Prithvijit Chattopadhyay

https://prithv1.github.io/

Email : prithvijit3@gatech.edu
Mobile : +1-540-277-7523

Education

- **Georgia Institute of Technology** — Atlanta, GA
  Master of Science in Computer Science; Advised by Dr. Devi Parikh — *Aug. 2017*
- **Delhi Technological University** — Delhi, India
  Bachelor of Technology in Electrical Engineering; GPA: 4.00 — *Aug. 2012 – Dec. 2016*

Research Interests

Computer Vision, Machine Learning, AI, Interpretability in Deep Networks, Human-AI Collaboration

Publications

- **Evaluating Visual Conversational Agents via Cooperative Human-AI Games**
  AAAI Conference on Human Computation and Crowdsourcing (HCOMP) 2017, ***Oral***
  P.Chattopadhyay*, D.Yadav*, V. Prabhu, A. Chandrasekaran, A. Das, S. Lee, D. Batra, D. Parikh

- **It Takes Two to Tango: Towards Theory of AI's Mind**
  Chalearn Looking at People Workshop, CVPR 2017 - Explainable Computer Vision Track
  A. Chandrasekaran*, D.Yadav*, **P. Chattopadhyay*** V. Prabhu*, D. Parikh

- **Counting Everyday Objects in Everyday Scenes**
  IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2017, ***Spotlight***
  P.Chattopadhyay*, R.Vedantam*, R. Selvaraju, D. Batra, D. Parikh

- **Delhi Technological University: Design and Development of the Littoral AUV Zyra 2.0**
  AUVSI RoboSub Journal 2014, ***Journal***

Experience

- **Computer Vision Lab, Georgia Tech** — Atlanta, GA
  Research Assistant — *Fall 2017 - Current*

  Working with Dr. Devi Parikh and Dr. Dhruv Batra on problems lying at the intersection of computer vision and natural language processing with a focus towards building intelligent AI systems and subsequently studying their behavior in the context of human-AI teams.

- **CVMLP Lab, Virginia Tech** — Blacksburg, VA
  Research Assistant — *Jun 2015 - May 2017*

  Worked with Dr. Devi Parikh and Dr. Dhruv Batra on several problems in Computer Vision with a focus towards scene understanding and Visual Question Answering.

- **Robotics Reserach Lab, IIIT Hyderabad** — Hyderabad, India
  Research Intern — *Dec 2014 - Jan 2015*

  Worked with Dr. K Madhava Krishna on implementing an efficient strategy for a robot to explore, discover, recognize and navigate to a selected few objects among some scattered in an environment, based on a - guess from far and recognize from near - strategy. Built software stacks on ROS (in C++) for efficient navgation governed by vision.

- **Indian Association for the Cultivation of Science, Kolkata** — Kolkata, India
  Research Intern — *Jun 2014 - Aug 2015*

  Worked with Dr. Soumitra Sengupta with a focus towards searching for Charged Rotating Black Hole solutions in Einstein-Gauss-Bonnet dilaton coupled gravity. Studied and simulated the conditions for existence of multiple horizons in constant scalar curvature f(R) gravity and acquired results demonstrating the convergence of event and cosmological horizons in the same.

- **Autonomous Underwater Vehicle Team, DTU** New Delhi, India
  Undergraduate Researcher *Aug 2012 - Aug 2016*

  Worked under the guidance of Dr. R K Sinha.

  - **Underwater Acoustics**: Developed and implemented range estimation algorithms for Passive Source Localization from Time Difference of Arrival (TDOA) values in conjunction with machine vision techniques.
  - **Control Systems**: Designed control modules of the AUV. Implemented simultaneous PID loops to maintain the orientation of the AUV in motion.

Selected Projects

- **Counting in Everyday Scenes**: We build dedicated models for counting designed to tackle the large variance in counts, appearances, and scales of objects found in natural scenes. Our approach is inspired by the phenomenon of subitizing - the ability of humans to make quick assessments of counts given a perceptual signal, for small count values. Given a natural scene, we employ a divide and conquer strategy while incorporating context across the scene to adapt the subitizing idea to counting. Subsequently, we study how counting can be used to improve object detection and show a proof of concept application of our counting methods to the task of Visual Question Answering. CVPR'17 Spotlight.
- **Theory of AI's Mind**: We argue that for human-AI teams to be effective, humans must also develop a theory of AI's mind (ToAIM) - get to know its strengths, weaknesses, beliefs, and quirks. We instantiate these ideas within the domain of Visual Question Answering (VQA). We find that using just a few examples (50), lay people can be trained to better predict responses and oncoming failures of a complex VQA model. We further evaluate the role of existing explanation (or interpretability) modalities play in helping humans build ToAIM. Our results indicate that existing explanation modalities do not make VQA models more *legible*.
- **EvalAI**: We designed an open source platform to help researchers, students and data scientists to host and participate in AI challenges. By simplifying and standardizing the process of benchmarking AI, EvalAI aims to circumvent many of the factors impeding the rate of progress in AI such as - standardized evaluation protocols, faster evaluation, etc. Supported by CloudCV, EvalAI hosted the VQA Challenge at CVPR'17 with a 6x speedup in evaluation compared to the previous iteration of the challenge on CodaLab. Researchers from a number of organizations have shown interest in hosting their AI Challenges on EvalAI in the near future. Some of these organizations are: Facebook AI Research, Google Research, Stanford University, Georgia Tech, etc.
- **Evaluating Visual Conversational Agents**: We designed a cooperative 'image-guessing' game - GuessWhich - to evaluate state-of-the-art visual conversational agents by pairing them with humans under a dialog-based image retrieval setting. Our human studies suggest a counter-intuitive trend - that while AI literature shows that while RL finetuned chatbot teams perform better compared to chatbots trained in a supervised fashion for this task; this improvement in performance does not translate to human-AI teams suggesting a potential disconnect between becnhmarking of AI in isolation and in the context of human-AI teams. HCOMP'17 Oral.
- **Incorporating Domain Knowledge in Neurons**: We introduce a simple, highly efficient zero-shot learning approach that learns to map domain knowledge about novel classes onto a dictionary of composite concepts learnt by neurons in a deep network and then solves for network parameters which can effectively combine these concepts - essentially learning novel deep classifiers by discovering and composing learned semantic concepts. We learn these mappings between domain knowledge and neurons for a diverse set of inputs including attributes, natural language captions, and Wikipedia articles. Inverting these mappings allows us to provide visual and textual explanations for predictions made by the newly learned classifiers for unseen classes.

Programming Skills

- **Languages**: C++, Python, Matlab, Lua, LaTeX, Shell, Javascript, CSS, PHP
- **Frameworks**: Caffe, Torch/PyTorch, Keras, Tensorflow, ROS, PCL, OpenCV, Qt, Spark, CUDA

Acheivements

- **Winner**: VT-Hacks, 2017, a Major League Hacking event.
- **Semi-Finalists**: ROBOSUB - AUVSI, 2013
- **Finalists**: NIOT SAVe, 2013
- **Awarded**: Merit Scholarships for Academic Performance (2012-2014)
- **Selected**: KVPY and INSPIRE Fellowships, 2012
- **National Top 1 Percent**: Indian National Physics Olympiad (InPhO), 2013