Biswajit Paria

5th year undergraduate (dual degree)
Dept. of Computer Science and Engineering
Indian Institute of Technology Kharagpur

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Education

Indian Institute of Technology Kharagpur, India Jul 2012 - Apr 2017
Bachelor and Master of Technology (dual degree) with Honours
in Computer Science and Engineering
GPA 9.77/10.0, highest among final year dual degree students.

Kendriya Vidyalaya IIT Kharagpur Jul 2010 - Apr 2012
All India Senior School Certificate Examination (AISSCE)
Central Board of Secondary Education (CBSE)
Percentage score 92.4%

Kendriya Vidyalaya IIT Kharagpur Apr 2005 - Apr 2010
All India Secondary School Examination (AISSE)
Central Board of Secondary Education (CBSE)
GPA 9.8/10.0

Interests

My broad interests are in Machine Learning and AI. Currently I am working on general deep learning including unsupervised learning methods such as Generative Adversarial Networks and Variational methods. I am also interested in Reinforcement Learning after having recently taken a formal course on it.

Internships

Indian Institute of Science, Bangalore, India Summer 2016
Natural Language Inference (NLI) using Deep Learning for NLP
under Prof. Ambedkar Dukkipati

Worked with the Stanford NLI dataset. Given two sentences, the task is to determine whether the sentences are related as an entailment, contradiction or are neutral. We explored models using LSTMs, Attention Models, and Dependency Parses. Eventually, we came up with an hybrid model which is currently under preparation for submission in a reputed conference.

University of Southern California, Los Angeles, USA Summer 2015
Computational Phenotyping using Deep Neural Networks
under Prof. Yan Liu

Worked with ICU time series data consisting of a multitude of medical parameters and used deep learning with a laplacian prior regularizer, to predict health outcomes. We performed causality analysis on the final layer nodes, analyzed the activations of the most *causal* nodes using decision trees, and extracted their maximally activating inputs. This analysis is a step towards developing a robust automated symptom analyzer.

Indian Institute of Technology Kharagpur, India Summer 2014
On Farey Table and its Compression for Space Optimization with Guaranteed Error Bounds
under Prof. Partha Bhowmick

Studied the number theoretic properties of Farey Sequences and the Farey Table, and came up with a novel algorithm for a lossy compression of the Farey Table. The Farey Table is an useful data-structure in digital geometry. It's quadratic size ($\Theta(n^2)$) prohibits its use for large dimensions. The compressed table has a size of ($O(n \log n)$), thus allowing table creation for large n.

Research Projects

Bachelor's Thesis 2015 - 2016
Visualization Regularizers for Neural Network based Image Recognition
Advisor: Prof. Pabitra Mitra

Introduced a novel regularizer for Neural Networks based on the *visualizations* of the hidden nodes. We leveraged the closed algebraic form of the visualizations of the first layer nodes, and used it as a smoothness prior. We show that the regularizer is a special case of the general Tikhonov regularization. Experimental

results show that the visualization regularizers are an improvement over standard L2 regularizers.

Advanced Machine Learning Course Project Spring 2016
Data Matrix Size Reduction using Sampling for Scalable Machine Learning
under Prof. Sourangshu Bhattacharya, IIT Kharagpur and Prof. Anirban Dasgupta, IIT Gandhinagar

Implemented various sampling and projection algorithms on synthetically generated datasets and tested on binary SVM classification. We implemented Clarkson Woodruff's feature sampling, Achlioptas' methods for euclidian distance preservations and low rank approximations, and leverage score based sampling.

Papers

Avisek Lahiri, Biswajit Paria, Prabir Kumar Biswas. **Forward Stagewise Additive Model for Collaborative Multiview Boosting.** *IEEE Transactions in Neural Networks and Learning Systems*, 2016. (Under minor revision)

Biswajit Paria, Anirban Santara, Pabitra Mitra. **Visualization Regularizers for Neural Network based Image Recognition.** *arXiv preprint arXiv:1604.02646*, 2016

Sandipan Sikdar, Marcin Bodych, Rajib Ranjan Maiti, Biswajit Paria, Niloy Ganguly, Tyll Krueger, Animesh Mukherjee. **On the broadcast of segmented messages in dynamic networks**. *IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, 2015.

Other Projects

Learning to Play 2-player Computer Soccer using Deep Reinforcement Learning Autumn 2016
Ongoing Design Lab project.

Distributed P2P File Sharing and Search System, Distributed Systems Course Project Spring 2016
Implemented a P2P file sharing platform for distributed search and download,
with replication of the file database.

A Search Engine for Mathematical Formulae, NLP Course Project Autumn 2015
To search for text and mathematical formulae in academic articles.

TinyC Compiler, Compilers Course Project Autumn 2014
A compiler for a C-like language.

Genetic Algorithm based Jigsaw Solver Jan - 2014
A jigsaw puzzle solver for images divided into uniform sized squares and randomly shuffled.

Academic Honors and Awards

Goralal Syngal Scholarship 2015 & 2016
for academic excellence at IIT Kharagpur.

Charubala Devi Memorial Prize 2015
for being the best in order of merit among all third year students.

Viterbi-India Scholarhip 2015
for funding a summer internship at USC. One of the 20 scholars in India.

ACM ICPC 2015 and 2016 World Finalist 2015
Our team qualified for the International Collegiate Programming Competition (ICPC)
twice, in 2015 and 2016. One of the 7 teams from India.

JBNSTS third best project 2014
Awarded for our work on Counting Dyck Paths of Bounded Height.

Jagadish Bose National Science Talent Search (JBNSTS) Scholar 2013
Awarded to 30 candidates in the state of West Bengal.

Indian National Physics Olympiad (INPhO) Awardee 2012
Among top 30 candidates in India.
Selected to attend the International Physics Olympiad (IPhO) selection camp.

Kishore Vaigyanik Protsahan Yojana (KVPY) Scholar 2011
by Dept. of Science and Technology, Govt. of India for exceptional aptitude in basic sciences.
Stood 7th in India.

Indian National Mathematical Olympiad (INMO) Awardee 2010

Among top 30 candidates in India.
Selected to attend the International Mathematical Olympiad Training Camp (IMOTC).

Australian Mathematics Competition (AMC) Gold Medallist 2009
Recieved a Gold Medal in the Intermediate Division. One of the 23 medallists in the world.

Technical Skills

Proficient in C, C++, Python, Java, Bash, Matlab, Tensorflow, Numpy
Familiar with Mathematica, HTML, Javascript, Caffe, Theano, Scikit-learn, Keras, Lasagne, Nltk, Stanford Core-NLP

Coursework

Relevant
Machine Learning · Advanced Machine Learning · Probability and Statistics · Speech and Natural Language Processing · Artificial Intelligence · Matrix Algebra · Information Retrieval · Reinforcement Learning (ongoing NPTEL course by B. Ravindran, IIT Madras)

Others
Algorithms-I & II · Discrete Mathematics · Parallel and Distributed Algorithms · Selected Topics in Algorithms · Computational Statistics · Advanced Graph Theory · Database Management Systems · Operating Systems · Computer Networks · Computer Organization and Architecture · Theory of Computation · Operations Research · High Performance Computer Architecture · Distributed Systems · Cryptography

Extra Curricular Activities

Machine Learning Teaching Assistant Autumn 2016
Responsibilities include interaction with students, and supervising and and evaluating term projects.

Machine Learning Reading Group 2016
Organizer and speaker at the weekly machine learning reading group.

National Service Scheme 2012-2014
Helped under-privileged children in academics and created an enjoyable school atmosphere for learning.