Sameer Dharur

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Purpose	Seeking full-time research positions in artificial intelligence (AI) located in the USA starting June 2021.
Research Interests	I am interested in building AI agents that can *see* (computer vision), *communicate* (natural language processing) and *act* (robotics) in novel settings in reasonable, logical and interpretable ways.
Education	**Georgia Tech**, Atlanta, USA *Master of Science*, Computer Science, August 2019 - May 2021. Advised by Prof. Dhruv Batra. **Birla Institute of Technology and Science (BITS)**, Pilani, India *Bachelor of Engineering*, Computer Science, August 2012 - May 2016. Advised by Prof. Chittaranjan Hota.
Conference Papers	**SOrT-ing VQA Models : Improving Consistency via Gradient Alignment** Preprint *(Under Review)* **S. Dharur**, P. Tendulkar, D. Batra, D. Parikh, R. Selvaraju. **Extracting User Behavior at Electric Vehicle Charging Stations with Transformer Deep Learning Models** *3rd International Conference on Advanced Research Methods and Analytics (CARMA), Valencia, 2020* D.J. Marchetto, S. Ha, **S. Dharur**, O.I. Asensio.
Journal Articles	**Topic Classification of Electric Vehicle Consumer Experiences With Transformer-based Deep Learning** *Patterns, Cell Press (to be published in January 2021)* S. Ha, D.J. Marchetto, **S. Dharur**, O.I. Asensio. **Using machine learning techniques to aid environmental policy analysis: a teaching case in big data and electric vehicle infrastructure** *Case Studies in the Environment, University of California Press, 2020* O.I. Asensio, **S. Dharur**, X. Mi.
Workshop Papers	**SOrT-ing VQA Models : Improving Consistency via Gradient Alignment** *NeurIPS workshop - Interpretable Inductive Biases and Physically Structured Learning, 2020.* **S. Dharur**, P. Tendulkar, D. Batra, D. Parikh, R. Selvaraju.
Patents	**Motion Assisted Image Segmentation and Object Detection** *United States Patent and Trademark Office (Filed by Qualcomm)* **S. Dharur**, V. Jain, R. Tyagi, H.S. Dhoat.
Selected Projects	**Interpreting Point Goal Navigation in Dynamic Environments (In Progress)**: Point Goal Navigation agents trained in static environments have achieved near-perfect performance at the task. But how would they generalize to dynamic environments where obstacles are encountered on-the-fly? Do agents trained in static environments learn to find alternative sub-optimal paths in dynamic environments during test time? Are these choices visually interpretable? Conducting these experiments in the Habitat simulator and API, with results coming soon.

Visually Explaining Point Goal Navigation (In Progress): Conducting gradient-based interpretability experiments on Point Goal Navigation to answer questions around the visual explainability of deep reinforcement learning models trained for autonomous navigation in static environments (i.e, 'Where do these models look while navigating a novel environment?'). Additionally analyzing the temporal significance of prior states on current actions (i.e, 'Do these models exhibit foresight?'), and how they would react when surprised by obstacles in their paths. Results from our experiments are coming soon.

SOrT-ing VQA Models: Improving Consistency via Gradient Alignment: Used gradient-based techniques to rank relevant perception sub-questions for a higher order reasoning question as a way to study logical consistency among state-of-the-art Visual Question Answering (VQA) models. Introduced a new approach called Sub-question Oriented Tuning (SOrT) to train VQA models by aligning the gradient representations of sub-questions with those of their corresponding reasoning questions. *Achieved an improvement of 6.5% points on consistency over baselines.*

Extracting User Behavior at Electric Vehicle Charging Stations with Transformer Deep Learning Models: An inter-disciplinary project aimed at developing econometric policy recommendations for electric vehicle charging stations across the United States. This involved performing multi-label classification on an imbalanced dataset of unstructured, free-form natural language user reviews using Transformer models (BERT and XLNet), and then performing econometric analysis using Fractional Response Models (FRMs). *Improved mean F1 scores on topic classification by 9% points over baselines.*

Generating hashtag sequences on image based social media posts: Introduced a multi-modal vision-and-language application of generating hashtag sequences on social media posts. Scraped a dataset from publicly available Instagram posts and trained a CNN + LSTM encoder and an LSTM decoder for the task of hashtag sequence generation. *Reported a BLEU score of 0.69 on the validation split.*

Improving cancer detection in lung X-rays via data augmentation by VAEs: Used Variational Autoencoders (VAEs) for data augmentation to generate realistic malignant and benign lung X-rays to train more accurate cancer detection models. *Improved mean F1 scores on cancer detection by 4.5% points over baselines.*

User Privacy via Face Detection in a Video Call: Built a feature to enhance user privacy in a video call by obscuring the background, through object detection and semantic segmentation on Qualcomm's Snapdragon Neural Processing Engine (SNPE). *Top 5 among 350 projects at the Qualcomm India Maker Challenge 2018.*

Work Experience		
Intern - Conversational AI		**Salesforce**
May 2020 - Aug 2020		Bellevue, USA

Worked on reducing the semantic redundancy among recommended responses in Einstein Reply Recommendations. The feature, to be integrated into Salesforce's Service Cloud as part of its 228 release, *led to the generation of 2.3x more diverse responses* with minimal increase in latency and memory consumption.

Machine Learning Software Engineer   **Qualcomm**
Feb 2018 - July 2019   Hyderabad, India

Developed the Snapdragon Neural Processing Engine (SNPE) and adapted Google's Android Neural Networks (ANN) API to Qualcomm's chipsets. Implemented and tested a wide range of deep neural networks on chipsets, meeting key performance indicators such as timing, accuracy, power and memory consumption.

Modem Software Engineer   **Qualcomm**
Oct 2016 - Feb 2018   Hyderabad, India

Developed modem software on Qualcomm's Snapdragon 430 range of chipsets.

Applications Developer   **Oracle**

July 2016 - Oct 2016   Hyderabad, India

Developed a J2EE-based product for interfacing between hotels and booking sites, as part of the Hospitality Global Business Unit (HGBU).

Teaching Experience

- Head Teaching Assistant - Deep Learning, Fall 2020, Georgia Tech.
- Teaching Assistant - Deep Learning, Spring 2020, Georgia Tech.
- Teaching Assistant - Cryptography, Spring 2016, BITS Pilani.

Selected Coursework

- Deep Learning
- Machine Learning
- Natural Language Processing
- Linear Algebra
- Probability and Statistics
- Data Mining
- Data Structures and Algorithms
- Data and Visual Analytics

Technical Skills

Languages: Python, Java, C, C++, R, SQL, LaTeX, HTML, CSS, Javascript.
Deep Learning Frameworks: PyTorch, Tensorflow.

Awards and Recognition

- Finalist (Top 5 among 350) : Qualcomm India Maker Challenge 2018.
- Finalist (Top 15 among 350) : Qualcomm India Maker Challenge 2017.
- Winner/Finalist : Multiple open and inter-college quizzing competitions in India.

Extra Curricular

- Professional Quiz Master - conducted ~50 quizzes in India from 2010 to 2019.
- President of K-Circle, India's oldest quiz club, from 2017 to 2019.

References

- Prof. Dhruv Batra, Associate Professor, Georgia Tech - dbatra@gatech.edu.
- Prof. Devi Parikh, Associate Professor, Georgia Tech - parikh@gatech.edu.
- Dr. Ramprasaath Selvaraju, Sr Research Scientist, Salesforce - rselvaraju@salesforce.com.