MOHAMMAD REZA HEYDARI

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m google scholar

EDUCATION

Master in Electrical Engineering

Sharif University

Control systems major

Sep. 2018 - Aug. 2021

- Cumulative GPA: 18.80/20 (4/4)
- Thesis: A Comparison of Basal Ganglia and Prefrontal Cortex in Value Learning

Bachelor in Electrical Engineering

Sharif University

Control systems major

Sep. 2014 - Jul. 2018

• Cumulative GPA: 18.70/20 (3.96/4)

PUBLICATIONS

- (eLife review) **Heydari, Mohammad Reza**, Mohammad Ali Kheirkhah Ravandi, Okihide Hikosaka, and Ali Ghazizadeh. "Prefrontal cortex signals value category while basal ganglia represent learned values in value learning." bioRxiv (2023): 2023-11.
- **Heydari, M. Reza**, Saber Salehkaleybar, and Kun Zhang. "Adversarial orthogonal regression: Two non-linear regressions for causal inference." Neural Networks 143 (2021): 66-73.
- Mottaghi, A., Behdin, K., Esmaeili, A., Heydari, M., & Marvasti, F. (2017). OBTAIN: Real-Time Beat Tracking in Audio Signals. arXiv preprint arXiv:1704.02216.

RESEARCH EXPERIENCE

The role of the SNr and vIPFC in visual value learning in the macaque brain

Ghazizadeh's Neuroscience Lab

Sharif University

i Jun. 2019 - Sep. 2021

- Proposed a novel approach based of reinforcement learning literature to determine the perceptual value of good/bad fractals.
- Analyzed the neural/behavioural relationship of two brain regions SNr and vIPFC (electrophysiology) and compared the learning trends.

Development of a model for causal inference in gene regulatory network Learning and Intelligence Lab

Sharif University

ä Jan. 2018 - Sep. 2019

 Proposed a new neural network for regression tasks with a minimaxtype loss function similar to GANs, that minimizes the mutual information between residual and regressors.

Real-time beat tracking in audio signals Communication Research Institute

Advanced

Sharif University

Sep. 2016 - Mar. 2017

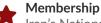
• Employed spectrograms and novelty curves to detect real-time periodic onsets (beats) in songs. Specifically, my task involved recognizing online periodic local peaks in the novelty curve. To achieve this, I developed a heuristic method that determines the optimal size of a window in which only one local peak exists.

HONORS AND AWARDS

P

5th Place

3rd International Conference on Signal Processing (ICOSP), *Florence*, *Italy*



Iran's National Elites Foundation (INEF)

Honorary Admission for Master exempted from entrance exam, Sharif University

1st and 2nd Place

in bachelor and master control systems major among 24 and 15 students, *Sharif University*

12th and 8th Place

among 171 bachelor and 143 master students in EE dep., Sharif University

23rd Place

Iranian university entrance exam (Konkur) among 225,000 participants

SKILLS

Personal Trait

Industrious Self-motivated

Quick learner | Creative thinker

Python

Threading AsynclO Sysv-IPC
Selenium Tensorflow (1, 2) Po

Selenium Tensorflow (1, 2) Pytorch
OpenCV Pandas Django Celery

FastAPI

PyCrypto

SqlAlchemy

PyQT

AMQP Redis Plotly Dash

Pydantic

Infrastructure and Utilities

Rest-Framework

TKinter

Unix/Bash Redhat OpenShift

Postgres MySQL Sentry Redis

RabbitMQ Git/Gitlab Slate Docs

Electrical Engineering

Verilog Assembly Altium Designer

PLC RaspberryPi B4 stm8/32 ROS

Flutter

Material Design

Provider

Dio

ACADEMIC PROJECTS

Image to latex

Deep learning course project

Spring 2019

 The conversion of images of mathematical formulas to LaTeX code was accomplished using a combination of innovative methods, which led me to secure the first place among 50 participants. The list of methods employed includes: CNN inception (pre-trained in enc-dec task) - a clustering based PCA - Transformer with a new positional encoding (pre-trained via SkipGram method)

Simulating Q-learning, Actor-Critic, and TD-lambda in maze task

Advanced topics in neuroscience course project

Spring 2019

Beta travelling wave detection and visualization in cortex

Advanced topics in neuroscience course project

Spring 2019

Designing controller and compensator for the Gasifier

Multiple-input multiple-output course project

Fall 2018

EMG sensor design

Summer 2020

• Designed and implemented analog and digital parts of 6 EMG real-time sensors with Raspberry Pi B4 for rehabilitation of arm and wrist. Real-time random forest classifier for pose estimation.

INDUSTRIAL ACTIVITIES

Co-Founder and technical lead

Cardano trader

Tehran, Iran

- **J**un. 2019 Nov. 2021
- A Startup for applying AI and ML methods to the Tehran Market.
- Collected whole market tick data at all times. Utilized Umap and HDBScan for time-dependent clustering of various symbols.
- Applied various ML and DL methods to classify the positive/negative trend of the price across different time frames, including Random Forest, CNN, RNN, and Transformer network.

Intern School of cognitive sciences, IPM

Tehran, Iran

a Aug. 2020 - Feb. 2021

Intern

R&D unit of MECO, MAPNA holding

Karaj, Iran

Jun. 2018 - Aug. 2018

Intern

R&D unit of CROUSE, automotive part manufacturer

Karaj, Iran

i Jun. 2017 - Aug. 2017

Secure Storage

Bot Toast

FI Chart

C/C++ basic libraries and concepts

Matlab and Simulink for signal and system analysis

LANGUAGES

Persain



English



TOEFL 99: R 30, L 24, S 23, W 22 GRE: Q 168, V 144, AW 4

TEACHING EXPERIENCE

Al introduction

TA

Iran Uni. of Sci. and Tech. (IUST)
Spring 2023

Advanced Neuroscience

TA

Sharif University

Spring 2020

Modern Control

TA

Sharif University

Spring 2020

Deep Learning

TA

Sharif University

Fall 2019

Linear Control Systems

LA

Sharif University

Fall 2018 & Fall 2017

Probability and Statistics

TA

Sharif University

Spring 2017

Digital Circuits and Lab

LA

Sharif University

Fall 2016

National Physics Olympiad

LA

Tehran, Iran

Fall 2015

RESEARCH INTERESTS

Neuroscience (learning, vision, sensorimotor) Machine learning (rl, time-series, vision) Brain machine interface Signal processing and code implementation