

# Ashish Mittal

IBM Research, Bangalore, India

mittal.ashish61@gmail.com  
+91 – 983 351 9812

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INTERESTS	Natural Language Processing, Machine learning, Conversation Systems, Graphical Models
WORK EXPERIENCE	<b>IBM India Pvt Ltd.</b> <span style="float: right;"><i>Jul 2015 - Present</i></span> <i>Research Engineer - Cognitive Solutions &amp; Services</i> <ul style="list-style-type: none"><li>• Focused on building an end-to-end system which helps in analyzing vast amount of data using natural language queries.</li><li>• The system that we build should be agnostic to the language of the query and be supported in multiple languages.</li><li>• The natural language querying should be context aware so that a natural conversation can take place when an end user is using the system.</li></ul>
INTERNSHIP EXPERIENCE	<b>Tata Research Design and Development Center, Pune</b> <span style="float: right;"><i>Dec 2011 - Mar 2012</i></span> <i>Intern</i> <ul style="list-style-type: none"><li>• <b>Objective:</b> To provide a solution to handle the preprocessing directives while refactoring C++ code.</li><li>• Designed and implemented an efficient and novel solution of the problem using annotations of preprocessor directives in the abstract syntax trees.</li></ul>
EDUCATION	<b>M.Tech in Computer Science</b> <span style="float: right;"><i>July 2013 - May 2015</i></span> <i>Indian Institute of Technology (IIT), Bombay</i> <span style="float: right;"><i>CGPA: 9.7/10.0</i></span> <i>Master's Specialization: Machine Learning</i> <ul style="list-style-type: none"><li>• <i>Advisors:</i> Prof. Sunita Sarawagi, Prof. Ganesh Ramakrishnan - IIT Bombay, Prof. Mausam - IIT Delhi</li><li>• <i>Dissertation:</i> Number Relation Extraction with Minimal Supervision<ul style="list-style-type: none"><li>– <b>Objective:</b> To create a knowledge base of facts consisting numerical attributes of entities from the unstructured text.</li><li>– Designed two extraction systems that require minimal human supervision per relation: (1) NumberRule, a rule based extractor, and (2) NumberTron, a probabilistic graphical model.</li></ul></li></ul> <b>B.E. in Computer Science</b> <span style="float: right;"><i>July 2008 - May 2012</i></span> <i>Dharmsinh Desai University (Deemed University)</i> <span style="float: right;"><i>Percentage: 84.79%</i></span>
RESEARCH PAPER PUBLICATIONS	<ul style="list-style-type: none"><li>• Laura Chiticariu, Marina Danilevsky, Samved Divekar, Arnaldo C. F., Mauricio Hernandez, Howard Ho, Salil Joshi, Hima Karanam, Saravanan Krishnan, Rajashekhar K., Yunyao Li, <b>Ashish Mittal</b>, Fatma Ozcan, Abdul Quamar, Diptikalyan Saha, Karthik S., Jaydeep Sen. <i>Creation and Interaction with Large-scale Domain-Specific Knowledge Bases</i>. Demonstrations Track (Accepted), VLDB 2017.</li><li>• Diptikalyan Saha, Avriilia Floratou, Karthik Sankaranarayanan, Umar Farooq Minhas, <b>Ashish R. Mittal</b>, and Fatma Özcan. <i>ATHENA: an ontology-driven system for natural language querying over relational data stores</i>. Proceedings of the VLDB Endowment 9, no. 12 (2016): 1209-1220.</li><li>• Aman Madaan, <b>Ashish Mittal</b>, G. Ramakrishnan Mausam, Ganesh Ramakrishnan, and Sunita Sarawagi. <i>Numerical Relation Extraction with Minimal Supervision</i>. In AAAI, pp. 2764-2771. 2016.</li></ul>
PATENTS FILED	<ul style="list-style-type: none"><li>• A Mittal, D Saha, K Sankaranarayanan, J Sen, <i>A System for Dialog in Natural Language using an Ontology</i>, 2017. US Patent Application No. IN920170003US1.</li><li>• A Mittal, D Saha, K Sankaranarayanan, <i>Translating Structured Languages to Natural Language using Domain-specific Ontology</i>, 2017. US Patent Application No. IN920160340US1.</li><li>• A Mittal, R Sharma Mittal, E Vijay, Y Shrinivasan, <i>System, Method and Computer Program Product for Packing</i> 2016. US Patent Application No. YOR920160945US1.</li></ul>

## KEY PROJECTS

### **Enabling Conversations over Relational data stores using Domain specific Ontology**

*Team Member: D Saha, K Sankaranarayanan, J Sen, IBM Research, India Jan 2016 - Present*

The aim of this project is to enable natural language conversations over relational data stores using domain specific Ontologies. Typical user requirements span multiple queries and these rely on the context provided by the previous queries. Such a system allows an end-user to form contextual queries which can be executed over Relational data stores.

### **Multilingual Natural Language Querying over relational data stores using Domain specific Ontology**

*Team Member: S Krishnan, K Sankaranarayanan - IBM Research, India*

*Alan Akbik, Yunyao Li - IBM Research, Almaden*

*May 2016 - Dec 2016*

The focus of this project is to develop a holistic multilingual natural language querying system over relational data stores. The aim was to use semantic parsing to understand the underlying meaning of the query and interpret it in a language agnostic way to support querying over multiple languages.

### **Natural Language Querying over relational data stores using Domain specific Ontology**

*Team Member: D Saha, K Sankaranarayanan, J Sen - IBM Research, India Jul 2015 - May 2016*

The main objective of this project was to provide an ontology-driven system for natural language querying of complex relational database. Developed system with unique two-stage approach, where the input natural language query is first translated into an intermediate query language over the ontology, called OQL, and subsequently translated into SQL. The two-stage approach allows to decouple the physical layout of the data in the relational store from the semantics of the query, providing physical independence.

### **Delic - Demistifying Licences**

*Team Members: A Madaan, K Punamiya, H Pandey, N Shah, IIT Bombay, India AngelHack Hackathon winner, Spring' 14*

The objective was to bring out the essence(summary) of the end user license agreements and highlight the important points. Implemented an end-to-end solution using NLP techniques to find out the relevant clusters of information and then rank them.

### **Movie Recommender System using Latent Dirichlet Allocation**

*Mentor: Prof Soumen Chakrabarti, IIT Bombay*

*Spring' 14*

The objective of the project was to recommend the similar movies to the input movies using content based similarity from their story description. Used topic modeling techniques like LDA to find the topic cluster distribution and then used statistical measures to compute the similarity.

### **Devnagari Character Recognition**

*Mentor: Prof.Siva, IIT Bombay*

*Autumn '13*

The objective of the project was to classify the image of a devnagari character from set of possible devnagari characters. Implemented an Artificial Neural Network (ANN) and trained the network using handcrafted training images.

### **Implementation of relational algebra's division operator in PostgreSQL**

*Mentor: Prof. S Sudarshan, IIT Bombay*

*Autumn'13*

Implemented division operator using external merge sort to handle most of the data types in PostgreSQL. Added the syntactic support in PostgreSQL for division operator.

## RELEVANT COURSES

- Machine Learning
- Probabilistic Graphical Models
- Artificial Intelligence
- Web mining and information retrieval
- Probabilistic Models
- Functional Programming
- Convex Optimization
- Deep Learning\*
- Quantum cryptography\*
- Introduction to Data Science\*

*\*Massively Open Online Courses (MOOCs) completed on various platforms*

## SKILLS

- **Programming Languages:** Java, C, C++, Python, Shell scripting, javascript, OWL
- **Softwares and Tools:** Matlab, scikit-learn, NLTK, L<sup>A</sup>T<sub>E</sub>X, D3.js, Protege

MISCELLANEOUS  
ACHIEVEMENTS

- Won the AngelHack Hackathon held in Mumbai with project title of *Demystifying Licenses*.
- Obtained **Department Rank 2** out of 120 students in M.Tech CSE.
- Obtained **All India Rank 11** out of 2,24,160 students in GATE 2013.
- Obtained **All India Rank 115** out of 1,56,780 students in GATE 2012.
- Awarded **Certificate of Excellence, Top Ranker 2012** from Nasscom for being a top ranker in Department of Computer Engineering at Dharmsinh Desai University.
- Awarded **Eklavya Scholarship of Excellence** for first position in the Department of Computer Engineering at Dharmsinh Desai University, 2008-2010.