

Sepehr Seghatoleslami

Machine Learning Engineer | Reinforcement Learning, Computer Vision & Applied Research

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EXPERIENCE

Research Assistant - Computer Vision for Neuroimaging

Cognitive Development and Neuroimaging Laboratory, Western University | Apr 2026-present

- Developing automated substantia nigra segmentation for 3T and 7T neuromelanin-sensitive MRI using a prior-guided PyTorch 3D U-Net, uncertainty estimates, and automated quality checks.
- Building localization-robust training and evaluating against expert-drawn masks through subject-level comparisons and stress tests. Work is ongoing.

Mathematics and Computer Science Tutor

Self-employed | Iran and Canada | 2020-2024

- Taught olympiad combinatorics and geometry, alongside university calculus, linear algebra, and computer science.

SELECTED RESEARCH AND ENGINEERING

VODLens CS2 - Retrieval with Video Evidence

2026 | Python, Polars, DuckDB, FAISS, sentence-transformers, Streamlit

- Built retrieval over 1.93 million professional game situations, linking comparable cases to POV clips and checking coaching-brief citations against retrieved evidence.
- Compared nine retrieval systems on 70 queries. Learned state weights improved nDCG@5 by 0.120 over hand-set weights under the judged benchmark; a separate metric checked the findings.

Detecting Emergent Collusion in Algorithmic Pricing

Undergraduate thesis, Western University | 2026 | Supervisor: Dr. Apurva Narayan

- Ran 1,000 Q-learning sessions and reproduced the Calvano benchmark at 0.852 normalized profit gain versus 0.849, with exact evaluation of frozen policies and best responses.
- Constructed audit-aware policies retaining 70.7% of the competitive-to-monopoly gain against the full detector suite and 99.3% against the reaction audit alone; studied subsequent attacks on a widened audit.

Connect Four - Learning and Hybrid Search

2026 | Python, PyTorch, DQN, C/pthreads

- Combined supervised pretraining on 67,557 solved positions, a dual-path network, 1,024 parallel game environments, staged reinforcement learning, and a C alpha-beta search engine.
- Best hybrid checkpoint: 57 wins and 8 draws in 100 games against depth-6 minimax, compared with 40 wins for the bare DQN. The documented 10-hour curriculum is a separate run.

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Selected work and background

FURTHER WORK

AutoDoseRL - Insulin Dosing in Simulation

2026 | Python, PyTorch, Stable-Baselines3, Gymnasium, simglucose

- Built a continuous-action PPO controller using rolling glucose inputs and insulin context, with an external action-constraint layer and no meal announcements.
- Reached 88.7% mean time in range and 1.0% time below range across ten adult virtual patients on unseen episodes. PID reached 59.0% TIR; basal-bolus reached 95.2% with meal information unavailable to PPO.

Visual Robustness under Domain Shift

2026 | Python, PyTorch, ResNet-18, NVIDIA A100

- Trained ResNet-18 from scratch on 100,000 Tiny ImageNet images for 100 epochs under baseline, RandAugment, and AugMix recipes; evaluated 50 controlled corruption conditions.
- AugMix improved mean corruption accuracy by approximately 7.9 percentage points, from 27.47% to 35.32%, with clean accuracy of 61.64% versus 61.66% for the baseline.

Collusion and Detectability in Poker

Independent research | 2026 | Python, CFR, linear programming

- Studied a colluding pair in three-player Leduc hold'em using explicit constructions, constrained optimization, and exact strategy evaluation.
- Under the same three-feature detector family, found achievable values of about +1.95 chips/hand for a mixed honest reference and +0.51 for a selfish-CFR reference. These are best-found lower bounds, not certified optima.

EDUCATION AND DISTINCTIONS

B.Sc. Honours Specialization in Computer Science

Western University | 2026

Major average: 92% | Overall average: 89%

Dean's Honor List | Western Admission Scholarship

Silver medal, Iranian National Mathematical Olympiad (2021)

Bronze medal, Iranian National Mathematical Olympiad (2020)

Third prize, European Mathematical Cup (2021)

TECHNICAL SKILLS

ML and vision: PyTorch, NumPy, torchvision, CNNs, segmentation, supervised pretraining, robustness evaluation

Learning and retrieval: PPO, DQN, Q-learning, Stable-Baselines3, Gymnasium, FAISS, sentence-transformers, Polars, DuckDB, ranking and LLM evaluation

Programming and systems: Python, C/C++, Java, SQL, parallel simulation, pthreads, Git, Linux, Bash, Docker, LaTeX