Purva Tendulkar

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Education

Georgia Institute of Technology — Atlanta, GA, USA
Master of Science in Computer Science (Specialization: Machine Learning) — *Aug. 2018 – Aug. 2020*
CGPA: 4.0/4.0

College of Engineering Pune — Pune, MH, India
Bachelor of Technology in Computer Science — *Aug. 2014 – May 2018*
CGPA: 9.14/10.0

Research Interests

Machine Learning, Computer Vision, Human Computer Interaction, Natural Language Processing

Work Experience

University of California San Diego — Aug. 2020 – Mar. 2021
Research Staff | Supervisor: Prof. Xiaolong Wang — *San Diego, CA*
- Developing deep learning models to understand object-centric visual dynamics via intuitive physics models for Facebook's PHYRE dataset.
- Developing novel, modularized approaches for encoding heuristics of object interactions in order to allow the system to generalize better to complex unseen configurations and avoid problems of overfitting.

Georgia Institute of Technology — Aug. 2019 – Aug. 2020
Graduate Research Assistant | Supervisor: Prof. Devi Parikh — *Atlanta, GA*
- Worked on problems related to Creative AI and Vision & Language.
- Worked on using AlexNet and ResNet-based autoencoders and Facebook's Pythia MMF models.
- Presented oral talks at ICCC 2019, ICCC 2020 and CVPR 2020.

AiBee — May 2019 – Aug. 2019
Research Intern | Supervisors: Chunhui Gu, Juan Carlos Niebles, Prof. Silvio Savarese — *Palo Alto, CA*
- Improved existing models for event detection, contributing over 5k+ lines of code to an existing codebase via Git.
- Developed an LSTM-based deep learning model which can detect events based on trajectories of people in a shopping mall and learns to distinguish between staff and customers.

Nanyang Technological University — May 2017 – Aug. 2017
Research Assistant | Supervisor: Prof. Arvind Easwaran — *Singapore*
- Modeled the Stuxnet attack – a notorious worm that affects Cyber-Physical Systems.
- Performed extensive vulnerability analysis at different levels of abstraction in the Berkeley Metropolis environment.

Indian Institute of Technology, Bombay — May 2016 – Jul. 2016
Software Development Intern | Supervisor: Prof. Varsha Apte — *Mumbai, India*
- Developed a Django-based framework for automatically evaluating programming assignments of courses at IIT.
- Worked as a full-stack developer to add engaging features for both instructors and students.

Publications

- **SOrT-ing VQA Models: Improving Consistency via Gradient Alignment**
  Sameer Dharur, **Purva Tendulkar**, Dhruv Batra, Devi Parikh, Ramprasaath R. Selvaraju
  Conference of the North American Chapter of the Association for Computational Linguistics (NAACL), 2021
  Interpretable Inductive Biases and Physically Structured Learning (NeurIPS), 2020

- **Feel The Music: Automatically Generating A Dance For An Input Song**
  Purva Tendulkar, Abhishek Das, Aniruddha Kembhavi, Devi Parikh
  International Conference on Computational Creativity (ICCC) 2020, ***Oral***

- **SQuINTing at VQA Models: Interrogating VQA Models with Sub-Questions**
  Ramprasaath R. Selvaraju, **Purva Tendulkar**, Devi Parikh, Eric Horvitz, Marco Tulio Ribeiro, Besmira Nushi, Ece Kamar
  Conference on Computer Vision and Pattern Recognition (CVPR) 2020, ***Oral (5.7% acceptance rate)***

- **Trick or TReAT: Thematic Reinforcement for Artistic Typography**
  Purva Tendulkar, Kalpesh Krishna, Ramprasaath R. Selvaraju, Devi Parikh
  International Conference on Computational Creativity (ICCC) 2020, ***Oral***

Programming Skills

Languages: Python, C/C++, SQL (Postgres), JavaScript, HTML/CSS
Frameworks: PyTorch, TensorFlow, Django
Version Control: Git

Awards and Achievements

- Finalist for the Microsoft AI & Facebook AI Residency Programs in 2020 (cancelled due to COVID-19).
- Winner of the Best Presentation Award at ICCC 2019.
- Recipient of the Pratibha Eaton Excellence Award for women engineering students in 2017.
- Finalist at the Computer and Science Quiz organized by Computer Society of India in 2011.
- Recipient of the Maharashtra Talent Search Award in 2009.

Selected Projects / Paper Descriptions

Blind Image Dehazing

B.Tech Thesis Project | Supervisors: Yuval Bahat, Kalpesh Krishna

- Implemented the ICCP 2016 paper Blind Image Dehazing Using Internal Patch Recurrence.
- Improved the method for selecting pairs of image patches compared to the original brute force method and achieved approximately 20x better speed for optimization in PyTorch compared to the original MATLAB implementation.
- Received 3rd prize in the Computer Science & IT Department for thesis judged by industry experts.

Feel The Music: Automatically Generating A Dance For An Input Song [dances] [press coverage]

- Developed a personable, AI-based musical application in which a user can provide any music as input to obtain dance visualizations which are synced to the beat and correlated to the music.
- Conducted human evaluation studies on Amazon Mechanical Turk and analysed how different choices of music-dance alignment and visualization affect its perception and creative value.
- Presented virtually as an Oral at ICCC 2020.

Trick or TReAT: Thematic Reinforcement for Artistic Typography [http://doodle.cloudcv.org/]

- Developed an unsupervised, deep-learning based application that can assist artists by automatically generating doodles given any input word and theme.
- Conducted extensive human studies on Amazon Mechanical Turk on readability, theme-relevance and creativity.
- Presented as an Oral at ICCC 2019 and received the Best Presentation Award.

SQuINTing at VQA Models: Interrogating VQA Models with Sub-Questions

- Collected and analysed a dataset of perceptual sub-questions sufficient for answeing reasoning questions in the Visual Question Answering dataset.
- Developed an approach to make Visual Question Answering models more consistent via sub-question attention alignment and showed gains in consistency and reasoning accuracy.

SOrT-ing VQA Models: Improving Consistency via Gradient Alignment

- Developed a gradient-based interpretability approach to explain VQA model decisions in natural language.
- Showed that contrasting relevant sub-questions against irrelevant ones encourages models to be more consistent.