Fatih İlhan
Resume

School of Computer Science, College of Computing
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Research Interests

Efficient Inference/Fine-tuning for Large Language/Multi-modal Models, Systems for AI, Computer Vision, Distributed/Federated Learning, Ensemble Learning, Reinforcement Learning, AI Safety and Alignment

Academic Experience

Georgia Institute of Technology — **Atlanta, GA, USA**

Ph.D. in Computer Science, CGPA: 3.84/4.00, Supervisor: Prof. Ling Liu — Aug 2021 – Present

- Thesis Topic: Resource-adaptive Efficiency Optimizations for Large Vision-Language Models
- Coursework Focus: Machine Learning, Database Systems, Algorithms
- Published 13 papers (5 as first author) in top venues such as CVPR, NeurIPS, ICLR, EMNLP.
- Served as reviewer for CVPR, ICCV, AAAI, ICML, ICDCS, IEEE PAMI and IEEE TOIT.
- Head TA for the Advanced Internet Systems course with 5 TAs and 100-150 students, selected as the outstanding Head TA for OMSCS program.

Bilkent University — **Ankara, Türkiye**

M.Sc. in EEE, CGPA: 3.58/4.00, Supervisor: Prof. Serdar Kozat — Sep 2019 – Aug 2021

- Thesis: Nonstationary Time Series Prediction with Markovian Switching RNNs
- Published 3 papers in top IEEE journals, served as reviewer for IEEE TNNLS and IEEE TSP.
- TA for the courses: Statistical Learning and Data Analytics, Neural Networks.

B.Sc. in Electrical and Electronics Engineering, CGPA: 3.81/4.00 — Aug 2014 – Jun 2019

- Senior Project: GPS-independent outdoor localization system
- Specialization in signal processing, machine learning, communications
- Attended exchange program at Nagoya University, Japan (Spring 2018) and studied intelligent automobile systems.

Ankara Science High School — **Ankara, Türkiye**

High School Degree, Science Track, CGPA: 95.26/100 — Sep 2010 – Jun 2014

Work Experience

IBM Thomas J. Watson Research Center — **Yorktown Heights, NY**

Researcher Intern, Mentors: Dr. Gong Su, Dr. Donna Dillenberger — May-Aug 2022/23/24

- Worked on memory-efficient decoding with KV cache compression for long-context inference with LLMs, filed a patent application.
- Researched efficient pruning for LLM fine-tuning through CPU/GPU workload balancing. Our work led to a publication at CVPR24.
- Worked on computation-efficient federated learning under heterogeneous settings with on-premise deployments, filed a patent. Our work led to two publications at CVPR23 and ICDCS23.

DataBoss Analytics — **Ankara, Türkiye**

Machine Learning Engineer — Aug 2018 – Jul 2021

- Built Predy.AI, an end-to-end pipeline for real-time spatio-temporal prediction, anomaly detection annd recommendation systems, within a team of three engineers. Analyzed retail data from customer businesses to provide procurement and logistics insights, reduced consumption forecast errors by up to 40%.

Roketsan — **Ankara, Türkiye**

Electronics Engineer Intern — Jun 2017 – Jul 2017

- Integrated GPS and INS data using Extended Kalman Filter for navigation systems and enhanced localization precision by 85%. Built a Labview application for fast and simultaneous communication with eight GPS receivers.

Skills

Programming: Python, C++, CUDA, Triton, SQL, R, Java, MATLAB, Assembly (8051), VHDL
Tools: Deep Learning Frameworks (PyTorch, Keras, Tensorflow, vLLM), MLOps Tools (Kubernetes, Polyaxon, MLFlow), Other Tools (Docker, Flask, Django, Kafka, Spark), Agile (Gitlab, Atlassian Tools)
Test Scores: TOEFL iBT: 108, GRE: 149/170/3.5

Projects

Source codes with more details are available on: *github.com/git-disl* and *github.com/fatih-ilhan*

Efficient Inference/Fine-tuning:
- Memory-efficient federated learning/fine-tuning: ScaleFL [C12, C13], RECAP [C18], Fed4LM [P1]
- Adaptive inference: HiDEC [C11], EENet [C17]
- KV cache compression for long-context inference [P2, P3]
- Efficient ensemble learning: LLM-TOPLA [C15]

Robust Deep Learning Systems:
- Defense algorithms against adversarial attacks. [C8, C9, C10, C14]
- LLM safety and alignment [C16, C19]

Time Series Prediction and Anomaly Detection:
- Online time series analysis [J3, C1, C2, C5]
- Spatio-temporal event prediction [J1, C6]
- Anomaly detection [J2, C3]

Conference Papers

[C19] T. Huang, S. Hu, **F. Ilhan**, S. F. Tekin, and L. Liu, "Booster: Tackling Harmful Fine-tuning for Large Language Models via Attenuating Harmful Perturbation", *International Conference on Learning Representations (ICLR)*, 2025. *(oral)*

[C18] **F. Ilhan**, G. Su, S. F. Tekin, T. Huang, S. Hu, and L. Liu, "Resource-Efficient Transformer Pruning for Fine-tuning of Large Models", *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2024.

[C17] **F. Ilhan**, KH. Chow, S. Hu, T. Huang, S. F. Tekin, W. Wei, Y. Wu, M. Lee, R. Kompella, H. Latapie, G. Liu, L. Liu, "Adaptive Deep Neural Network Inference Optimization with EENet", *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2024.

[C16] T. Huang, S. Hu, **F. Ilhan**, S. F. Tekin and L. Liu, "Lazy Safety Alignment for Large Language Models against Harmful Fine-tuning", *Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)*, 2024.

[C15] S. F. Tekin, **F. Ilhan**, T. Huang, S. Hu and L. Liu, "LLM-TOPLA: Efficient LLM Ensemble by Maximising Diversity", *ACL Conference on Empirical Methods in Natural Language Processing (EMNLP Findings)*, 2024.

[C14] KH. Chow, Sihao Hu, Tiansheng Huang, **Fatih Ilhan**, Wenqi Wei, and Ling Liu, "Diversity-driven Privacy Protection Masks Against Unauthorized Face Recognition", *Privacy Enhancing Technologies Symposium (PETS)*, 2024

[C13] **F. Ilhan**, G. Su, Q. Wang and L. Liu, "Scalable Federated Learning with System Heterogeneity", *IEEE International Conference on Distributed Computing Systems (ICDCS)*, 2023. *(demo)*

[C12] **F. Ilhan**, G. Su and L. Liu, "ScaleFL: Resource-Adaptive Federated Learning with Heterogeneous Clients", *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023.

[C11] **F. Ilhan**, S. F. Tekin, S. Hu, T. Huang, KH Chow, L. Liu, "Hierarchical Deep Neural Network Inference for Device-Edge-Cloud Systems", *ACM International World Wide Web Conference (WWW)*, 2023. *(poster)*

[C10] T. Huang, S. Hu, KH. Chow, **F. Ilhan**, S. F. Tekin and L. Liu, "Lockdown: Backdoor Defense for Federated Learning with Isolated Subspace Training", *Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)*, 2023.

[C9] KH. Chow, L. Liu, W. Wei, **F. Ilhan** and Y. Wu, "STDLens: Securing Federated Learning Against Model Hijacking Attacks", *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023.

[C8] W. Wei, L. Liu, KH. Chow, **F. Ilhan** and Y. Wu, "Model Cloaking against Gradient Leakage", *IEEE International Conference on Data Mining (ICDM)*, 2023.

[C7] S. Hu, T. Huang, **F. Ilhan**, S. F. Tekin, L. Liu, "Large Language Model-Powered Smart Contract Vulnerability Detection: New Perspectives", *IEEE International Conference on Trust, Privacy and Security in Intelligent Systems, and Applications (IEEE TPS-ISA)*, 2023.

[C6] **F. Ilhan**, S. F. Tekin and B. Aksoy, "Spatio-Temporal Crime Prediction via Temporally Hierarchical Convolutional Neural Networks", *28th IEEE Signal Processing and Communications Applications Conference*, 2020.

[C5] **F. Ilhan**, N. M. Vural and S. S. Kozat, "LSTM-Based Online Learning with Extended Kalman Filter Based Training Algorithm", *28th IEEE Signal Processing and Communications Applications Conference*, 2020.

[C4] **F. Ilhan** and E. Mumcuoglu, "Performance Analysis of Semi-Supervised Learning Methods under Different Missing Label Patterns", *28th IEEE Signal Processing and Communications Applications Conference*, 2020.

[C3] **F. Ilhan**, S. F. Yilmaz and S. S. Kozat, "A Two-Stage Multi-Class Classification Approach Based on Anomaly Detection", *28th IEEE Signal Processing and Communications Applications Conference*, 2020. *(poster)*

[C2] N. M. Vural, B. Altas, **F. Ilhan** and S. S. Kozat, "Shortest Path Learning in Non-Stationary Environments via Online Convex Optimization", *28th IEEE Signal Processing and Communications Applications Conference*, 2020.

[C1] N. M. Vural, B. Altas, **F. Ilhan** and S. S. Kozat, "Online Shortest Path Learning via Convex Optimization", *28th IEEE Signal Processing and Communications Applications Conference*, 2020.

Journal Papers

[J3] **F. Ilhan**, O. Karaahmetoglu, I. Balaban and S. S. Kozat, "Markovian RNN: An Adaptive Time Series Prediction Network with HMM-based Switching for Nonstationary Environments", *IEEE Transactions on Neural Networks and Learning Systems*, 2021.

[J2] N. M. Vural, **F. Ilhan**, S. F. Yilmaz, S. Ergüt and S. S. Kozat, "Achieving Online Regression Performance of LSTMs with Simple RNNs", *IEEE Transactions on Neural Networks and Learning Systems*, 2021.

[J1] **F. Ilhan** and S. S. Kozat, "Modeling of Spatio-Temporal Hawkes Processes with Randomized Kernels", *IEEE Transactions on Signal Processing*, 2020.

Preprints

[P3] **F. Ilhan**, S. F. Tekin, S. Hu, T. Huang and L. Liu, "Neural Cache Compression for Memory-Efficient Inference with Large Vision-Language Models", *in progress*, 2025.

[P2] **F. Ilhan**, G. Su and L. Liu, "Memory-Efficient Decoding with KV Cache Compression for Long-Context LLMs", *in progress*, 2025.

[P1] **F. Ilhan**, S. F. Tekin, S. Hu, T. Huang and L. Liu, "Fed4LM: Efficient Federated Fine-tuning under Data and Resource Heterogeneity with a Mixture of Masked Adapters", *in progress*, 2025.

Patents

[T2] **F. Ilhan**, G. Su, "Memory-Efficient Decoding with KV Cache Compression for Large Language Models", *(filed)*, 2025.

[T1] **F. Ilhan**, G. Su, "Computation-Efficient Federated Learning System for Resource Heterogeneity", P20240403701, 2023.

Awards and Honors

- Outstanding Head TA Award in OMS CS program by Georgia Tech (2024).
- Full Scholarship from the Scientific and Technological Research Council of Türkiye for M.Sc. studies.
- Full Scholarship from Bilkent University during B.Sc. and M.Sc. Studies.
- 80th among 0.2M university graduates in ALES (Turkish National GRE).
- JASSO Scholarship for Exchange Program at Nagoya University.
- Bilkent University High Honor Student during B.Sc. Studies.
- 191st among 2M high school graduates in University Entrance Examination.