Akshay Goindani

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EDUCATION

Carnegie Mellon University, School of Computer Science, Pittsburgh, PA   2023 - 2025 (expected)
- MS in Intelligent Information Systems

International Institute of Information Technology - Hyderabad   2017 - 2022
- B.Tech (*Honors*) & M.S. by Research in Computer Science & Engineering
- Major CGPA - 9.21/10.00, CGPA - 8.99/10.00

PUBLICATIONS

- **Goindani, A**. and Shrivastava, M., 2021. A Dynamic Head Importance Computation Mechanism for Neural Machine Translation. International Conference on Recent Advances in Natural Language Processing.

- Sivaprasad, S.*, **Goindani, A.***, Fritz, M. and Gandhi, V., Class-wise Domain Generalization: A Novel Framework for Evaluating Distributional Shift. NeurIPS 2022 Workshop on Distribution Shifts.(* Equal Contribution)

- Sivaprasad, S.*, **Goindani, A.***, Garg, V. and Gandhi, V., 2021. Reappraising Domain Generalization in Neural Networks. *Arxiv (2022)*. (* Equal Contribution)

- Kodali, P., Sachan, T., **Goindani, A.**, Goel, A., Ahuja, N., Shrivastava, M. and Kumaraguru, P., 2022. Leveraging Code-Mixing Metrics & Language Model Embeddings To Estimate Code-Mix Quality. *Arxiv (2022)*.

RESEARCH EXPERIENCE

Research Assistant (Master's Thesis)   Spring 2019 – Spring 2022
Advisor: Professor Manish Shrivastava   *IIIT Hyderabad, India*
- Developed a dynamic head importance computation mechanism for Neural Machine Translation (NMT).
- Proposed a unified model for generation and translation of Code-Mixed languages (Under Review).

Research Assistant   Summer 2020 – Spring 2022
Advisor: Professor Vineet Gandhi   *IIIT Hyderabad, India*
- Proposed a novel class-wise domain generalization framework for evaluating distributional shift for image classification. Developed an Iterative Domain Feature Masking method that achieves SOTA performance. (Paper)

Research Assistant   Fall 2021 - Spring 2023
Advisors: Prof. Ponnurangam Kumaraguru, Prof. Jisun An   *PreCog Research Group, IIIT Hyderabad, India*
- Analyzed hate speech on Twitter, and the impact of offline events during COVID-19 on online user activity.
- Built BERT-based classifiers to detect religious hate speech in tweets, and predict user behavior (Under Review).

Research Intern   Summer 2021
Advisor: Professor Hadi Hemmati, MITACS Globalink Research Internship   *University of Calgary, Canada*
- Developed Explainable AI model to generate interpretations for complex deep learning models' (e.g., CodeBERT) predictions, on sequence-to-sequence tasks such as method name prediction, code documentation generation.

Research Intern   Winter 2020 – Spring 2021
Advisor: Professor Hogun Park, LearnData Lab   *Sungkyunkwan University, Seoul, South Korea*
- Proposed a novel approach on Augmenting Knowledge Graphs to Question-Answering Systems, using Graph Neural Networks (GNN), to impart commonsense knowledge to QA models, for Open-Domain Question-Answering task.

WORK EXPERIENCE

Associate Engineer, Machine Learning   July 2022 - June 2023
ExaWizards AI Platform   *ExaWizards Inc., Tokyo, Japan*
- Development of Temporal Activity Localization in videos using Natural Language Description of activities.

Applied Scientist Intern   Summer 2022
International Machine Learning Team   *Amazon, Bangalore, India*
- Developed Attribute Extraction Model to predict missing values of various attributes in product description.
- Enhanced performance of offline Reinforcement Learning by augmenting trajectories of online RL trained agents.

AI-ML Research & Engineering Intern   Summer 2021
ExaWizards AI Platform   *ExaWizards Inc., Tokyo, Japan*
- Designed Deep Learning techniques to retrieve body poses from images and videos in real-time, by utilizing probabilistic view-invariant pose embeddings to compute K-Nearest Neighbors of a query image.

Key Projects

Hateful Meme Classification

- Built a Multi Modal Deep Learning Classifier to classify memes as hateful vs non-hateful (Link to GitHub), using ensemble of models like VisualBert, ERNIE-VIL, DeVLBERT, OSCAR, UNITER and LXMERT.
- Ranked 12th on the leader-board of the competition hosted by Facebook AI.

Learning Bilingual Word Embeddings with Minimal Bilingual Data

- Implemented unsupervised method to learn bilingual word embeddings for English & Italian, using a common embedding space via parameterized linear transformation.
- Incorporated supervised learning with a few known translation pairs to the bilingual dictionary after every iteration. The code for the project is at GitHub.

Hybrid Machine Translation

- Proposed a Machine Translation approach that utilizes a combination of phrase tables extracted with Statistical Machine Translation methods, and a Sequence-to-Sequence architecture for Neural Machine Translation.
- The proposed approach outperforms Bi-LSTM with attention mechanism by 1 - 1.3 BLEU points for low resource languages. The code for the project is available at GitHub.

Tree-CNN

- Implemented a CNN-based hierarchical Image Classification model that utilizes the semantic relationship among the classes for prediction. The code for the project is available at GitHub.

DeepCrypt

- Developed Bayesian and Hyperplane Classifier for encrypted inputs and weights using comparison, argmax and dot product building blocks, implemented using DGK, Paillier and Goldwasser Micali Cryptosystem (Link to GitHub)

Extreme Tic-Tac Toe Bot

- Designed AI bot to play ultimate tic-tac-toe game, using alpha-beta pruning, iterative deepening search, and zobrist hashing.

Teaching Experience

Mentored students, provided multiple tutorials, designed and evaluated assignments, for courses:

Statistical Methods in AI (Fall 2020)   *Computer Graphics* (Spring 2021)
Automata Theory (Fall 2019)   *Computational Social Science* (Spring 2022)

Honors & Awards

- **Dean's List Award** for Academic Excellence (Top 5% of all students), 2018 - 2021
- ACM ICPC 2019 - Successfully cleared Online Round and secured rank 90 out of 300 candidates at Regional Level
- Recipient of MITACS Globalink Graduate Fellowship for CAD 15,000
- Secured an **All India Rank 1658** in the IIT-JEE Mains, across 1.4 million candidates, at National Level
- Secured an **All India Rank 4218** in the IIT-JEE Advanced, across 0.2 million candidates, at National Level

Technical Skills

Languages: Python, C/C++, Matlab, Bash, HTML/CSS, JavaScript
Libraries: PyTorch, TensorFlow, Pandas, Matplotlib, NumPy, Scikit-Learn, LIME, Fairseq, Flask
Deep Learning Techniques: Autoencoders, RNN, CNN, GRU, LSTM, Transformers, BERT, VisualBERT, GNN

Courses

Artificial Intelligence	Natural Language Processing, Machine Learning, Statistical Methods in AI, Optimization Methods, Deep Learning Specialization, Artificial Intelligence
Computer Systems	Database Systems, Operating Systems, Software Engineering, Digital Signal Analysis and Applications, Computer Graphics
Mathematics	Discrete Maths, Linear Algebra, Probability & Statistics, Complex Analysis, Multivariate Analysis, Formal Methods
Security & Networks	Advanced Computer Networks, Principles of Information Security
Algorithm & Programming	Data Structures and Algorithms, Computer Programming