

# FATEME SADAT HAGHPANAH

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- Dual Master's degrees in Computer Science and Biomedical Engineering, with deep expertise in machine learning across various frameworks and tools.
- Recent experience as a Machine Learning Scientist at Signal1, with a strong background in software development, backend coding, and tool building in Java.
- Nearly two years of hands-on experience working with big data, including building tools to support data-driven experimentation.
- Expertise in handling sensitive PII data, including patient images, laboratory results, and other medical data, gained through both academic and professional work.

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INDUSTRY EXPERIENCE	◇ <b>Machine Learning Scientist at Signal1 - (Toronto, Canada)</b>	Dec. 2023 – Aug. 2024
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- Led the end-to-end optimization and migration of the *CHARTWatch* legacy machine learning pipeline from Kubeflow to a microservice architecture.
  - This involved conducting in-depth data analysis, resolving key issues, and implementing code updates to ensure the alignment of deterioration model scores with the Java-based main repository.
  - The migration improved system reliability, reduced Kubeflow maintenance overhead, and increased the model update frequency from 6 hours to just 15 minutes, enabling more efficient continuous monitoring.
- Led an end-to-end machine learning-based Delirium Prediction feasibility study for a hospital client.
  - Proactively acquired knowledge of Delirium and researched its application to machine learning, despite no medical background.
  - Formulated strategies to map the problem to ML pipeline and devised innovative labeling solutions based on hospital data.
  - Evaluated the model's performance, delved into its explainability, and scrutinized feature selection, limitations, and areas for enhancement to optimize its effectiveness.
  - Appraised the model's practical utility in real-world hospital settings, measuring its effectiveness for early detection and its potential to alleviate nursing staff workload.
- Frameworks: Java, Python, Pandas, Azure, Docker, Helm

	◇ <b>Data Scientist at Divar, Classified-Ad Platform - (Tehran, Iran)</b>	Sept. 2017 – Aug. 2018
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- Developed an innovative search algorithm utilizing semantic networks, word embedding, and cutting-edge NLP algorithms to enhance search result relevancy, improving the user experience.
- Leveraged behavioral pattern analysis to refine user queries and optimize search filters across categories, enhancing the overall search experience.
- Developed a machine learning image search algorithm using CNNs to assist human reviewers in identifying and removing duplicate listings from the platform.
- Framework: Python, PySpark, fastText, Apache Zeppelin, SQL, Airflow.

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ACADEMIC EXPERIENCE	◇ <b>Research Assistant at University of Toronto - (Toronto, Canada)</b>	Jan. 2021 – May 2023
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Affiliated with "*Vector Institute for Artificial Intelligence*," "*University Health Network*," and "*SickKids, the Hospital for Children*."

- Designed and developed the first-ever neural network-based pipeline to detect cerebral microbleeds (CMB) in preterm infants' brain MRI scans.
- Developed a supervised convolutional neural network model to expedite the diagnosis of brain tumors in children within hospital emergency rooms with the AUC ROC score of 0.95.
- Frameworks: PyTorch, Sci-kit Learn, Pandas, OpenCV.

	<ul style="list-style-type: none"> <li>◇ <b>Research Assistant at Columbia University - (NY, USA)</b> Sept. 2018 – Sept. 2020 <ul style="list-style-type: none"> <li>· Implemented a U-Net-based segmentation model to accurately distinguish between 9 different tissues and 78 distinct regions of the neonatal brain's MRI</li> <li>· Designed a novel segmentation algorithm to identify 6 various tissues of whole-body MRI scan to enhance MRI safety.</li> <li>· Frameworks: PyTorch, Sci-kit Learn, Pandas, OpenCV.</li> </ul> </li> </ul>
EDUCATION	<ul style="list-style-type: none"> <li>◇ <b>M.Sc. in Computer Science, University of Toronto</b> Jan. 2021 – May 2023 Select Courses: Natural Language Processing and Computing (A-), Topics in Machine Learning for Health (A), Topics in Computational Social Science (A), Machine Learning (A+). GPA: 4.00/4</li> <li>◇ <b>M.Sc. in Biomedical Engineering, Columbia University</b> Sept. 2018 – Dec. 2019 Select Courses: Applied Data Science (A), Empirical Methods of Data Science (A), Applied Deep Learning in Biomedical (A+).</li> <li>◇ <b>B.Sc. in Computer Engineering, Sharif University of Technology</b> Sept. 2013 – Jan. 2018 Select Courses: Signal and Systems, Probability and Statistics for Computer Engineering, Data Structures and Algorithms, Discrete Structures, Advanced Programming.</li> </ul>
SELECT SKILLS	<ul style="list-style-type: none"> <li>◇ <b>Programming Languages</b> : Python, Java, C/C++, MATLAB, SQL.</li> <li>◇ <b>Machine Learning Data Science</b> : PyTorch, TensorFlow, Scikit-Learn, Numpy, Pandas, PySpark, Apache Spark, Apache Zeppelin, Tableau</li> <li>◇ <b>Development Tools Frameworks</b> : Jupyter, OpenCV, Git, Docker, Helm, Apache Airflow</li> <li>◇ <b>Cloud DevOps</b> : Microsoft Azure, Datadog</li> <li>◇ <b>Languages</b> : Persian (Native), English (Fluent), Spanish (Beginner).</li> </ul>
PUBLICATIONS	<ul style="list-style-type: none"> <li>◇ Yun Wang*, <u>Fateme Sadat Haghpanah*</u>, Xuzhe Zhang, Katie Santamaria, Gabriela Koch da Costa Aguiar Alves, Elizabeth Bruno, Natalie Aw et al. <b>ID-Seg: an infant deep learning-based segmentation framework to improve limbic structure estimates.</b> Brain Informatics 9, no. 1 (2022): 12.</li> <li>◇ Xuzhe Zhang, Elsa D. Angelini, <u>Fateme S. Haghpanah</u>, Andrew F. Laine, Yanping Sun, Grant T. Hiura, Stephen M. Dashnaw et al. <b>Quantification of lung ventilation defects on hyperpolarized MRI: The Multi-Ethnic Study of Atherosclerosis (MESA) COPD study.</b> Magnetic Resonance Imaging 92 (2022): 140-149.</li> <li>◇ Yun Wang*, <u>Fateme Sadat Haghpanah*</u>, Natalie Aw, Andrew Laine, and Jonathan Posner. <b>A transfer-learning approach for first-year developmental infant brain segmentation using deep neural networks.</b> bioRxiv (2020): 7.</li> </ul>
SELECT PROJECTS	<ul style="list-style-type: none"> <li>◇ <b>Neural Machine Translation - Course Project at University of Toronto</b> Jan. 2023 – Apr. 2023 <ul style="list-style-type: none"> <li>· Developed an NLP translation model using transformer architecture with attention mechanisms to translate English to French on the Hansards dataset. <a href="#">[Code]</a></li> </ul> </li> <li>◇ <b>Causality in Medical Imaging - Course Project at University of Toronto</b> Sept. 2022 – Dec. 2022 <ul style="list-style-type: none"> <li>· Led a team to investigate causality in medical imaging, using supervised machine learning to detect MRI acquisition parameters on the PPMI dataset to enhance performance. <a href="#">[Code]</a></li> </ul> </li> <li>◇ <b>Face Emotion Recognition - Course Project at Columbia Univesity</b> Sept. 2019 – Dec. 2019 <ul style="list-style-type: none"> <li>· Built a facial emotion recognition classifier using feature extraction techniques and trained various models, including LDA, SVC, RandomForest, and CNN-based approaches<a href="#">[Code]</a></li> </ul> </li> </ul>
HONORS AND AWARDS	<ul style="list-style-type: none"> <li>◇ <b>CRA-WP Scholarship</b> to attend CRA-WP Grad Cohort Workshop for Women. April 2023 and 2022</li> <li>◇ <b>Vector Institute for Artificial Intelligence Research Grant</b> 2023, 2022, and 2021</li> <li>◇ <b>Temerty Innovation Grant for AI in Medicine</b> 2021 Won a research grant of 200K from T-CAIREM as one of the three winners for the proposal titled "Machine Learning-Based Innovation in Ocular Pediatric Assessment Using Point of Care Ultrasound."</li> <li>◇ <b>Bronze Medal</b> in 8th Iranian National Olympiad of Astronomy &amp; Astrophysics (INOA). 2012</li> </ul>