

# Amin Karimi Monsefi

PH.D. STUDENT OF COMPUTER SCIENCE.

Columbus, Ohio, USA

☎ (+1) 740-803-4733 | ✉ amin.karimi1992@gmail.com / | 🏠 https://7amin.github.io/ | 📱 amin-karimi-monsefi-5672b4153

*“Be the change that you want to see in the world.”*

## Summary

I am Amin Karimi Monsefi, a dedicated Ph.D. student in Computer Science with a focus on Computer Vision and Machine Learning at Ohio State University. Under Prof. Rajiv Ramnath's supervision, three projects were undertaken. Project One focused on a self-supervised approach for general images, utilizing multimodal architectures like CLIP and LLaVA to enhance image encoders. This aimed to create robust models for vision-related tasks. Project Two addressed limited labeled data in Medical Image analysis by employing self-supervised learning, training models with unlabeled medical images to extract valuable features. Project Three delved into Smart Mobility Research, using deep learning for time series analysis to predict accidents and road construction in specific zones. Diverse data sources, including historical records, weather data, and demographic information, were utilized, introducing a multi-source dataset and multimodal architecture for advancements in the field. Holding Bachelor's and Master's degrees in Computer Engineering from Shahid Beheshti University of Tehran, my academic journey has spanned hardware and software realms. From my Bachelor's exploration of reinforcement learning in multi-object environments to my Master's innovative approach to software testing using machine learning, I am passionate about pushing boundaries. With ten published papers, eight years of experience, and a commitment to effective teaching, I thrive on solving intricate problems and staying at the forefront of technological advancement.

## Education

### PhD. in Computer Science

Columbus, Ohio, USA

OHIO STATE UNIVERSITY

Jan. 2022 - Exp. Present

- Supervisor: Prof. Rajiv Ramnath
- Project One: involves the exploration of a self-supervised approach tailored for general images. This project aims to leverage multimodal architectures such as CLIP and LLaVA to enhance the image encoder and also we employed Data-centric AI approaches to build a better encoder, thereby establishing robust foundation models for various vision-related tasks, including but not limited to image generation, using the encoder for classifications, and more.
- Project Two: Medical Image - I focused on addressing a common challenge: the limited availability of labeled data. To overcome this obstacle, I adopted a self-supervised learning approach. By leveraging this technique, I aimed to train models using unlabeled medical images, allowing them to learn meaningful representations and extract valuable features from the data.
- Project Three: focuses on Smart Mobility Research. This field centers on employing deep learning methods for time series analysis. My current focus involves crafting models aimed at forecasting and scrutinizing the likelihood of accidents and road construction within designated zones. Additionally, we have introduced a multi-source dataset and a multimodal architecture for this project's advancement. To accomplish this, I harness diverse data streams, such as historical records, weather data, satellite and map imagery, and demographic details.

### M.Sc. in Computer Engineering with focus on Software

Tehran, Iran

SHAHID BEHESHTI UNIVERSITY

Sep. 2015 - Exp. Sep. 2017

- Thesis: An Approach for Automatic Software Test Data Generation Using Machine Learning and Program Static Structure
- Supervisor: Prof. H.Haghighi
- I achieved **Ranked 1st**, National M.Sc Entrance Exam of Computer Engineering, Among More Than 10.000 Students

### B.Sc. in Computer Engineering with focus on Hardware

Tehran, Iran

SHAHID BEHESHTI UNIVERSITY

Sep. 2011 - Exp. Sep. 2015

- Thesis: Applying Reinforcement Learning on Multi-Agent Environments
- Supervisor: Prof. M. Abdoos

## Papers

### SelfReinforce: Bridging the Exploration Gap in Reinforcement Learning through Self-Supervised Learning

Under Submission

2024

### FreqFuseVision: Frequency-Based Image Masking for Enhanced Visual Representations Through Generative and Self-Distillation Fusion

Under Submission

2024

## Masked LoGoNet: Extracting Local and Global Features for 3D Image Analysis in Medical Domain

Under Review

AMIN KARIMI MONSEFI, PAYAM KARISANI, STACEY CHOI, NATHAN DOBLE, HENG JI, SRINIVASAN PARTHASARATHY, RAJIV RAMNATH

2024

## CrashFormer: A Multimodal Architecture to Predict the Risk of Crash

Hamburg, Germany

AMIN KARIMI MONSEFI, POUYA SHIRI, AHMAD MOHAMMADSHIRAZI, NASTARAN KARIMI MONSEFI, RON DAVIES, SOBHAN MOOSAVI, RAJIV RAMNATH

2023

- Conference: International Conference on Advances in Geographic Information Systems
- 31st ACM SIGSPATIAL

## Novel Physics-Based Machine-Learning Models for Indoor Air Quality Approximations

Long Beach, California, USA

AHMAD MOHAMMADSHIRAZI, AMIN KARIMI MONSEFI, AIDA NADAFIAN, MOHAMMAD H RAFIEI, RAJIV RAMNATH

2023

- Conference On Knowledge Discovery And Data Mining
- 29TH ACM SIGKDD

## Smart and collaborative industrial IoT: A federated learning and data space approach

Elsevier

BAHAR FARAHANI AND AMIN KARIMI MONSEFI

2023

- Journal: Digital Communications and Networks

## Will there be a construction? Predicting road constructions based on heterogeneous spatiotemporal data

Seattle, Washington, USA

AMIN KARIMI MONSEFI, SOBHAN MOOSAVI AND RAJIV RAMNATH

2022

- Conference: International Conference on Advances in Geographic Information Systems
- 30th ACM SIGSPATIAL

## Real-time Travel Time Estimation Using Matrix Factorization

Elsevier

AMIN KARIMI MONSEFI, EBRAHIM BADRESTANI, BEHNAM BAHRAK, ALI ELAHI, ADIB FARAMARZI, POURIA GOLSHANRAD, HAMID MAHINI, ARMIN ZIRAK

2019

- Journal: Transportation Research Part C: Emerging Technologies

## Solving the Reaction-Diffusion equation based on analytical methods and deep learning algorithm; the Case study of sulfate attack to concrete

Elsevier

AMIN KARIMI MONSEFI AND RANA BAKHTIYARZADE

2019

- Journal: Computer and Mathematics with Applications

## Weakly Supervised Learning Technique for solving Partial Differential Equations; Case study of 1-D Reaction-Diffusion Equation

Tehran, Iran

BEHZAD ZAKERI, AMIN KARIMI MONSEFI, SANAZ SAMSAM AND BAHAREH KARIMI MONSEFI

2019

- Conference: TopHPC Conference (High Performance Computing and Big Data Analytics)
- Selected Paper And Publish In The Springer Book Series
- Communications in Computer and Information Science

## Performing Software Test Oracle Based on Deep Neural Network with Fuzzy Inference System

Tehran, Iran

AMIN KARIMI MONSEFI, BEHZAD ZAKERI, SANAZ SAMSAM AND MORTEZA KHASHEHCHI

2019

- Conference: TopHPC Conference (High Performance Computing and Big Data Analytics)
- Selected Paper And Publish In The Springer Book Series
- Communications in Computer and Information Science

## Deep Learning Prediction of Heat Propagation on 2-D Domain via Numerical Solution

Zanjan, Iran

BEHZAD ZAKERI, AMIN KARIMI MONSEFI AND BABAK DARAFARIN

2019

- Conference: The International Conference on Contemporary Issues in Data Science
- Selected Paper And Publish In The Springer Book Series
- Lecture Notes on Data Engineering and Communications Technologies Communications in Computer and Information Science

## Study of Emotions and Thoughts of The Society and The Effect of Various Events on Them by Social Media

Tbilisi, Georgia

AMIN KARIMI MONSEFI, BEHZAD ZAKERI AND BABAK DARAFARIN

2018

- Conference: 5th International Conference on Information Technology, Computer and Telecommunication

## Professional Experiences

## JIBB

San Francisco, USA

### SENIOR DATA SCIENTIST

Des 2020 - Dec 2021

- JIBB is the smart new way to capture, save and share your handwriting from anywhere, anytime. Whether you select a **whiteboard** or **paper** session to start, you will always have these options: Share and save a high-quality JPEG copy of your writing at any time from the mobile app or your JIBB Workspace.
- My work is **detecting objects** and **remove extra objects** from images and videos.
- I **detect color** of contests and **remove shadow** and **reflection** from images and videos. I developed different method of **CNN** for my works.

## BlueBitSoft

Tehran, Iran

### TECHNICAL CONSULTANT (CTO)

Des 2018 - Dec 2021

- Bluebitsoft is an international team that masters the production of pharmacy software solutions. The team consists of software and business experts who love developing groundbreaking software in the industry. Our products are currently deployed in Nederland's pharmacies and we hope to expand our products throughout the World.
- I was technical consultant at the company, I designed a high level an architecture for there software.

## Esign Start Up

Tehran, Iran

### TEAM LEAD OF SOFTWARE ENGINEER (PART TIME JOB)

Des 2020 - Dec 2021

- Esign is a start up team that work on selling carpets..
- I'm team lead of implementing team for developing a web application for selling carpets.

## TAP30(New name is TAPSI) (Online Taxi)

Tehran, Iran

### SENIOR DATA SCIENTIST & BACK-END DEVELOPER

Mar. 2018 - Des 2020

- Designed and Implemented Pricing micro-services by Python and communicate by event messaging (RabbitMQ).
- Designed and Implemented **fake GPS detection** algorithm and micro-service by Python and communicate by event messaging (RabbitMQ).
- Implemented smart side of our back-end based on passengers' data (Origin Suggestion, Destination Suggestion, Favorite Location Suggestion, and Ride Suggestion) by using **unsupervised algorithms**
- Implemented micro-service ETA (estimated arrival time) by drivers' GPS information. We introduce a **new algorithm for ETA based on GPS data** and we published a paper for our work too
- Produced Base map of Tehran and Karaj cities using in-ride drivers' GPS information.
- Implemented SMART map for predicting locations with higher ride demand rates in cities.
- In Tap30, we work with Python and NodeJs to develop our back-end, and we use Spark, Kafka, and R for our analytical purposes; besides, we exploit PostgreSQL, MongoDB, and Redis to store our data.

## Haft-Sang Company Group

Tehran, Iran

### SENIOR SOFTWARE ENGINEER & WEBSITE BACK-END DEVELOPER

Apr. 2016 - Mar. 2018

- Implemented APIs for **streaming videos, music** and etc.
- Designed and Implemented a software architecture able to connect to MCI and MTN APIs and transfer users' information.
- Implemented server sides of more than 10 Apps in the media.
- In The Haft-Sang, we worked with ASP.Net and .NetCore for server side of our software, also, we employed SQL Server as databases.

## Shahid Beheshti Cyberspace Faculty

Tehran, Iran

### EXPERT WEBSITE BACK-END DEVELOPER

Sep. 2014 - Feb. 2016

- Developed a crawler and classifier to crawl more than 1000 websites to extract contents and images for classification and categorization of real-time content streams using fuzzy models and neural network.
- Implemented Restful API server which is communicating with the client side of the website to transform data from the server to the web.
- In the SBCF, we worked with ASP.Net and Java SE as back end side of our website and SQL Server and Cassandra as databases.

## Zoraq (Start-up company)

Tehran, Iran

### BACK-END WEB DEVELOPER INTERN

Jun. 2013 - Oct. 2013

- Learned how to develop a website using C#, Asp.Net.
- Learned how to create databases for websites using SQL Server.
- learned how to write Rest APIs.
- learned how to design website's front-end side using HTML/CSS.
- In the Zoraq, I experienced the taste of working in development teams and started my professional career as an developer.

## Honors & Awards

### ACM-ICPC COACH AND TEAM LEAD

Apr 2018 **Coach**, 42nd Annual World Finals

Beijing, China

Dec 2017 **Coach**, 7th and 17th teams, Regional Contest

Tehran, Iran

Nov 2017 **Coach**, 10th and 16th teams, Internet Programming Contest

Tehran, Iran

Oct 2017 **Coach**, The 1st team, Regional Contest

Kabul, Afghanistan

Oct 2017 **Coach**, The 1st team, Online Programming Contest

Kabul, Afghanistan

Oct 2015 **Coach**, The 11th team, Iran-Internet-PC-IU Online Programming Contest

Tehran, Iran

Oct 2015 **Coach**, The 23rd team, Iran-Internet-PC-SBU Online Programming Contest

Tehran, Iran

Nov 2014 **Coach**, The 12th, 53rd, and 131st teams, Internet Programming Contest

Tehran, Iran

## ACM-ICPC CONTESTANT

Dec 2014	<b>10th Place</b> , Asia Regional Contest	<i>Tehran, Iran</i>
Oct 2014	<b>2nd Place</b> , Qualification Contest, Shahid Beheshti University	<i>Tehran, Iran</i>
Dec 2013	<b>3rd Place</b> , Asia Regional Contest	<i>Tehran, Iran</i>
Oct 2013	<b>1st Place</b> , Qualification Contest, Shahid Beheshti University	<i>Tehran, Iran</i>
May 2013	<b>5th Place</b> , The 5th ACM National Collegiate Programming Contest, University of Kashan	<i>Kashan, Iran</i>
Apr 2013	<b>8th Place</b> , The 1st ACM National Collegiate Programming Contest, University of Shahrood	<i>Shahrood, Iran</i>
Dec 2012	<b>25th Place</b> , Asia Regional Contest	<i>Tehran, Iran</i>
Nov 2012	<b>16th Place</b> , The 3rd ACM National Collegiate Programming Contest, Amir Kabir University of Technology	<i>Tehran, Iran</i>
Oct 2012	<b>2nd Place</b> , Qualification Contest, Shahid Beheshti University	<i>Tehran, Iran</i>

## OTHER

June 2015	<b>Ranked 1st</b> , National M.Sc Entrance Exam of Computer Engineering, Among More Than 10.000 Students	<i>Iran</i>
June 2011	<b>Ranked Top 1%</b> , National B.Sc Entrance Exam of Mathematics, Among More Than 256,000 Students	<i>Iran</i>
Mar 2009	<b>Bronze Medal</b> , Mathematics Olympiad of Waterloo University	<i>Tehran - Waterloo</i>

## Teaching Experiences

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### TEACHING ASSISTANT

3 times	<b>Modeling and Problem Solving with Spreadsheets and Databases</b> , Fall 22/23 and Spring 23	<i>Ohio State Uni</i>
Spr 2012	<b>Introduction to Programming</b> , Teacher: Dr. A. M. Aznavah	<i>Shahid Beheshti Uni</i>
Fall 2012	<b>Introduction to Programming</b> , Teacher: Dr. A. M. Aznavah	<i>Shahid Beheshti Uni</i>
Spr 2013	<b>Introduction to Programming</b> , Teacher: Dr. M. H. Moayeri	<i>Shahid Beheshti Uni</i>
Spr 2013	<b>Discrete Mathematics</b> , Teacher: Dr. F. Safaie	<i>Shahid Beheshti Uni</i>
Fall 2013	<b>Discrete Mathematics</b> , Teacher: Dr. H. Haghighi	<i>Shahid Beheshti Uni</i>
Spr 2014	<b>Discrete Mathematics</b> , Teacher: Dr. F. Safaie	<i>Shahid Beheshti Uni</i>
Spr 2015	<b>Introduction to Algorithm</b> , Teacher: Dr. E. Bavafaye	<i>Shahid Beheshti Uni</i>
Fall 2015	<b>Data Structure</b> , Teacher: Dr. M. E. Moghadam	<i>Shahid Beheshti Uni</i>
Fall 2015	<b>Artificial Intelligence</b> , Teacher: Dr. M. Shamsfard	<i>Shahid Beheshti Uni</i>
Fall 2015	<b>Introduction to Algorithm</b> , Teacher: Dr. R. Ghavamizade	<i>Shahid Beheshti Uni</i>
Fall 2016	<b>Data Structure</b> , Teacher: Dr. M. E. Moghadam	<i>Shahid Beheshti Uni</i>
Fall 2016	<b>Artificial Intelligence</b> , Teacher: Dr. M. Shamsfard	<i>Shahid Beheshti Uni</i>
Spr 2017	<b>Discrete Mathematics</b> , Teacher: Dr. H. Haghighi	<i>Shahid Beheshti Uni</i>
Spr 2018	<b>Discrete Mathematics</b> , Teacher: Dr. H. Haghighi	<i>Shahid Beheshti Uni</i>

## Skills

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<b>Data Analysis</b>	<ul style="list-style-type: none"><li>• Python</li><li>• MATLAB, R</li><li>• TensorFlow, Keras, Pytorch, Scikit-Learn</li><li>• Spark, Kafka, Hadoop</li></ul>
<b>Programming</b>	<ul style="list-style-type: none"><li>• C, C++, C#</li><li>• Java</li><li>• NodeJS</li><li>• VHDL, Verilog</li><li>• HTML, CSS, JS</li></ul>
<b>Applications</b>	<ul style="list-style-type: none"><li>• Web Backend (ASP.net MVC, .net Core)</li><li>• Web UI (HTML, CSS, JS)</li><li>• Application Development (Android)</li></ul>
<b>Databases</b>	<ul style="list-style-type: none"><li>• SQL (SQL Server, MYSQL, PostgreSQL)</li><li>• NOSQL (Cassandra, MongoDB, Redis, Memcached, SolR, Elasticsearch, Lucene)</li></ul>
<b>DevOps</b>	<ul style="list-style-type: none"><li>• CI/CD (gitlab)</li><li>• Docker, VM</li><li>• RabbitMQ</li><li>• Cloud (Azure)</li></ul>