Peyman Ghasemi, PhD

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Education

University of Calgary — Calgary, AB, Canada
PhD in Biomedical Engineering — *2021 – 2024*
- Thesis: *Reinforcement Learning for Coronary Artery Disease Treatment Optimization*

Tehran University of Medical Sciences — Tehran, Iran
MSc in Health Economics — *2017 – 2020*
- Thesis: *Machine Learning Models and Google Trends Data to Predict Pharmaceutical Demand*

University of Tehran — Tehran, Iran
BSc in Electrical Engineering (Biomedical Engineering) — *2012 – 2017*

Experience

Machine Learning Engineer — August 2024 – Present
CropMind Inc. (Contract) — *Calgary, Canada*
- Trained and deployed accurate (over 90%), robust, and fast computer vision models to detect and count apple fruits (based on YOLOv9)
- Developed and deployed ML models to segment important parts of the apple canopy and flowers (UNET)
- Technologies: *Python, PyTorch, OpenCV, Docker, FastAPI, GCP*

Applied Data Scientist — April 2022 – April 2024
Aerial Technologies Inc. — *Calgary, Canada*
- Designed an algorithm to detect sleep and wake-up time using WiFi signal based on UNET structure
- Developed models to detect human fall based on MobileNet and UNET structures with fewer false positive results
- Improved the algorithm efficiency by over 90% by designing a novel filter to exclude easy cases from the ML inference, extracting important features, and replacing Hilbert-Huang Transform with Fast Fourier Transform
- Technologies: *Python, TensorFlow, Keras, SciPy, FFT, Git, AWS*

Data Scientist and Computer Vision Engineer — March 2019 – March 2021
Pixofarm GmbH. — *Tehran, Iran*
- Fast and accurate detection and segmentation of fruit images on a mobile processor
- Development of a novel fast semi-automatic image segmentation method using the Dijkstra graph algorithm
- Estimation of real 3D fruit size from their 2D images
- Improvements on the harvest size predictive models using machine learning techniques and field knowledge
- Technologies: *Python, C++, OpenCV, TensorFlow, Sklearn, Git, AWS*

Software Developer and R&D Team Member — September 2017 – October 2018
ETC Universe Inc. — *Tehran, Iran*
- Microscopic image acquisition/processing and optimization of lens specifications
- Detection and segmentation of different parts of sperms in microscopic images and videos
- Detection of abnormalities in sperms using ML and rule-based methods
- Technologies: *C++, MATLAB, Python, OpenCV, Sklearn*

Technical Skills

Programming: Python, Matlab, C++, SQL, R
Data Analysis: Supervised/Unsupervised Learning, Deep Learning, Reinforcement Learning, Statistical Modeling, Computer Vision, Signal & Image Processing, RAG
ML Tools: Tensorflow, PyTorch, Scikit-learn, Keras, XGBoost, LightGBM, Transformers, AWS Sagemaker, SHAP, LangChain
Libraries & Tools: NumPy, SciPy, Matplotlib, Seaborn, OpenCV, Pandas, NLTK, Flask, Gradio, GIT, Docker
Other Skills: Problem-Solving, Teamwork, Project Management, Scientific Writing, Adaptability and Continuous Learning, Economic Evaluation, Biomedical Engineering
Languages: English, Persian, Azeri

Other Notable Projects

RL for CAD treatment Recommendation | *Python, PyTorch, Pandas, D3rlpy* | *PhD* 2024

- Developed Reinforcement Learning (RL) methods to optimize treatments for Coronary Artery Disease (CAD)
- Explored different offline RL algorithms: Q-learning, DQN, Conservative Q-learning. [RL4CAD on GitHub]

Unsupervised ICD/ATC codes Feature Selection | *Python, Tensorflow, Autoencoders* | *PhD* 2023

- Developed and compared different unsupervised feature selections algorithms
- Selected hierarchically structured medical codes (e.g., ICD and ATC) from large healthcare databases (>30M records). [ICD10-Unsupervised-Feature-Selection & icd-atc-feature-selector on GitHub]

Pharmaceutical Demand Prediction | *Python, ARIMA, LSTM* | *MSc* 2020

- Used Google Trends data as a proxy to burden of diseases and estimation of healthcare demand.
- Used ARIMA and LSTM models to predict the demand for medicines based on internet search about associated diseases.

Mortality Prediction Using HRV | *MATLAB, DFA, FFT* | *BSc* 2016

- Extracted heart rate variability (HRV) timeseries from ECG signals
- Calculated linear & nonlinear features of the HRV (e.g., DFA, sample entropy, frequency domains, etc.) as predictors of death in patients with sepsis.

ECG Fiducial Points Detection | *MATLAB* | *Freelance Project* 2018

- Used Lynn's filter to denoise ECG and Pan-Tompkin's algorithm to extract R peaks.
- Determined onsets of the waves by analyzing the morphology of the signal.

Selected Publications | Google Scholar: https://scholar.google.com/citations?user=JnG6blIAAAAJ&hl

- **Peyman Ghasemi**, M. Greenberg, D. Southern, *et al.*, "Personalized decision making for coronary artery disease treatment using offline reinforcement learning," *npj Digital Medicine (Nature)*, 2025. DOI: 10.1038/s41746-025-01498-1
- **Peyman Ghasemi**, M. Greenberg, D. Southern, *et al.*, "Addressing distribution shifts in optimization of coronary artery disease treatment using reinforcement and transfer learning," *JAMIA*, 2025, [Under Review]
- **Peyman Ghasemi** and J. Lee, "Unsupervised feature selection to identify important ICD-10 and ATC codes for machine learning on a cohort of patients with coronary heart disease: Retrospective study," *JMIR Medical Informatics*, 2024. DOI: 10.2196/52896
- B. Kim, **Peyman Ghasemi**, P. Stolee, *et al.*, "Clinicians and older adults' perceptions of the utility of patient-generated health data in caring for older adults: Exploratory mixed methods study," *JMIR aging*, 2021. DOI: 10.2196/29788
- **Peyman Ghasemi** and M. R. Raoufy, "Prediction of mortality in patients with sepsis using detrended fluctuation analysis of heart rate variability," in *23rd Iranian Conference on Biomedical Engineering and 1st International Iranian Conference on Biomedical Engineering (ICBME)*, IEEE, 2016. DOI: 10.1109/ICBME.2016.7890947

Honors and Awards

Alberta Innovates Graduate Student Scholarship 2023-2024
University of Calgary, AB, Canada

Libin Cardiovascular Institute Graduate Scholarship 2021-2023
University of Calgary, AB, Canada

Volunteer Activities

RadioBME 2017 – 2018
Scientific Podcasting about Engineering in Medical and Health Technology *Persian Social Media*

Chairman and board member of BMESB 2015 – 2017
Biomedical Engineering Student Branch *University of Tehran*

- Organized several technical workshops and scientific lectures (10+), and two BME-related student Congresses (400+ participants)
- Managing director of "BioTech Magazine" (nationwide awarded student magazine to promote BME research and jobs among students)

Reviewer 2023 – 2024
Journal of Medical Internet Research *University of Calgary*