Bassel El Mabsout

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EDUCATION

Ph.D. in Computer Science 2018 – Present
Boston University
Dissertation: "Tree Shaping, a solution to the expression problem showcased via a compiler for a programming language named Puler"
Advisor: Dr. [Advisor Name]

B.S. in Computer Science 2012 – 2015
American University of Beirut

RESEARCH INTERESTS

- Reinforcement Learning and Control Systems
- Safety-critical Controller Learning
- Multi-objective Optimization
- State Estimation and Computer Vision
- Programming Language Theory

PUBLICATIONS

Peer-Reviewed Journal Articles

Mabsout B.**, Mysore S.**, Saenko K., Mancuso R. (2021)
"How to train your quadrotor: A framework for consistently smooth and responsive flight control via reinforcement learning"
ACM Trans. Cyber-Phys. Syst., 5(4)
DOI: [add DOI]

Other Publications

Mabsout B. (2023)
"Tree Shaping, a solution to the expression problem showcased via a compiler for a programming language named Puler"
Masters Thesis, Boston University

ONGOING RESEARCH

Population Descent Submitted
A natural-selection based Memetic algorithm which adaptively controls hyperparameter selection via a normalized fitness function – PREPRINT

Sim2Real Adaptation via Anchored Learning Submitting
Anchors allow for adapting RL-based controllers on the fly while mitigating the issue of catastrophic forgetting.

Our method does so by finding controllers which satisfy performance conditions both in simulation and reality – PREPRINT

Safety-critical controller learning Ongoing

We construct learned bounded Lyapunov functions for maintaining safety under a differential equation and on residual dynamics. Adapting controllers to improve the probability of safety and performance in the real world – SOURCE

State-estimation using Gaussian splatting Ongoing

The pose of a quadrotor is estimated by combining Gaussian splatting with an onboard camera feed. Estimation occurs in real-time on the embedded system

Multi-objective RL via generalized-mean scalarization Ongoing

We use the generalized-mean for scalarizing a normalized multi-Q-value function forming a continuous specification in a multi-objective RL setting

RESEARCH EXPERIENCE

Graduate Research Assistant 2018 – Present

Boston University

- Developed novel reinforcement learning algorithms for quadrotor control
- Created frameworks for safety-critical controller learning
- Implemented state estimation using Gaussian splatting

Research Assistant 2016 – 2018

American University of Beirut

- Developed *neural-swarm*, a collection of experimental optimization algorithms
- Implemented decentralized swarm control systems

TEACHING EXPERIENCE

Course Instructor - CS 654 2023

Boston University

- Created and supervised projects for 24 students
- Mentored students in modeling and controlling AmazingBall System
- Developed curriculum focusing on minimizing sim2real gap

Research Mentor 2021 – Present

RISE Program: Mentored undergraduate researcher in gradient-based optimization
BU Spark: Supervised team of 5 students in quadrotor research project
Efficient RL: Guided graduate students in power-efficient reinforcement learning

GRANTS & AWARDS

SERVICE & LEADERSHIP

Peer Review

- Reviewer for ICLR, ICRA, ROBOT, EMSOFT, COG, DATE, ECRTS, RTSS, TJCA

Academic Service

- [Add department/university service]

PROJECTS

Stochastic dynamics learning BU/MIT

Achieving safer learned model-based control requires accurate models, given most real-world systems are stochastic, we built Generative Adversarial Networks which modeling the distribution of the system's trajectories – SOURCE

Honda Ridesharing SAIL

In collaboration with BU's SAIL and Honda, we worked on privacy preserving (using MPC) preferential ride-sharing. My responsibilities included defining optimization constraints so users with similar preferences get pooled together

Seizure Prediction Machine learning – CS542

A Kaggle competition project which accurately predicted seizure activity in epileptic patients. Utilizing machine learning techniques, we achieved the highest score with a significant margin (AUC score of 0.92) – PREPRINT

Finding a NASH-ε Equilibrium Complexity Theory – CS535

This term paper simplifies an existing proof of the complexity class specifying the run-time of finding approximate Nash equilibria – PREPRINT

Haskell Blog Personal Blog

I created a Haskell blog hosted on IPFS about programming language concepts such as automatic differentiation and dependently typed vector construction which garnered some interest and was featured on Haskell News

TECHNICAL SKILLS

Programming Languages *(by familiarity)*: Haskell, Nix, Python, Typescript, Java, C, Processing, Javascript, Coq, SQL, Bash, C++, Elm, C#, F#, ATS, Lean, GLSL, WGSL, Clojure, Matlab

Frameworks & Libraries: Tensorflow, Pytorch, Keras, Numpy, Scipy, Pandas, Jax, Spinning Up, Pybullet, Gurobi, React-Native, Megaparsec, Extension-Schemes, Polysemy, Firebase

Tools: Git, Nix, GNU utils, Makefiles, LaTeX, HTML, CSS, Markdown, XML, Typst, Soldering