ARUN PATRO

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EDUCATION

Courant Institute, New York University 2022 - Now
MS in Computer Science

Indian Institute of Technology, Kharagpur 2013 - 2018
B.Tech. + M.Tech. in Electrical Engineering (Signal Processing)

WORK EXPERIENCE

Normal Computing New York City
ML Resident Jun 2023 - Dec 2023

- **Tree Search with LLMs**: Worked on Tree-of-Thought style planning algorithms for System-2 and objective-driven problem solving and code generation using with LLMs. Developed **branches**, an OSS to visually interact with these trees.
- **Verilog Code Gen**: Explored LLMs for generating Verilog code, using prompting, contrained generation, execution feedback and Reinforcement Learning to solve the VerilogEval dataset.

Meesho Bangalore + Hyderabad
Data Scientist - 2 Nov 2021 - Aug 2022

- **Visual Taxonomy Tagging**: Built the Image Engine which powered Attribute Extraction, Similarity Learning and Brand Logo identification across 35 categories and avg 10m products per month. Deployed and maintained the ML systems end-to-end with monitoring, logging, sanity checks and other pipelines. This led to 30% savings = $20M per year

Myntra Designs Bangalore
Data Scientist — Supply Chain Inbound Mar 2019 - Aug 2020

- **Style Grading**: Modelled a style's sales potential using a probabilistic model, trained on similar style's sales data. Grade score is the probabilitiy that the style's $CVR > CVR_{threshold}$. Led to a 10% improvement in Revenue Per Impression and catalouge health. This improved the platform and catalouge hygiene.
- **Regional Utilisation**: Modelled the optimal allocation of products to Myntra's principal warehouses considering their dynamic capacity. Estimated the regional demand of products using product attributes as features and MLP model. Optimized using Integer Programming.

Myntra Designs Bangalore
Data Scientist — Image Sciences Jul 2018 - Mar 2019

- **GAN Experiments**: Experimented with text-to-image generation using Attentional GANs to generate novel designs conditioned on natural language. We showed the control of specific attributes using careful interpolation. Proposed gradient aware loss functions for estimating noise vectors in GANs. Improved symmetry of stripes in generations by imposing symmetry constraints.

SELECTED BLOGS

- **Monte Carlo Tree Search for Code Generation using LLMs**
- **Developing Advanced Reasoning and Planning Algorithms with LLMs**
- **Benchmaring rust-vs-cpp for graphics**

RESEARCH AND PUBLICATIONS

CVIT, International Institute of Information Technology - Hyderabad Hyderabad
Research Fellow — Vision for Mobility Sep 2020 - Sep 2021

Worked on improving object detectors and understanding the role of contextual objects to aid scene understanding. Experimented with Compositional Models and Part Detectors for robust object detection under partial occlusion of traffic objects on BDD, KITTI and 2000km of IDD.

Intelligent Warehouse Allocator for Optimal Regional Utilization [link]
AI for Fashion Supply Chain Workshop, KDD 2020
Girish Sathyanarayana, Arun Patro

Let AI Clothe You: Diversified Fashion Generation [link]
Computer Vision - Workshops, ACCV 2018
Rajdeep H. Banerjee, Anoop Rajagopal, Nilpa Jha, Arun Patro, Aruna Rajan

Evaluation of Loss Functions for Estimation of Latent Vectors from GAN [link]
International Workshop on Machine Learning for Signal Processing (MLSP)
Arun Patro, Vishnu Makkapati, Jayanta Mukhopadhyay

Enhancing Symmetry in GAN Generated Fashion Images [link]
BCS SGAI International Conference on AI-2017
Vishnu Makkapati, Arun Patro

PROJECTS

3D Digitization of Humans for Size and Fit Estimation Aug 2020
Won BRONZE at annual Myntra Hackathon. Using two images of a person in tight fit clothes, we could estimate the size and fit of a person upto 1 inch accuracy. We used Open Pose and PIFuHD.

Automated Fashion Generation using Generative Adversarial Networks 2017 - 2018
with *Vishnu Makkapati* and *Prof. Jayanta Mukhopadhyay*
Modelled DCGAN variants to improve quality of fashion images with periodic patterns (stripes, checks, etc). Worked on inverting GANs to encode images in latent space, and create mix-and-match designs.

Blur Kernel Estimation using Deep Convolutional Networks 2016 - 2017
with *Dr. Rajiv Ranjan Sahay*
Estimation of guassian blur kernels to quantify the degree of defocus blur of non-uniformly blurred images. Trained CNNs to learn the blur parameter (sigma) of a gaussian blur from image patches.

SKILLS

Languages	English, Hindi, Odia, Python, Rust, JS, C++
Data Science	PyTorch, Python for Data Science Stack
Courses	Computer Graphics, Computer Vision, Machine Learning, Deep Learning, Bayesian Machine Learning, Signal Processing, Optimization, Natural Language Processing, Deep Reinforcement Learning, Copyright Law, Indian Constitution Law