

# Somak Aditya

PhD Candidate, 4<sup>th</sup> Year, Computer Science  
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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

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|--|---|
| <i>Doctor of Philosophy</i> , Computer Science | <b>Arizona State University</b> , Tempe, AZ |
| Advisors: Prof. Chitta Baral, Dr. Yezhou Yang  | August 2014-Current                         |
| GPA 4.0 (out of 4.0)                           |   |

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

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|---|--------------------------------------|
| <i>Bachelor of Engineering</i> , Computer Science | <b>Jadavpur University</b> , Kolkata |
| CGPA 8.87 (out of 10), 7 <sup>th</sup> in Class   | 2005-2009                            |

## TEACHING EXPERIENCE

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| <i>Teaching Assistant</i> , Department of Computer Science, Arizona State University   | 2014 – 2016 |
| <ul style="list-style-type: none"><li>• CSE-576 Natural Language Processing, Fall 2015 and 2016</li><li>• CSE-471 Introduction To Artificial Intelligence, Spring 2016</li><li>• CSE-310 Data Structures and Algorithms, Spring 2015</li></ul> |             |

## PROFESSIONAL EXPERIENCE

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|--|---------------------------|
| <i>Strand Life Sciences Pvt. Ltd.</i> , 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. |                           |

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|--|---------------------------|
| <i>Yahoo Software Development India Pvt. Ltd.</i> , 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) 15<sup>th</sup> in Graduate Aptitude Test in Engineering (GATE) 2009, entrance exam of the IISc & IITs, in Computer Science & Engineering.
- **WBJEE, 2005** Ranked 105<sup>th</sup> 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 Fermüller. [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 32nd AAAI Conference on Artificial Intelligence*, 2018. To Appear.

## CONFERENCE PRESENTATIONS

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

## ONGOING PROJECTS

*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.

## PREVIOUS PROJECTS

*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.

*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.

## PROFESSIONAL SERVICES

Conference Reviewer: IJCAI 2016, AAAI 2017, IJCAI 2017

Journal Reviewer: The Visual Computer

## REFERENCES

Available on Request