

Somak Aditya

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RESEARCH INTERESTS

I am working on different aspects of Image Understanding using the tools of Machine Learning and Knowledge Representation. I am deeply motivated by the interdisciplinary efforts and I am a believer of the deep potential impacts of the joint efforts of symbolic reasoning and probabilistic modeling in the field of Artificial Intelligence as a whole.

EDUCATION

Doctor of Philosophy, Computer Science **Arizona State University**, Tempe, AZ
Advisors: Prof. Chitta Baral, Dr. Yezhou Yang 2014-2018
GPA 4.0 (out of 4.0)

Master of Engineering, Computer Science **Indian Institute of Science**, Bangalore
Dissertation Title: Generic Incremental K-Means Clustering 2009-2011
Advisor: Professor M. Narasimha Murty
GPA 7.3 (out of 8.0), 2nd in Class

Bachelor of Engineering, Computer Science **Jadavpur University**, Kolkata
CGPA 8.87 (out of 10), 7th in Class 2005-2009

TEACHING EXPERIENCE

Teaching Assistant, Department of Computer Science, Arizona State University 2014 – 2016

- CSE-576 Natural Language Processing, Fall 2015 and 2016
- CSE-471 Introduction To Artificial Intelligence, Spring 2016
- CSE-310 Data Structures and Algorithms, Spring 2015

PROFESSIONAL EXPERIENCE

Adobe Research (BEL) September 2018 – Present
Research Scientist
As a Research Scientist, I extensively collaborate with other researchers and product managers to understand product needs, formulate research problems that revolves around business use-cases.

Strand Life Sciences Pvt. Ltd., Bangalore December 2011 – July 2014
Specialist Software Engineer (III)
Worked in the development of RNA-Seq spliced aligner and the user interface for the project from scratch. This was one of the main features in the Avadis-NGS 1.4 release. I also worked in the algorithm development and implementation of SNP detection in targeted regions, base-quality recalibration and local realignment. I contributed in a number of enhancements and optimizations in different stages of the Avadis-NGS SNP-Detection workflow.

Yahoo Software Development India Pvt. Ltd., Bangalore

July 2011 – November 2011

Senior Software Engineer

The team was in charge of creating a website to provide a unifying experience to the advertisers to launch their campaigns across all websites of Yahoo. I worked in the creation of the data model used and a part of the user interface.

INTERNSHIPS

Cognitive Analytics, Verisk Analytics, New Jersey

May 2017-Aug 2017

Cognitive Analytics and Machine Learning Research Intern

Worked under Dr. Maneesh Singh, director of Image and Video Analytics, JDE, Verisk Analytics. Taking a detour from my PhD research, we explored Generative Adversarial Networks, that can utilize knowledge from pre-trained experts, which is aimed to generate complex images that depict situations (objects, actions and objects interacting through actions). I also assisted in several other projects (Visual Semantic Role Labeling, Situational Image Generation using Blender), alongwith was responsible for screening incoming Ph.D. candidates for full-time and intern positions.

IBM India Research Labs, Delhi

May 2015-Aug 2015

Research Intern, Cognitive System Solutions

Worked in Important Event and Entity Detection from Financial News Articles. I successfully created a reasoning framework based on an automatically constructed Knowledge Base of Financial Terms from Investopedia and manually created a Gold-standard for evaluating the system.

ACADEMIC ACHIEVEMENTS

- **Assistantship 2018** The research assistantship is gifted by Verisk Analytics based on the internship.
- **Fellowship 2016, 2017, 2018** Awarded Partial University Graduate Fellowship from Arizona State University. (\$2k for Spring-2016, \$2.5k for Spring-2017, \$4k for Spring-2018)
- **Fellowship 2014** Awarded CIDSE Doctoral Fellowship from Arizona State University. (\$15000 for 2014-2015. \$30000 in total with assistantships.)
- **Fellowship 2009-11** Awarded MHRD Scholarship for qualifying GATE, 2009 (Rs. 8000 p.m.)
- **GATE 2009** AIR (All India Rank) 15th in Graduate Aptitude Test in Engineering (GATE) 2009, entrance exam of the IISc & IITs, in Computer Science & Engineering.
- **WBJEE, 2005** Ranked 105th in West Bengal Joint Entrance Examination, 2005 for Engineering Entrance (out of over 50000 candidates)

PUBLICATIONS

- ① Somak Aditya, Yezhou Yang, Chitta Baral, Cornelia Fermuller, and Yiannis Aloimonos. [From Images to Sentences through Scene Description Graphs using Commonsense Reasoning and Knowledge.](#) *arXiv preprint arXiv:1511.03292*, 2015.
- ② Somak Aditya, Yezhou Yang, Chitta Baral, Cornelia Fermuller, and Yiannis Aloimonos. [Visual Commonsense for Scene Understanding Using Perception, Semantic Parsing and Reasoning.](#) In *2015 AAAI Spring Symposium Series*, 2015.

- ③ Arpit Sharma, Nguyen H Vo, Somak Aditya, and Chitta Baral. [Identifying Various Kinds of Event Mentions in K-Parser Output](#). *NAACL HLT 2015*, pages 82–88, 2015.
- ④ Arpit Sharma, Nguyen H Vo, Somak Aditya, and Chitta Baral. [Towards addressing the winograd schema challenge: building and using a semantic parser and a knowledge hunting module](#). In *Proceedings of the 24th International Joint Conference on Artificial Intelligence*, pages 1319–1325. AAAI Press, 2015.
- ⑤ Somak Aditya, Chitta Baral, Yezhou Yang, Yiannis Aloimonos, and Cornelia Fermuller. [DeepIU: An Architecture for Image Understanding](#). In *Advances of Cognitive Systems*, 2016.
- ⑥ Somak Aditya, Yezhou Yang, Chitta Baral, and Yiannis Aloimonos. [Answering Image Riddles using Vision and Reasoning through Probabilistic Soft Logic](#). *arXiv preprint arXiv:1611.05896*, 2016.
- ⑦ Somak Aditya. [Explainable Image Understanding Using Vision and Reasoning](#). In *2017 AAAI Doctoral Consortium*, 2017.
- ⑧ Somak Aditya, Yezhou Yang, Chitta Baral, Yiannis Aloimonos, and Cornelia Fermüller. [Image Understanding using Vision and Reasoning through Scene Description Graph](#). *Computer Vision and Image Understanding (CVIU)*, 2017. In Press, Accepted Manuscript.
- ⑨ Somak Aditya, Yezhou Yang, and Chitta Baral. [Explicit Reasoning over End-to-End Neural Architectures for Visual Question Answering](#). In *Proceedings of the Thirty-Second AAAI Conference on Artificial Intelligence, New Orleans, Louisiana, USA, February 2-7, 2018*, 2018.

CONFERENCE PRESENTATIONS

📖 <i>Explicit Reasoning over End-to-End Neural Architectures</i>	2018
Hilton, New Orleans, Louisiana, AAAI 2018 Technical Talk	
📖 <i>Explicit Reasoning over End-to-End Neural Architectures</i>	2018
Arizona State University, Tempe, USA, 2018 Southwest Robotics Symposium	
📖 <i>Explainable Image Understanding using Vision and Reasoning</i>	2016
Hilton Union Square, San Francisco, CA, USA, AAAI 2017 Doctoral Consortium	
📖 <i>Visual Commonsense for Scene Understanding Using Perception, Semantic Parsing and Reasoning</i>	2015
Stanford University, California, USA, 2015 AAAI Spring Symposium Series	

PROFESSIONAL SERVICES

Organizer

- Integrating learning of Representations and models with deductive Reasoning that leverages Knowledge, KR 2018 (<https://sites.google.com/view/r2k2018/home>)

Conference Reviewer: IJCAI 2016, AAAI 2017, IJCAI 2017

Journal Reviewer: The Visual Computer, Robotics and Autonomous Systems (RAS), AIJ, CVIU

Program Committee Member: Cognitive Vision 2019 (ACS at MIT)

PROJECTS (During PhD)

Understanding images and videos using a combination of Computer Vision, Statistical and Logical Reasoning

Advisors: Prof. Chitta Baral, Dr. Yezhou Yang Arizona State University
Collaborator: Prof. Yiannis Aloimonos University of Maryland, College Park
i) Solving Image Riddles using Vision and Reasoning, ii) Visual Question Answering using Deep Learning and Probabilistic Soft Logic, iii) Image Caption Generation Through Knowledge Graphs from Images

Compositional and Generative modeling of Images from text

Advisors: Dr. Yezhou Yang Arizona State University
Collaborator: Dr. Maneesh Kr. Singh Verisk Analytics, New Jersey
The goal of the project is to learn a generative model of natural images that abides by properties of compositionality with respect to an input condition (text or features).

Building a Knowledge Parser for Formal Representation of English Text

Advisor: Prof. Chitta Baral Arizona State University
Parsing Natural Language Text and Creating a Knowledge Graph using a combination of Rule-based and Machine Learning Techniques.

Integrating Statistical and Logical Approaches in Recognizing Social Constructs from Textual Conversation

Advisor: Prof. Chitta Baral Arizona State University
Our goal was to recognize high-level social constructs such as Leadership and Status from textual conversation using an approach that integrates statistical methods and symbolic logic based methods.

PREVIOUS PROJECTS

Applying incremental clustering for Link Prediction

Advisor: Prof M. Narasimha Murty Indian Institute of Science
Primary goal is to apply unsupervised learning (mainly DC-Tree Clustering and our novel incremental clustering) algorithms to predict links in social networks, collaboration networks and compare the results to that of supervised learning methods.

Generic Incremental K-Means Clustering

Advisor: Prof M. Narasimha Murty Indian Institute of Science
Solving the generic incremental K-Means clustering problem, proposing a modified incremental framework and an order-independent idealistic solution.

Structured Information Retrieval using XML

Advisor: Prof M. Narasimha Murty Course Project, Indian Institute of Science
Hosting different type of XML files (for e.g. an XML which contains the details of actors, actresses or an XML that contains student information) in DB2, we built a stand-alone information retrieval system that when searched with names or any keyword present in the any of the actors, students, cars, movie, department XML files will retrieve the relevant XML elements from the files.

An energy-efficient hierarchical, distributed clustering for clustering sensor nodes in Sensor Networks

Advisor: Prof M. Narasimha Murty Indian Institute of Science
We proposed a two step (first centralized, and then distributed) algorithm which attempts to create

hierarchical cluster of the nodes in a wireless sensor network and maintain and hence adapt the cluster configuration over time. The clustering is a constrained one, where the algorithm tries to produce clusters so as to minimize the communication energy dissipation over the network.

REFERENCES

Available on Request