MERT KOSAN

PHD CANDIDATE IN COMPUTER SCIENCE

☎ +1 805 568 88 95 | ✉ mertkosan@gmail.com | ⌂ mertkosan.com | mertkosan | in mertkosan | 🎓 Mert Kosan

Education

Computer Science Department, University of California, Santa Barbara (UCSB) *Santa Barbara, USA*

Doctor of Philosophy in Computer Science *Sept 2018 - June 2023 (Expected)*

- Advisor: Prof. Ambuj K. Singh | Thesis Title: **Transparent Representation Learning for Attributed Graphs**
- Research Interests: **Graph Machine Learning, Explainability, Anomaly Detection, Human-AI Collaboration** | GPA: 4.00/4.00

Computer Science and Engineering Department, Sabanci University *Istanbul, Turkey*

Bachelor of Science in Computer Science *Sept 2013 - June 2018*

- Ranked 1st | GPA: 3.99/4.00

Work Experience

Visa Research *Austin, USA*

PhD Machine Learning Scientist Intern | Topic: Improving AI Decisions with Feedback Loop Active Learner *June 2022 - Sept 2022*

- Proposed a human-in-the-loop recommender system improving AI decisions using active learning for anomaly detection applications, but applicable to different application scenarios such as credit card approval systems. The framework helps increasing in precision and recall.
- Published paper on the project, and patent filing under progress.

Visa Research *Austin, USA*

PhD Machine Learning Scientist Intern | Topic: Peer Group Analysis with Anomaly Detection *June 2021 - Sept 2021*

- Proposed a scalable and parallelizable dynamic peer grouping algorithm working with any existing anomaly detection algorithm to reduce false alarms and detect anomalies in their early stages. The framework reduces the false positives substantially and detects multiple events earlier.
- Filed a patent, which is currently under review.

Visa Research *Austin, USA*

PhD Machine Learning Scientist Intern | Topic: Fraud Detection and Profiling *June 2020 - Sept 2020*

- Developed a framework that generates profiling and optimized strategies for near-real-time unsupervised fraud detection on graphs. The framework profiles the fraud automatically and accurately in less than a second with a small number of transactions.
- Filed a patent, which is currently under review.

Publications

[Under review] Mert Kosan, Arlei Silva, Ambuj Singh. ***Robust Ante-hoc Graph Explainer with Bilevel Optimization.***

[Under review] Zexi Huang, Mert Kosan, Arlei Silva, Ambuj Singh. ***Link Prediction without Graph Neural Networks.***

[WSDM 2023, MLoG-WSDM 2023] Mert Kosan*, Zexi Huang*, Sourav Medya, Sayan Ranu, Ambuj Singh. ***Global Counterfactual Explainer for Graph Neural Networks.*** *ACM International Conference on Web Search and Data Mining.* (Selected among **Top 10** in WSDM 2023, **Best Paper Award** in MLoG-WSDM 2023)

[WSDM 2023 Crowd Science] Mert Kosan, Linyun He, Shubham Agrawal, Hongyi Liu, Chiranjeet Chetia. ***AI Decision Systems with Feedback Loop Active Learner.*** *WSDM 2023 Crowd Science Workshop on Collaboration of Humans and Learning Algorithms for Data Labeling.*

[DLG-AAAI 2023] Mert Kosan, Arlei Silva, Sourav Medya, Brian Uzzi, Ambuj Singh. ***Event Detection on Dynamic Graphs.*** *Deep Learning on Graphs: Method and Applications, Association for the Advancement of Artificial Intelligence*

[AAMAS 2023] Debajyoti Kar*, Mert Kosan*, Debmalya Mandal, Sourav Medya, Arlei Silva, Palash Dey, Swagato Sanyal. ***Feature-based Individual Fairness in k-Clustering.*** *International Conference on Autonomous Agents and Multiagent Systems* (Extended Abstract)

Research Experience

Multi-scale Graph Anomaly Detection *Santa Barbara, USA*

University of California, Santa Barbara *March 2022 - Present*

- Proposed an unsupervised anomaly detection architecture utilizing spectral energy-driven graph neural networks for multi-scale anomalies.
- Our preliminary results show that we can identify spatial and spectral anomalous subgraph patterns in ground-truth anomalies.

Robust Ante-hoc Graph Explainer with Bilevel Optimization *Santa Barbara, USA*

University of California, Santa Barbara *Aug 2021 - Feb 2023*

- Addressed limitations of available post-hoc and ante-hoc graph explainers in meaningful explanations, reproducibility, and robustness.
- Proposed a novel robust ante-hoc graph explainer that utilizes graph neural networks (GNN) and bilevel optimization.
- Outperformed state-of-the-art methods on graph classification tasks in accuracy, meaningful explanations, reproducibility, and robustness.

Link Prediction without Graph Neural Networks

Santa Barbara, USA

University of California, Santa Barbara

Aug 2021 - Feb 2023

- Addressed limitation of available link prediction methods using graph neural networks in handling imbalanced classification.
- Proposed a novel topology-centric method consisting of graph learning, topological heuristics, and training with N-pair loss for link prediction.
- Outperformed state-of-the-art link prediction baselines with 145% more accuracy and 6000 times faster inference time.

Feature-based Individual Fairness in k-Clustering

Santa Barbara, USA

University of California, Santa Barbara

Sep 2022 - Jan 2023

- Proposed new individual fairness metric based on the availability of similar individuals (in terms of attributes) in the same cluster.
- Showed the problem is NP-complete by reducing from Satisfactory-Partition and proposed a heuristic solution powered by linear programming.
- Outperformed state-of-the-art fairness methods in clustering in cost, fairness, macro fairness, and cluster quality (less imbalance).

AI Decision Systems with Feedback Loop Active Learner

Austin, USA

Visa Research

June 2022 - Sep 2022

- Addressed the limitation of the collaboration of AI decision systems and human labelers in human-in-the-loop systems
- Proposed FLAL, for better ground-truth labeling by learning the interests/expertise of humans using active learning through recommendations.

Global Counterfactual Explanation for Graph Neural Networks

Santa Barbara, USA

University of California, Santa Barbara

Oct 2021 - Aug 2022

- Formulated a novel problem of global counterfactual reasoning/explanations for graph neural networks applied on graph classification tasks.
- Proposed GCFExplainer, the first global explainer generating global counterfactual summary by vertex-reinforced-random-walks on an edit map.
- Outperformed state-of-the-art local counterfactual explainers in explanations and recourse quality in terms of cost and coverage.

Group Prospect Theory - Decision Making with White and Black-box Models

Santa Barbara, USA

University of California, Santa Barbara

Oct 2019 - Dec 2021

- Analyzed how the risky behavior of individuals alters in the group setting from the individual setting using Prospect Theory.
- Found that black-box models have more predictive models while suffering from generating interpretable results compared to white-box models.

Event Detection on Dynamic Graphs

Santa Barbara, USA

University of California, Santa Barbara

Jan 2019 - Aug 2021

- Proposed an event detection framework using dynamic graph neural networks further enhanced by structural and temporal self-attention. DyGED learns correlations between the graph macro dynamics (a sequence of graph-level representations) and labeled events.
- Outperformed baselines powered by graph micro dynamic and static GNN architecture in terms of accuracy on multiple newly created datasets.

Differential Privacy Framework for Movie Recommendation System

Istanbul, Turkey

Sabanci University

Sep 2016 - May 2018

- Proposed and implemented a movie recommendation system that utilize differential privacy framework which guarantees the privacy of the individuals without losing the utility.

Teaching Experience

Co-designer/Instructor - Machine Learning Workshops with Python

Santa Barbara, USA

University of California, Santa Barbara

May 2019 - June 2019

- Helped the students, from A Self-Organized PhD Students Exchange Program by Junior Nanotech Network, for their projects.

Teaching Assistant - Data Structures & Algorithms

Santa Barbara, USA

University of California, Santa Barbara

Sep 2018 - April 2019, Sep 2021 - Dec 2021

- Led discussion and problem-solving teaching sessions. Discussed class assignments and projects with students.

Co-designer/Instructor - Enhancement Workshops for Computer Science

Istanbul, Turkey

Sabanci University

Jan 2018 - June 2018

- Helped undergraduate students to enhance their common computer science skills such as Git, Linux, Python.

Academic Services

Registration Chair	KDD'23
Reviewer	NeurIPS, ICLR, KDD, WebConf, WSDM, ICDM, SDM, AAAI, TIST, TKDD, TKDE.

Skills

Programming	Python (PyTorch, Keras, Scikit-Learn, NetworkX), C++, Java, SQL
Miscellaneous	Linux, Git, LaTeX(Overleaf/R Markdown), Microsoft Office.
Soft Skills	Result-oriented, Responsible, Hardworking, Fast-learner.
Languages	Turkish (native), English (fluent), Spanish (beginner).
Hobbies	Chess, Strategy Games, Football, Snooker, Science Fiction, Instrumental Music.