ANANT GUPTA

CONTACT INFORMATION

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EDUCATION

University of Wisconsin-Madison 2017 - present
MS in Computer Science (ongoing), GPA: 4.0/4.0 as of Jan 2019
PhD in Computer Science (ongoing)

Indian Institute of Technology, Bombay 2012 - 2016
BTech. in Computer Science and Engineering, CGPA: 9.22/10.0
with honours

RESEARCH INTERESTS

Computational Imaging
Design of image acquisition and processing algorithms for active vision systems. I am interested in finding information theoretic and statistical bounds on the performance of cameras, and quantifying the trade-off between accuracy and low complexity.

Online learning and Bandits
I am interested in developing algorithms with provable regret bounds for multi-armed bandit problems that arise in the real world, and have various kinds of structured feedback.

Saddle-point Optimization
Optimal convergence rates for saddle point optimization (min-max optimization), with applications in adversarial training and GANs.

PUBLICATIONS

- **Anant Gupta**, Atul Ingle, Andreas Velten, and Mohit Gupta. Photon-Flooded Single-Photon 3D Cameras. In *CVPR*, 2019. URL pages.cs.wisc.edu/~anant/photon-flooded-cameras
- **Anant Gupta**, Atul Ingle, and Mohit Gupta. Asynchronous Single-Photon 3D Imaging. In *ICCV*, 2019 (to appear).
- **Anant Gupta**. Best-arm identification with cascading bandits. *ArXiv preprint*, Nov 2018. (Preprint). URL http://arxiv.org/abs/1811.07476

GRADUATE COURSES

Learning Theory: Theoretical Foundations of ML, Mathematical Foundations of ML, Algorithmic Game Theory and Machine Learning
Probability and Statistics: Robust Statistics, Information Theory
Miscellaneous: Non-linear Optimization, General Relativity

RESEARCH EXPERIENCE

Research Assistant May, 2018 - present
WISION Lab, Computer Sciences, UW Madison
Prof. Mohit Gupta

Optimal flux for single photon 3D cameras:
Single photon cameras are used to estimate scene depth through repeated time-of-flight measurements. They differ from traditional depth cameras in their measurements, which follow a multinomial distribution with exponentially decaying biases. The small tails lead to noisy information about scene points with large depths. Moreover, the rate of decay increases with flux, leading to the counter-intuitive result that reducing the flux can improve depth accuracy. We model the problem of depth recovery as statistical parameter estimation, and derive an optimal flux criterion using a notion of statistical efficiency.

Asynchronous shifting for single photon cameras:
LiDAR (light based depth ranging) systems typically use a synchronous acquisition scheme, where

the light source and camera operate in phase at the same frequency, providing i.i.d. measurements. We show that for single photon cameras, forgoing i.i.d.ness of measurements through the asynchronization of source and camera can remove structured biases from the measurements, and reduce depth error significantly.

Independent Research April, 2018 - Jan, 2019

Cascading bandits:

I worked on a variant of the problem of best arm identification in multi-arm bandits, called cascading bandits, where a stochastic number of arms receive a reward in each round. This was motivated by a real world LiDAR problem. Since each round potentially provides information about more than one arm, the sample complexity is much lower than in the standard formulation. Using a novel subroutine to perform uniform sampling, an optimal algorithm for the standard version is adapted to this variant. Furthermore, an upper bound on sample complexity using this algorithm, and a nearly matching lower bound are derived. It turns out that cascading bandits are also interesting in the context of search rankings, where regret minimization is typically used.

Work Experience

Google, Bangalore Jul, 2016 - Aug, 2017

Software Engineer

As a part of the Docs intelligence team, I worked on developing features for document summarization and understanding for Google's suite of cloud editors.

Researched and implemented classification-based and machine translation-based grammar checking (recently launched).

Led the efforts for quality evaluation of launched products, defining metrics, running experiments and analyzing usage data.

Internships

Amazon Lab126, Sunnyvale May - Aug 2019

Applied Scientist Intern Mentor: Ambrish Tyagi

Worked on the problem of image co-segmentation using unsupervised deep learning.

Google, Mountain View May - July 2015

Software Engineering Intern Mentor: Nikita Beloglazov

Enhanced Google's ad serving pipeline to enable intercepting ad requests on the client using service workers.

Academic Honours and Achievements

Secured All India Rank 7 in IIT JEE out of 480,000 students, All India Rank 2 in AIEEE out of 1,300,000 students (college entrance examinations equivalent to SATs).

Awarded Kishore Vaigyanik Protsahan Yojana (KVPY) scholarship with an All India Rank 20.

Technical Skills

Proficient in MATLAB, Python, C++, Java, Javascript, SQL

Experience in Deep Learning frameworks: Tensorflow, PyTorch

Teaching

TA, Computer Vision (Graduate course), UW Madison Jan - May, 2018

TA, Discrete Mathematics, UW Madison Sept - Dec, 2017

TA, Computer Programming and Utilization, IIT Bombay July - Nov, 2015