TALAL ALRAWAJFEH

Senior Applied Scientist

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Professional Summary

Researcher and applied scientist with 10 years of experience across AI research, production machine learning, and software engineering. Five years of experience turning ambiguous, business-critical problems into production AI systems for regulated banking. Delivered a document signature verification model with 99% accuracy, cheque OCR/ICR automating 80% of manual data entry, and eKYC components supporting the automation of 70% of online onboarding applications. Combines mathematical depth with hands-on engineering and clear cross-functional technical leadership.

Core Skills

Areas of Expertise: Deep learning, machine learning, computer vision, time-series analysis and forecasting, anomaly detection, probabilistic modelling, Bayesian statistics, continual learning, neural processes, tabular foundation models, differential privacy, interpretability and explainability, Mathematics, formal verification, software engineering
Programming and Tools: Python, C, C++, x86-64 Assembly, Java, Kotlin, Scala, C#, Ruby, SQL, Lean, PyTorch, JAX, TensorFlow, Keras, scikit-learn, NumPy, SciPy, pandas, OpenCV, Pyro, Optuna, Numba
DevOps and MLOps: MLflow, ONNX, OpenVINO, TensorFlow Lite, Docker, Kubernetes, Git, CI/CD
Software Engineering: Spring Boot, .NET Core, Cython, FastAPI, Flask, Vert.x, Rails, Node.js, Kafka, CMake, Maven, Gradle, MySQL, Oracle Database, Redis, Elasticsearch

Professional Experience

Doctoral Researcher **Feb 2024–Present**
University of Helsinki *Helsinki, Finland*

- Lead theory-to-experiment research in privacy-preserving machine learning spanning differential privacy, Bayesian inference, variational inference, continual learning, neural processes, and tabular foundation models.
- Introduced PrivTab, a tabular foundation model for differentially private classification that adapts to new datasets through in-context learning in a single forward pass; first-author preprint, 2026.
- Introduced noise-aware differentially private variational inference for high-dimensional, non-conjugate models; designed a more accurate posterior evaluation method and demonstrated calibrated results on Bayesian regression tasks. Published first-author work at AISTATS 2025.
- Co-led an equal-contribution TMLR 2026 paper identifying classifier output label spaces as a privacy side channel; formalized differential privacy for continual learning and evaluated two mechanisms that restore valid privacy guarantees.
- Formalized differential privacy mechanisms and sensitivity proofs in Lean 4; run reproducible experiments at scale using Python, JAX, PyTorch, and high-performance computing infrastructure.
- Teaching assistant for Introduction to Data Science (three academic years) and Practical Machine Learning.

Senior Machine Learning Engineer **May 2019–Feb 2024**
ProgressSoft Corporation *Amman, Jordan*

- Led multiple data science teams within the AI department, coordinating delivery through regular technical reviews and checkpoints while owning problem framing, experimentation, evaluation, production integration, and stakeholder communication.
- Led deep-learning development for document signature segmentation and offline signature verification with 99% accuracy; delivered OCR/ICR models that automated at least 80% of manual data entry.
- Built document segmentation, passive livenes, and facial recognition components for bank eKYC software, including ID-card/passport detection, perspective correction, template matching, and field extraction; contributed to automating at least 70% of onboarding applications.
- Created domain-agnostic cash-flow forecasting systems combining statistical, ML, and deep-learning models; designed adaptive transaction anomaly detection that tracks customer-behaviour drift with controllable sensitivity.
- Deployed models as part of ProgressSoft software running on premises in banks; optimized inference with ONNX, OpenVINO, TensorFlow Lite, hardware benchmarking, and modern C++ implementations using SIMD/AVX.
- Technically led MessageDepot, an LLM-enabled system developed by team members for natural-language-to-SQL querying, result summarization, and chart generation.
- Interviewed candidates, screened CVs, onboarded employees, and created supervised self-learning improvement plans with structured checkpoints, progress reviews, and task feedback; helped coordinate work across the AI department.

Backend Engineer **Apr 2018–Apr 2019**
Strategic Directory for Shopping Sites / Blue Kangaroo *Amman, Jordan*

- Built data collection and analysis pipelines and production APIs for a white-label, AI-enabled e-commerce shopping assistant using Ruby on Rails, Kafka, and Elasticsearch.
- Improved reliability and maintainability through refactoring, code review, unit and integration testing, and docu-

mentation of APIs and integrations while collaborating across multiple teams.

Associate Java Developer **Sep 2016–Mar 2018**
ProgressSoft Corporation *Amman, Jordan*

- Developed and maintained large-scale electronic payment solutions for banks and corporates, including an electronic cheque-deposit service with multiple external REST and RPC integrations.
- Delivered regulated financial software using Java, Spring Boot, Hibernate/JPA, TDD, clean code, Agile, DevOps, performance benchmarking.

Selected Publications and Research

- **Interpretable Differentially Private Continual Learning with Prototype-Based Classifiers.** Yuan He, **Talal Alrawajfeh**, Wachirapatra Mahatubgris, Agil Aghasanli, Mikko A. Heikkilä, Plamen P Angelov, Antti Honkela. Submitted to ICLR.
- **Efficient Provably Private Classification with a Tabular Foundation Model. Talal Alrawajfeh**, Cristiana Diaconu, Ossi Räisä, Sebastian Rodriguez Beltran, Yuan He, John Bronskill, Richard E. Turner, Antti Honkela. arXiv preprint, 2026. arXiv:2610.10068 | Paper | Code
- **Privacy Leakage via Output Label Space and Differentially Private Continual Learning.** Marlon Tobaben*, **Talal Alrawajfeh***, Marcus Klasson, Mikko A. Heikkilä, Arno Solin, Antti Honkela. TMLR, 2026. *Equal contribution. Paper | Code
- **Noise-Aware Differentially Private Variational Inference. Talal Alrawajfeh**, Joonas Jälkö, Antti Honkela. AISTATS 2025, PMLR 258:4987–4995; poster presentation. Paper | Code

Education

PhD in Science **Feb 2024–Expected 2027**
University of Helsinki *Helsinki, Finland*
Specialization: Computer Science
Research focus: trustworthy machine learning, privacy-preserving machine learning, Bayesian statistics, amortized inference, continual learning, neural processes, and tabular foundation models.
Coursework average: **5.0/5.0**.

MSc in Mathematics **Sep 2017–Aug 2019**
University of Jordan *Amman, Jordan*
GPA: **4.0/4.0; first in class**.
Thesis: *On D-spaces and Covering Properties*; research in general topology, covering properties, and category-theoretic approaches to the D-space problem.

BSc in Mathematics **Sep 2013–Aug 2016**
University of Jordan *Amman, Jordan*
GPA: **3.83/4.0; first in class**. Completed the degree in three years.

Additional Information

Work status: Authorized to work in Finland; available with two weeks' notice; seeking Helsinki-based hybrid or remote roles
Languages: Arabic (native); English (full professional proficiency; TOEFL iBT 105/120); Finnish (approximately CEFR A2; University of Helsinki coursework through Finnish 5A; actively studying)