Pulkit Madaan

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Education

Johns Hopkins University
MSE Computer Science
Incoming Fall 2022

Indraprastha Institute of Information Technology Delhi
B.Tech in Computer Science and Applied Mathematics [Thesis]
Aug 2020
CGPA: 9.23/10.0
Best Academic Performance in B.Tech. CSAM

Skills

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

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. [preprint] [LINK]
- **Madaan, P., Maiti**, A., Anand, S., & Mittal, S. (2019). Deep mean shift clustering. [preprint] [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]

Academic Service

Served as a Reviewer, Programme Committee at The Second Workshop on Speech and Language Technologies for Dravidian Languages-ACL 2022

Experience

Associate ML Scientist - I **Jul'20 - Jul'22**
Wadhwani Institute of Artificial Intelligence
Agriculture Team, Core ML Team

- Developed a flexible & generic Object Detection codebase with rejection, visualization & deployment capabilities, on top of PyTorch Lightning. Improved the existing model, added new architectures & rejection framework for improved system performance incorporating on-ground feedback.
- Solution won the Global Change Award 2022 [article].
- Built a prototype that uses remote sensing to advise farmers on the frequency and quantity of crop-specific irrigation.

Summer Research Intern **May'20 - Jul'20**
Indraprastha Institute of Information Technology, Delhi
Advisor: Dr. Kaushik Kalyanaraman, Dr. Ojaswa Sharma

- Extended 3D surface reconstruction from curved cross-sections' codebase for experiments and visualisation.

Bachelor's Thesis **Jan'19 - Dec'19**
Indraprastha Institute of Information Technology, Delhi
Advisor: Dr. Saket Anand, Dr. Sushil Mittal

- Developed a model for better representation learning using deep neural clustering with mean-shift.

Mitacs Globalink Research Intern **May'19 - Aug'19**
Université du Québec à Montréal (UQAM)
Advisor: Dr. Fatiha Sadat

- Developed new data augmentations & training pipeline to improve Multilingual Neural Transformer for better translation of low-resource languages.

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.
- Recipient of Best Academic Performance in B.Tech. CSAM [Branch Topper | Gold Medalist] **[cert]**
- Recipient of Dean's Academic Excellence Award for 2 consecutive years: 2017-18, 2018-19 **[cert]**

Select Projects

Course: Probabilistic Graphical Models [**PyTorch**]
Flow Based Generative Models: GLOW
[Code] [Slides]

- Conditioned GLOW in different generation and conversion tasks (as a vocoder, as well as generation, usually done by GANs)

Course: Speech Understanding [**PyTorch, Librosa**]
Emotional TTS
[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.

Course: Reinforcement Learning [**PyTorch, VizDoom**]
Doom Playing DeepRL Agent
[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.

Relevant Courses

CS: Probabilistic Graphical Models, Speech Recognition and Understanding, Reinforcement Learning, Deep Learning, Machine Learning, Digital Image Processing, Object Oriented Programming, Analysis and Design of 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, Probability and Statistics, Linear Algebra