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Ranjan Mondal

Curriculum Vitae

With over four years of industry experience and a PhD in Machine Learning, I specialize in Deep Learning, Graph ML, and classical Machine Learning. My passion lies in leveraging the mathematical foundations of ML to solve complex business challenges. I have a proven track record of analyzing patterns, designing scalable ML solutions, and executing fast, business-driven implementations.
Additionally, I have hands-on experience in fine-tuning Large Language Models (LLMs), as well as working with Variational Autoencoders (VAEs), Reinforcement Learning, and Generative Adversarial Networks (GANs). My expertise enables me to bridge cutting-edge research with real-world applications, delivering impactful AI solutions.

Industry

Jan 2023 - Present — **JP Morgan Chase & Co**, *Bangalore, India*,
Applied AI/ML as Sr. Associate, Working on applied AI/ML in financial domain. Specifically, working on large scale graph learning, mathematical modeling of financial optimization problem, large language models, Large-Scale Matching, LLM orchestration .

2021 - 2023 — **Samsung Research**, *Bangalore, India*,
Lead Research Engineer,
Worked on state-of-the-art video panoptic segmentation problems for different embedded platforms. It involves real time instance tracking, temporal stability accurate mask prediction for video .

Education

2015 - 2021 — **Doctor of Philosophy in Computer Science**,
Machine Learning and Computer Vision,
Indian Statistical Institute (ISI), Kolkata, India.
Thesis: *Morphological Network: Learning with Morphological Neurons*
Supervisor: Prof. Bhabatosh Chanda

2013 - 2015 — **Master of Technology (M.Tech)**,
Computer Science,
Indian Statistical Institute(ISI), Kolkata, India.
Percentile: First Division with Distinction
Dissertation: *Unified Pre-fabrication and Post-fabrication Hardware Security*
Supervisor: Prof. Susmita Sur-Kolay

2009-2013 — **Bachelor of Technology (B.Tech)**,
Computer Science and Engineering,
Kalyani Government Engineering College, Kalyani, India.
DGPA: 8.08
Project: *Linux Kernel and File System Development*

Internship & Training

June. 2016 — Vision Understanding and Machine Intelligence Summer School, Universidade do Porto, Portugal

June. 2014 — Summer Intern at Advanced Micro Devices (AMD), Bengaluru, India
Mentor: Dr.Anasua Bhowmik - Principal Member of Technical Staff

Technical Skills

Language: Python, C, C++, Shell Script(bash)

Tools : Pytorch, TensorFlow, Django, Vim, Latex, CVXPY, PySpark, Neo4J, Backtrader, Plotly

MLOps Tools: SageMaker, Lambda functions, Step functions, EMR, ECS

Research Interests

Machine Learning, Quantitative Trading, Mathematical Modeling

Implicit Learning, Reinforcement Learning

Invited Talks & Tutorials

July 2024 Invited talk at Science and Engineering Research Board (SERB) Sponsored Workshop "Deep Learning: Foundation to Cutting Edge Technologies", UPES, Dehradun, India

March 2022 Invited talk on "Learning with structuring elements" at Winter School on Deep Learning, ISI, Kolkata, India

March 2020 Invited talk on "Deep Learning" at Indian Institute of Information Technology(IIIT), Guwahati, India

July 2019 Tutorial on "Data Visualization" using Python at ISI-ICTP Summer School on Internet of Things Indian Statistical Institute, Kolkata

Jan. 2019 Invited talk on "Object Supervised Learning to Adverserial Learning" at Techno Main, Salt Lake, Faculty Development Program on Image and Vision Computing

June. 2018 Tutorial on Convolutional Neural Network and Autoencoder at Indian Statistical Institute (Kolkata), Fourth Summer School on Computer Vision, Graphics and Image Processing

June. 2017 Tutorial on Python and Deep Learning at Indian Statistical Institute (Kolkata), Fourth Summer School on Computer Vision, Graphics and Image Processing

April. 2017 Invited talk on Python at Midnapore college (Medinipur, West Bengal), Workshop in Python

Feb. 2016 Invited talk on "System Administration" at University of Calcutta, IEEE Electron Devices Society sponsored workshop in Python and System Administration

Research Projects

Anomaly Detection from a Crowded Video Data

Given a crowed video from a static surveillance camera of normal crowd behaviour. A representation of normal behaviour is learned to detect anomaly

Image Dehazing

Deep learning approach has been used estimate to Transmittance Map and Environmental Illumination for Image Dehazing(code: `https://github.com/ranjanZ/CVPR2018_Dehazing`

Text/Non-Text Classification of a Document Image

Segmentation of text/non-text classification region in document image using convolutional neural network. We got comparable results with other state-of-the-art.

Morphological Network

Network with morphological structuring elements, dilation and erosion. we have shown that single hidden layer network with enough dilation-erosion node followed by a weighted combination layer can approximate any continuous function. It produces higher number of hyper planes than a regular neural network

Neural Network with Complex Weights

In classical neural network, we generally use real weights. Here we have tried to use complex weights and observed theoretically and experimentally whether we are getting any advantage or not

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Image De-raining by learning morphological Structuring Elements

Rain Drop has particular size and shape. We have used our 2D version of morphological Network and learn the dilation and erosion kernels to de-rain images(code: `https://github.com/ranjanZ/2D-Morphological-Network`)

Image Localization and Mapping

Given a Multiple images and from a single camera. We have developed an algorithm to find the pose of the camera.

Other Projects

Anomaly Detection in Similar Company Group

Built eigen centrality-based anomaly detection for company graphs, handling missing data

Company Peer Identification Using Multi-Modal Graph Learning

Built a scalable GNN system processing 400M+ multi-modal company records, using custom distance metrics and EMR for accurate peer-matching with missing-data robustness.

Fine-tuned LLaMA-2 (7B parameters) using a 4-GPU setup for parallelized training

Developed a structured industry summarization system for company profiles, ensuring consistent formatting and key information extraction

Automated Option Chain Analysis Tool with CI/CD Deployment

Built a tool fetching real-time NSE data, computing key metrics. Automated deployment via CI CD pipeline with Docker containerization. Implemented infrastructure-as-code for scalable cloud deployment. (`https://github.com/ranjanZ/option_chain_analysis`)

Contributed to MLPACK (http://mlpack.org)

Implemented Parallel Stochastic Gradient Descent method that can run on multiple CPU cores. (Pull Request #635)

Implemented a library of nonlinear conjugate gradient optimization. (Pull Request #604)

Build a web API's for Image De-hazing

Implemented API's using Django which can be deployed at Amazon Web Service (EC2) to dehaze a foggy image. A web page is also developed for the end users by which dehaze API can be called.

Linux Kernel and File System Development

Developed a disk based flexible filesystem as a kernel module with all essential filesystem features.

Others

Ranked 1st at Global Hackathon JPMC at Bangalore Region

Impact and Innovation award at JPMC, Bangalore

Ranked 5th at NIRTE2018(CVPR-W) Challenge on Image De-hazing

Intel AI Student Ambassador

Reviewer Of IEEE Transactions on Image Processing.

Reviewer Of IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)

Reviewer Of International Conference on Computer Vision(ICCV)

Reviewer Of Pattern Recognition Letters.

Received travel grant to visit conference Paris, France from DGCI-2019

Ranked 2nd at hackathon by Intel titled "Making Autonomous Vehicles Safer For Humans"

Received travel grant from CSIR to visit conference, ICDAR-2019, Sydney, Australia

Publications and Preprint

Ranjan Mondal and Bhabatosh Chanda. Anomaly detection using context dependent optical flow. In *Proceedings of the Eleventh Indian Conference on Computer Vision, Graphics and Image Processing*. ACM, 2018

Ranjan Mondal, Sanchayan Santra, and Bhabatosh Chanda. Image dehazing by joint estimation of transmittance and airlight using bi-directional consistency loss minimized fcn. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops*, pages 920–928, 2018

Sanchayan Santra, Ranjan Mondal, and Bhabatosh Chanda. Learning a patch quality comparator for single image dehazing. *IEEE Transactions on Image Processing*, 27(9), 2018

Ranjan Mondal, Pulak Purkait, Sanchayan Santra, and Bhabatosh Chanda. Morphological networks for image de-raining. In *International Conference on Discrete Geometry for Computer Imagery*, pages 262–275. Springer, 2019

Ranjan Mondal, Sanchayan Santra, Soumendu Sundar Mukherjee, and Bhabatosh Chanda. Morphological network: How far can we go with morphological neurons? *BMVC*, 2022

Ranjan Mondal, Deepayan Chakraborty, and Bhabatosh Chanda. Learning 2d morphological network for old document image binarization. In *15th IAPR International Conference on Document Analysis and Recognition (ICDAR)*. IEEE, 2019

Ranjan Mondal, Moni Shankar Dey, and Bhabatosh Chanda. Image restoration by learning morphological opening-closing network. In *Accepted at Mathematical Morphology - Theory and Applications*. DE GRUYTER, 2019

Swalpa Kumar Roy, Ranjan Mondal, Mercedes E Paoletti, Juan M Haut, and Antonio Plaza. Morphological convolutional neural networks for hyperspectral image classification. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 14:8689–8702, 2021

References

Prof. Bhabatosh Chanda, ISI, Kolkata, bchanda57@gmail.com

Prof. Swagatam das, ISI, Kolkata, swagatam.das@isical.ac.in

Dr. Pulak Purkiat, Amazon, Adelaide, pulak.isi@gmail.com

Declaration

- I hereby declare that the above information is correct to the best of my knowledge.