Aayush Gupta

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CONFERENCE SUBMISSIONS

A Decision-theoretic Approach to Detection-based Target Search with a UAV

Accepted at 2017 IEEE/RSJ International Conf. on Intelligent Robots and Systems (IROS)
Proposed a sequential algorithm that determines UAV actions in real time based on observations, using partially observable Markov decision processes (POMDPs). Our POMDP policy finds the target up to 3.3 times faster when compared to heuristic policy. Joint work with Daniel Bessonov and Patrick Li.

Dynamic Pricing via Reinforcement Learning for Multi-Objective Optimization in the On-Demand Economy

Accepted to BayLearn 2017
Presented a reinforcement learning framework to simultaneously reduce passenger wait time and maximize company profit. Formulated as a scalar optimization with multiple weighted objectives. Found policies with different weights using value iteration, and generated Pareto curve.

PROJECTS

Synthesizing CT images from MRI images with Generative Adversarial Networks 2017

Built a system with GAN to process unpaired, unaligned CT and MRI data to create CT images from MRI. Showed 20% improvement in mean average error and 0.6 improvement in peak signal to noise ratio over methods trained on aligned data.

Combination Drug Toxicity Prediction using Protein-Drug Interactome Signatures 2016

We consider the full proteomic signatures of each drug and combine their individual drug-protein interaction scores. Our supervised learning system predicts non toxic combination of drugs for diseases such as thyroid cancer.

Principal Component Analysis for Flow Cytometry Data 2015

Examined efficacy of Omalizumab on immunotherapy for ragweed allergy. Analyzed flow cytometry data for 159 patients from the Cesale Study in ImmPort. Used MySQL and R to classify cell populations. Studied Omalizumab effects at cell level with free IgE and B cell counts.

Cost-Effective Shadow Bot Follower Robot 2014

Built a wheeled robot with Arduino and Android to use Bluetooth phone commands to follow a person. Used ultrasonic sensors to avoid obstacles and a motor shield to drive.

Machine Learning for Dementia Detection in MRI images 2013

Preprocessed Oasis MRI dataset of 416 patients using Matlab. Wrote Python scripts to calculate different combinations of features. Determined importance of various factors for dementia detection using linear SVMs.
*1st Place 2013 Synopsys Science Fair (Bioinformatics), **N+1 Finalist, Broadcom Semifinalist***

EDUCATION

Saratoga High School

Class of 2018

AWARDS

Computer Science
USA Computing Olympiad Nationals 2016 (US Top 28)
Mastered algorithms like dynamic programming, recursion, shortest path, and binary trees (segment trees, etc) with C++.

Mathematics
USAjMo Qualifier 2016
AIME Qualifier (2014-17)
Perfect AMC 8 Score (Top 80)

Physics
USAPhO Silver Medal 2017

Linguistics Olympiad
NACLO Top 50 in US 2016

APPS/ VOLUNTEERING/ CLUBS

Auto-Latex Equations (2015)
Coded, branded, marketed Google Docs add-on for real time LaTeX mathematical expression rendering.
Over 40,000 weekly users. 3.7 star rating.

Volunteering
Taught math to middle schoolers in high school

Clubs
Founder/President of IoT club
Founder/President of AI club
V. President of Math club

Camps
Taught A-Star USACO Silver
SPARC Summer Camp 2017

SKILLS

Programming C++, Java, Julia, Python, SQL, Android, Javascript, R, Matlab

Hardware Raspberry Pi, Arduino