abhi gupta

I teach robots how to learn.
I build deep neural nets.
I tune hyperparameters all day.

contact
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education
computer science. operations research. columbia engineering class of 2021.

cs ai. computer vision. robotics. deep learning. reinforcement learning. robot learning. signals and systems.

math linear algebra. calculus. stochastic processes. linear and integer programming. convex optimization.

honors 3.99/4.0 GPA. tau beta pi engineering society. data science scholar. questbridge scholar.

experience
academic research. software engineering. machine learning. web dev.

agrawal research group shipra agrawal rl. discrete optimization. graph convolution.

06/20-12/20 Solving combinatorial optimization problems with branching heuristics is prohibitively time-consuming. We minimize the time to find an optimal solution by recovering and refining the q-function of a computationally expensive expert branching policy.

creative machines lab hod lipson robotics. rl. seq2seq. bayesian neural networks.

01/20-09/20 Accurately modelling high-dimensional and long-horizon dynamics is challenging because of exposure bias where prediction errors compound over time. We estimate and utilize the uncertainty in our autoregressive models within Monte-Carlo Tree Search to learn a sample-efficient and robust control policy.

columbia robotics lab peter allen robotics. rl. grasping. vision. meta-learning.

05/18-05/20 Grasp and shape manipulation is a high-dimensional control problem that is sensitive to objective geometry and physical kinematic constraints. Our multi-fingered grasping policies trained in simulation transfer exceptionally well to real world cluttered scenes. We also learn from demonstration to perform tasks like pick-pour-place directly in the real world with high sample-efficiency.

ctrl-labs facebook reality labs signal processing. feature engineering. metrics analysis.

05/19-09/19 Electromyography (EMG) signals are generated by the muscles in our arms when we move our hands. Analyzing how well models perform on EMG from new users, we are able to design a calibration procedure to fine-tune gesture recognition, cursor control, and hand tracking to the specific user.

publications
corl. iros. autonomous robots.

corl 2020 leveraging uncertainty aware dynamics models to refine actor-critic methods
robert kwiatkowskil, **abhi gupta**, wonjun sun, boyuan chen and **hod lipson**. under review.

iros 2020 squirl: robust and efficient learning from video demonstration of long-horizon robotic manipulation tasks
bohan wu, feng xu, zhanpeng he, **abhi gupta** and **peter allen**

autonomous robots 2020 generative attention learning: a "GenerAL" framework for high-performance multi-fingered grasping in clutter
bohan wu, iretiayo akinola, **abhi gupta**, feng xu, jacob varley, david watkins, and **peter allen**

recent projects
vision. seq2seq. motion planning. forward kinematics. grasping.

self-supervised hand tracking estimating joint angles of hands with arbitrary DOFs from depth input.

trackit! learning two-dimensional dynamics of perfectly elastic collisions from pixel observations.

emg-driven teleop controlling a robotic hand-arm system with grasp-level precision from muscular activity.

skills
python. c++. java. typescript. pytorch. tf. wandb. pyro. ros. react. aws. sql. nosql.