Amirreza Ghorbani Saravani

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Research Interests

- Software Architecture
- High-Performance Systems
- IoT (Internet of Things)
- Machine Learning and Deep Learning
- Interactive Visualization

Education

Bachelor of Engineering in Computer Engineering Sept 2016 – Sept 2020

University of Tehran, Tehran, Iran

University of Tehran is ranked 156^{st} in Computer Science and 387^{st} globally according to U.S. News – Dec 2020

- GPA cumulative : 3.43/4 (16.7/20)
- GPA last two years : 3.70/4 (17.0/20)
- Dissertation: Overview of Deep Auto-encoders for Image Synthesis (20/20 - in Persian language)

Honors and Awards

- Four successful participation in the Mobile Programming Marathon (MPM), a national 3-days competition, held by Sharif University of Technology in Tehran
- Granted 1,000,000 IRR by the University of Tehran to prepare and teach in the "Introduction to Python" workshop
- Ranked 1^{st} in "Android Programming" course, Also my project was entitled as the "Best Project" among 16 other projects
- Received a fee waiver for "Advanced Algorithms" Course, offered by the University of Tehran's Science Association, because of my outstanding performance in previous courses
- Top 1% among all applicants in the 2016 Iranian University Entrance Exam (approximately 200,000 participants)
- Receiving admission and tuition waiver from the University of Tehran

Research Experience

Machine Leaning, Deep Leaning and Computer Vision Fall 2018 – Present

University of Tehran, Tehran

I have been practicing both theories and practical implementations of various models and algorithms of Deep Neural Networks and Computer Vision. Tasks such as: Object Detection, Classification, Clustering, Regression and Neural Architecture Search (NAS). Also I have been using Python with Keras, Numpy and several other scientific libraries for modeling and visualization.

Detecting and Filtering Rice Seeds in Colored Images April 2020

Rice Research Institute of Iran, Guilan

Implemented several scripts with Python, OpenCV and Numpy to process input images in order to create a dataset for a classification task (*Source Code*).

- Developed highly configurable scripts to accommodate various types of images with different backgrounds and resolutions

- Detecting and removing irregular seeds based on their size and shape from the final set
- Outputs consistent with the most popular protocols and frameworks for dataset storage formats like NumPy, HDF5 and TensorFlow
- Implemented a comprehensive visualization system of dataset formation for debug and partly educational purposes

An Evolutionary Approach to Solve Capacitated Vehicle Routing Problem January 2020

University of Bergen, Norway - Instructor: Nooshin Heydari

In this project, I employed Genetic Programming methods coupled with Metaheuristic algorithms to generate feasible schedules for capacitated vehicles traveling among various nodes with strict time windows.

- Programmed entirely in C++, predominantly for fast run-time performance
- Implemented AMPL compatible input/output file processing format mainly for testing and validation of final results
- Increased performance by leveraging parallel processing over multiple CPU cores

Gaussian Processes for Regression Problems June 2019

University of Tehran, Tehran - Instructor: Dr. Atefe Hasanzade

I implemented a Gaussian Process Regression Model to fit a non-linear function with Python in which I practiced various concepts and implications of GP models as a Distribution Over Functions. Paired with intuitive visualizations of data, I successfully gained a solid understanding of a powerful probabilistic approach to regression problems.

Generating Logical Circuits Based on Truth Table Using Genetic Programming June 2018

University of Tehran, Tehran

Producing a logical circuits with only a truth table by utilizing Node-Based Genetic Programming and python language. After successful results, I transformed my code into a library for future Node-Based Problems (*Source Code*).

- Abstract and easy to use implementation in order to solve other problems like finding any composite function based on a series of input/outputs
- Ability to define custom Fitness function, assigning mathematical functions to nodes and determining input/output structure
- Full control over the evolution of generations with custom defined and dynamic hyper-parameters
- Providing solution visualization with Graphvis library

Using Dynamic Programming to Find Optimal Triangulation of a Convex Polygon May 2018

University of Tehran, Tehran - Instructor: Dr. Mohammad Hosami

In this research project, I have studied on improving Divide and Conquer algorithms by introducing Memory Tables and assessed their advantages and disadvantages. In particular, I focused on Dynamic Programming algorithms to solve tasks such as Triangulation of a Convex Polygon and Knapsack Problem (*Source Code*).

- Implemented a desktop GUI with Java and Processing3 library to draw polygons and display their optimal triangulation on screen.

Analyzing the Performance of Various Metaheuristic Algorithms March 2017

University Of Tehran, Tehran - Instructor: Seyed Pourya Miralavy

Explored various metaheuristic methods such as Simulated Annealing and Genetic Algorithm to measure their performance in identical environments and issues.

Top Projects

LightKnight: A Cross-Platform LED Strip Animator November 2019 – Present

JavaScript, HTML, CSS, ReactJs, wavesurfer.j, ElectronJs, Yarn, Git, Qt, Arduino *Personal Project*

LightKnight provides various functionalities and set of tools to create beautiful LED animations, synchronized perfectly over a music or any form of audio. Built-in Support for Arduino boards and capable of custom configuration for other hardware interfaces. (*Source Code*).

- Keyframe based animation, built upon several types of channels (RGB, Binary, Opacity) that represent distinct LED strips
- Comprising basic tools such as: Color gradient effect, Copy and Paste portion of frames, Removing frames, Audio waveform visualization, etc.

- Implemented a real-time LED block visualizer to display animations

NoSQL Database Schema Design of a Music Social Media November 2019

JavaScript, NodeJs, MongoDB, Mongoose, REST API, ExpressJs, Git *Introduction to Database Systems Course*

I designed and implemented a database schema for a music social media with various and complicated relationships among entities. Then for my presentation in the class, I developed a REST API with ExpressJs in NodeJs to access and query the database through an ORM called Mongoose (*Source Code*).

HumidiStat: Smart Home Controller (Android IoT Application Demo) August 2019

Android, JavaScript, React Native, ReAnimated, SVG, Git, NPM *Personal Project*

I coded an Android application based on some concept designs of a modern house that you are able to adjust the range of humidity and temperature with your smartphone (*Source Code*).

TimeLine: Chronological Record of Events (Web Application Demo) January 2019

HTML, CSS, ReactJs, Redux, SVG, Heroku, Git, NPM *User Interface Design Course*

Me and my team developed this demo website to illustrate an idea and present in our User Interface Design Class. Easy navigation through events in the past is the core idea of this project (*Source Code*).

- Stunning and intricate animations with SVG images
- Responsive and flexible design

Web Scrapers for Extracting Lyrics and Songs Information August 2018

Python, JavaScript, Java *A Private Startup*

As a consultant and freelancer, I implemented several web scrapers with different languages (Java, JavaScript and Python) and evaluated factors such as concurrency (multi-threaded vs asynchronous design), development and maintenance costs and resource usage. These bots were able to communicate with a MongoDB database through an outmoded API that I refactored and enhanced later to be compatible with newer versions.

Node-Based Genetic Programming Library May 2018

Python, Graphvis, Jupyter Notebook *Personal Project*

A simple library written in python for solving Node-Based problems with Genetic Algorithm as optimizer (*Source Code*).

- Online tuning of Hyper-Parameters
- Visualization of solution

SharCat (Student Management Software) March 2017

C++, Qt, CSS *Advanced Programming Course*

For our course project, we created an Student Management System with Qt framework in order to practice Object Oriented Programming concepts in C++ and developing a desktop GUI application (*Source Code*).

Technical Skills

Programming Languages: Python, C/C++, Java, JavaScript, Dart, C#, SQL
Data Science Frameworks: Keras, Tensorflow, Scikit-Learn, Numpy, Pandas, Matplotlib, Jupyter Notebook
Developer Tools: Git, GitHub, Docker, Google Cloud Platform, VS Code, Visual Studio, PyCharm, IntelliJ, Clion, Arduino IDE,
Web and Mobile: ReactJs, React Native, NodeJs, Flutter, HTML, CSS, ExpressJs, REST
Typesetting and Markups: LaTeX, Markdown, HTML, XML
Operating Systems: Windows (10, 8, 7, vista, xp) , Linux (Ubuntu, Debian, Arch), Android
Computer Graphics: Blender, Unreal Engine, OpenGL, Processing3, SVG

Teaching Experience

Teaching Programming Languages and Frameworks Privately July 2018 – March 2020

Guilan, Iran

In the past two years, I have been teaching private student in a selection of areas such as: Android Programming (Flutter, React Native), Web Development (ReactJs, JavaScript, HTML/CSS), Algorithms (Genetic Programming, Data Structures). Programming languages like Java, C++, Python and JavaScript have been mostly used in these classes.

Introduction to Python (Instructor) Spring 2019

Industrial Engineering Association, University Of Tehran

In a 3-days workshop, I taught approximately 21 students how to use Python for their scientific tasks. After a brief introduction to some libraries such as Numpy and Pandas, I instructed them how to use Python in different environments (interpreter, editor/IDE, IPython notebook) and presented several intuitive examples for easier understanding of difficult concepts (*Source Code*).

Advanced Programming Course (Teaching Assistant) Fall 2018

University of Tehran - Instructor: Dr. Mohammad Hosami

I taught Object Oriented Programming using C++ and Java and analyzed students' source codes to assist them in learning complex concepts. Also, I helped the instructor to grade several exam papers.

Advanced Programming Course (Teaching Assistant) Winter 2017

University of Tehran - Instructor: Dr. Ali Mohammad Pourpak

I was assigned as the teaching assistant for my own class where I taught Qt framework and desktop GUI programming since our course project required a software with a graphical interface. During our new year's holidays, I arranged an online classroom (link) and continued my work in there.

Workshops and Online Courses

Convolutional Neural Networks Oct 2020
Coursera, deppleaning.ai Certificate

Structuring Machine Learning Projects Jun 2020
Coursera, deeplearning.ai Certificate

Improving Deep Neural Networks: Hyperparameter tuning, Regularization ... May 2020
Coursera, deeplearning.ai Certificate

Neural Networks and Deep Learning May 2020
Coursera, deeplearning.ai Certificate

Android Programming Spring 2017
University of Tehran - Instructor: Seyed Pourya Miralavy

Advanced Algorithms Spring 2017
University of Tehran - Instructor: Seyed Pourya Miralavy

Languages

- **Persian**: Native
- **English**: Fluent

Official Test Scores

- **TOEFL iBT: 101** (Reading: 25, Listening: 29, Speaking: 25, Writing: 22)
- **GRE General: 314** (Quantitative: 163, Verbal: 151, AWA: 3)

Employment and Voluntary Works

- I was the lead Android developer in Mahta, a private educational consulting firm. Our team used Flutter and React Native to build mobile application.

  October 2018 – September 2019

- Voluntary moderator for the "Free Discussion" meetings which its primary purpose was to discuss various subjects in English language. I arranged meetings and occasionally lectured for other attendants

  Fall 2019

References

- **Dr. Atefe Hasanzade**

  Assistant Professor at the University of Tehran, Iran
  Email Address: hasanzadeh.a@ut.ac.ir

- **Dr. Saeed Zahedi**

  Professor at the Ferdowsi University of Mashhad, Iran
  Email Address: szahedi@mail.um.ac.ir

- **Dr. Mohammad Hosami**

  Instructor at the University of Tehran, Iran
  Email Address: mohammad.hosami@gmail.com

- **Nooshin Heydari**

  PhD candidate in the University of Bergen, Norway
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- **Seyed Pourya Miralavy**

  PhD candidate in the Michigan State University, United States
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