Pulkit Madaan

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Education

Johns Hopkins University
MSE Computer Science
Aug 2022 – May 2024 (Expected)

Indraprastha Institute of Information Technology Delhi
B.Tech in Computer Science and Applied Math
Aug 2016 – Aug 2020
CGPA: 9.23/10.0
Best Academic Performance in Major | [Thesis]

Skills

Languages: Python, Java, C++, Bash, R
Other: PyTorch, Jupyter, Git, Torchtext, LaTeX, Streamlit, Numpy, scikit-learn, PyTorch Lightning, Detectron2, Voxel51, Docker, Hydra, NNI.

Experience

Associate ML Scientist - I Jul'20 - Jul'22
Wadhwani Institute for Artificial Intelligence
Agriculture Team, Core ML Team [Code]
- Developed a flexible & generic Object Detection codebase with rejection, visualization & deployment capabilities, on top of PyTorch Lightning, Hydra, & NNI.
- Improved the existing model, adding new architectures & rejection framework incorporating on-ground feedback.
- Codebase Open-Sourced [Code].
- Solution won the Global Change Award 2022 [article].
- Built a remote sensing prototype to advise farmers on the frequency and quantity of crop-specific irrigation

CV Research Assistant Nov'20 - Ongoing
MINDS @ JHU
Advisor: Matthew M. Ippolito, Benjamin Haeffele
- Developing techniques for Malarial Parasite detection and life-stage prediction with low data and domain shift.
- Possible directions: sparse coding, cycleGAN, few-shot learning.

Reconstruction Research Intern May'20 - Jul'20
IIIT-Delhi
Advisor: Dr. Kaushik Kalyanaraman, Dr. Ojaswa Sharma
- Extended 3D surface reconstruction from curved cross-sections' codebase for experiments and visualization.

Bachelor's Thesis Jan'19 - Dec'19
IIIT-Delhi
Advisor: Dr. Saket Anand, Dr. Sushil Mittal
- Developed a model for better representation learning using deep neural clustering with mean-shift.
- The model learns a latent space that is clustered without the need for labels or number of clusters.

Mitacs Globalink Research Intern May'19 - Aug'19
UQAM
Advisor: Dr. Fatiha Sadat
- Developed new data augmentations & training pipeline to improve Multilingual Neural Transformer for better translation of low-resource languages.
- Work accepted at WILDRE-5 (part of LREC 2020)

Publications

- White, J., **Madaan, P.**, Shenoy, N., Agnihotri, A., Sharma, M., & Doshi, J. (2022). A Case for Rejection in Low Resource ML Deployment. ArXiv preprint `arXiv:2208.06359`. [Accepted at Challenges in Deploying and Monitoring ML Systems Workshop - NeurIPS 2022] [LINK]
- **Madaan, P.**, & Sadat, F. (2020, May). Multilingual Neural Machine Translation Involving Indian Languages. In Proceedings of the WILDRE5–5th Workshop on Indian Language Data: Resources and Evaluation (pp. 29-32).[LINK]
- **Madaan, P.**, Maiti, A., Anand, S., & Mittal, S. (2019). Deep Mean Shift Clustering. [preprint] [LINK]

Academic Service

- Served as a Reviewer, Programme Committee at The Second Workshop on Speech and Language Technologies for Dravidian Languages-ACL 2022.
- Volunteer at ICLR 2021.
- Course Assistant of Gateway Computing: Python at JHU.

Select Projects

Flow Based Generative Models: GLOW
Course: Probabilistic Graphical Models [Code] [Slides]
- Conditioned GLOW in different generation and conversion tasks (eg: replacement to vocoders, GANs)

[PyTorch, Colab]

Emotional TTS
Course: Speech Understanding [Code]
- Conditioned State-of-the-Art Text-To-Speech models, like Tacotron, on emotional labels to produce to non-robotic audios of a given text in a given emotion.

[PyTorch, Librosa, Jupyter]

Doom Playing DeepRL Agent
Course: Reinforcement Learning [Code] [Slides]
- Trained an agent using Deep Recurrent Q-Learning to play Doom: An FPS game having partially observable 3D states.
- Added the capability to self-learn as the agent plays against self to train itself.

[PyTorch, VizDoom, Jupyter]

Awards

- Part of Wadhwani AI team that won the HUL, Google and MyGov India's AI for Agriculture Hackathon. The winning prize was a grant of 1 Million INR.
- Best Academic Performance in B.Tech. CSAM [Branch Topper | Gold Medalist] **[cert]**
- Dean's Academic Excellence Award for 2 consecutive years: 2017-18, 2018-19 **[cert]**

Relevant Courses

CS: Causal Inference, Machine Translation, Speech Recognition and Understanding, Reinforcement Learning, Deep Learning, Machine Learning, Digital Image Processing, Object Oriented Programming, Algorithms, Data Structures
Math: Differential Geometry, Calculus on $\mathbb{R}^N$, Numerical PDEs, Stochastic Processes, Statistical Inference, Linear Optimisation, Real Analysis, Abstract Algebra, Discrete Structures, Scientific Computing, ODEs & PDEs