scripting, Lex, Yacc, Matlab, SQL, Octave, L^AT_EX, Visual Studio, Eclipse, Git, Weka

POSITIONS OF RESPONSIBILITY

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 tutoring classes for the junior batch 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)

- As the *Computer Room and Reading Room Secretary*, maintained the Hostel Website, Hostel Computer Center & implemented an online lending/borrowing system for books.
- Managed the hostel administrative affairs along with 9 other members of the Hall Executive Committee.

Secretary, Hospitality Cell, Techkriti 2011

(2011)

EXTRA-
CURRICULAR
ACTIVITIES

- Co-Developed an Android app MAP A FEST that could display events currently going on during a campus festival or otherwise, you can update your location and view your friends location on a Google Map, using Google Map API, MySQL databases and *facebook* APIs, during the Hack day by *Yahoo!* HACKU during Aug 24-26, 2012.
- Cleared the A-level Certificate of **National Cadet Corps (NCC)** from *1, CHD Naval Unit NCC, Chandigarh* in 2007 with an A-grade.
- Placed *2nd* in **Madmen (Video Ad Making Competition)** in *Spectrum, IIT Kanpur Films and Media Festival, 2012*.