Sourav Pal

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CS PhD Student at University of Wisconsin-Madison

Education

University of Wisconsin-Madison   Aug 2019 - Present
PhD in Computer Sciences
Advisor: Prof. Vikas Singh
CGPA: 4.0/4.0

Indian Institute of Technology Kharagpur, India   Jul 2014 - May 2018
B.Tech. (Hons.) in Computer Science and Engineering
CGPA: 9.33/10.0

Research Interests

Machine Learning, Deep Learning, Computer Vision.

Papers

- Mehta Ronak, **Pal Sourav**, Singh Vikas, Ravi Sathya N. "Deep Unlearning using conditional dependence" (In Submission; title altered for anonymity)
- Gupta Prakhar, Shubh Gupta*, Ajaykrishnan Jayagopal*, **Sourav Pal***, and Ritwik Sinha. "Saliency Prediction for Mobile User Interfaces." In Applications of Computer Vision (WACV), 2018 IEEE Winter Conference on, pp. 1529-1538. IEEE, 2018. (Published, Paper Link)
- **Sourav Pal***, Tharun Mohandoss*, Pabitra Mitra. "Visual Attention for Behavioral Cloning in Autonomous Driving." 11th International Conference on Machine Vision (ICMV 2018). (Published, Paper Link)
- Ankan Mullick, **Sourav Pal**, Projjal Chanda, Arijit Panigrahy, Anurag Bharadwaj and Siddhant Singh. "D-FJ: Deep Neural Network Based Factuality Judgment" (Truth Discovery and Fact Checking: Theory and practice workshop, ACM SIGKDD 2019) (Paper Link)
  * Authors contributed equally.

Patents

- Ritwik Sinha, Prakhar Gupta, Shubh Gupta, **Sourav Pal** and Ajaykrishnan Jayagopal. "Saliency Prediction for a Mobile User Interface." US 10664999 (Granted)
- Prakhar Gupta, Ritwik Sinha, Shubh Gupta, **Sourav Pal** and Ajaykrishnan Jayagopal. "Saliency Prediction for Informational Documents." US 15814009

Work Experience

Adobe Inc.   Jul'18 - Jul'19
Member of Technical Staff, Document Cloud - Adobe Acrobat
- Worked on prototyping a new feature for the Adobe Acrobat Reader. This feature enabled providing intelligent insights around conversations using machine learning.
  The prototype was declared as the winner of the Adobe Document Cloud HackWeek in Noida.
- Worked on voice first documents for Acrobat Reader and integrated the application with Amazon Alexa.

Internships

Adobe   May'21 - Aug'21
Data Science Intern
- Worked on controlled text summarization task.
- Proposed a novel pipeline for the task leveraging on the recent state of the art techniques for the problem.
- Implemented the end to end pipeline.
- Improved already existing methods to improve performance in the task of controlled text generation.

Adobe Research, BigData Experience Lab   May'17 - Jul'17
Research Intern
Advisor: Dr. Ritwik Sinha
- Worked on analysis and improvement of mobile user interfaces using eye gaze tracking.
- Used computer vision techniques to develop deep learning models to predict visual saliency of mobile interfaces.
- Developed metrics for evaluating saliency on a new kind of data set, which was collected by deploying an application in Amazon Mechanical Turk.
  Presented the work as a talk at the Adobe Tech Summit 2019 (Feb'3-7), San Francisco.

National Digital Library of India, MHRD Government of India.   May'16 - Jul'16
Summer Intern
Advisor: Prof. Partha Pratim Das, IIT Kharagpur
- Used dynamic instrumentation for debugging and analysis of multithreaded applications.
- Developed algorithms to create tools for data-race detection, deadlock detection, thread-model detection.
- Integrated the above tools with the popular IDE Eclipse as Plug-ins and with Code-blocks as user-defined tools.

Research Projects

University of Wisconsin-Madison   Aug'20 - Present
Advisor: Prof. Vikas Singh
- Currently working on utilizing ideas from wavelet transform to propose novel algorithms and architectures for present day deep learning problems.
- Previous project involves using a newly proposed correlation coefficient in variable selection. With the use of randomization, we were able to scale it to deep learning problems. We show Markov Blanket feature selection to be faster using this approach. We make the problem of deep unlearning feasible with a novel Hessian selection scheme based on the proposed framework. We show unlearning from both computer vision and natural language processing tasks with models at the scale of transformers. This manuscript is currently under review.

Bachelor's Thesis, Indian Institute of Technology Kharagpur   Jul'17 - May'18
Advisor: Prof. Pabitra Mitra
> The goal of the work was to use **Visual Attention** to enhance performance of **Autonomous Vehicles**. The first method proposed a supervised learning approach in which we collected eye-gaze data for the task of driving and used this to train a model for predicting the attention map. The second method described an unsupervised approach where we trained a model to learn to predict attention as it learns to drive a car. The results were conclusive of the fact that incorporation of visual saliency in the autonomous driving agent is capable of improving performance.
> ***The project was selected by the Department of Computer Science & Engineering, IIT Kharagpur for Patent Filing***

Detection and Classification of Multiple Objects in an Image   Dec 2017
SMARTathon 2017
> Developed an end to end system, which given an image could detect multiple objects and classify them. Proposed novel techniques to improve performance of existing systems. These included an image inpainting approach to better classify overlapping objects, a recursive algorithm which enabled detection and classification of minute objects in an image. Finally confidence scores and correlation between image labels were used to output the most suitable object classes.

Deep Learning in opinion detection, Natural Language Processing Term Project   Aug'17-Nov'17
Advisor: Prof. Niloy Ganguly and Mr. Ankan Mullick
> Used deep learning techniques to develop models to detect and categorize diverse opinionated sentences from within online news articles, both in general and event specific datasets. Implemented LSTM and CNN based models; used GloVe embedding word vectors and dependency based word embedding for training on MPQA and Yahoo datasets. Also, studied how the sentiment varies according to the opinion fraction in an article.

Object Segmentation in Images, Image Processing Term Project   Sep'17 - Oct'17
Advisor: Prof. Partha Pratim Das
> Worked on detecting the salient boundaries in The Berkeley Segmentation Dataset. Developed an approach based on histogram statistics after initial pre-processing of the original three channel input. The results were comparable to the human annotations.

JuiceLoc, Smart-phone Computing and Applications Term Project   Aug'17-Nov'17
Advisor: Prof. Bivas Mitra
> Worked on crowd sourced mobile phone charging point locator in busy locations based on magnetic field strength and WiFi signal strength variations. Developed a neural network model that generates indoor location of available charging stations based on charging patterns of other users.

Other academic projects, are present in my Github account.

Technical Skills

Programming Languages:
- **Proficient:** Python, Matlab, C++

- **Intermediate:** HTML, Bash, Verilog(HDL), Julia

Tools & Frameworks: PyTorch, Keras, TensorFlow, Caffe, Numpy, Scikit-learn, OpenCV, Weka, NLTK, LaTeX

Relevant Coursework

Mathematical Foundations of Machine Learning	Introduction to Computational Learning Theory	
Machine Learning	Learning Based Methods in Computer Vision	Matrix Algebra
Advanced Machine Learning	Probability and Statistics	Image Processing
Artificial Intelligence	Speech and Natural Language Processing	Deep Learning
Methods of Computational Mathematics	Data Visualization	
Non-Linear Optimization 1	Partial Differential Equations *	Real Analysis 1*

($*$ Ongoing courses)

Teaching Experience

- Head Teaching Assistant for Data Programming 1 (CS220) Fall 2020 at UW-Madison
- Teaching Assistant for Data Programming 1 (CS220/301) Spring 2020/Fall 2019 at UW-Madison

Academic Achievements

- Secured an **All India Rank(AIR) of 411 in JEE Main 2014** out of 1.5 million candidates.
- Secured a rank of **51 in WBJEEM 2014** out of 1,00,000 candidates.

Positions of Responsibility

- Served as mentor to undergraduate students at **UW-Madison** as part of the WISCERS program
- Served as **School Captain** of The Assembly of God Church School, Purulia. Successfully conducted all student activities during the academic year.
- Served as mentor to a group of six first year undergraduate students for a period of two years from 2016-2018 at **IIT Kharagpur**.

Extra Curricular Activities

- Active member of **National Service Scheme**(NSS). Awarded **Certificate of Recognition** for two years of extraordinary social service.
- One of the 10 teams in India to participate in **SMARTathon India 2017** organized jointly by **Samsung** and **FIIT IIT Delhi**.
- Emerged as **Runners-up at State Level Inter-school Quiz Competition**