Meghdad Kurmanji

Coventry, UK
meghdad.kurmanji@warwick.ac.uk
(+44) 7949726826
Scholar, LinkedIn, Portfolio, Github

EDUCATION

PhD in Computer Science - University Of Warwick   **Oct 2020 - Jan 2024**
- **Thesis**: Adaptability of Machine Learning Based Data Systems
- Developed DDUp, a continual learning framework for adaptability of learned data systems (**SIGMOD23**).   (paper,git)
- Developed SCRUB, a SOTA unlearning algorithm for large-scale deep learning models (**NeurIPS23**).   (paper,git)
- The first comprehensive empirical analysis of SOTA unlearning for learned data systems (**SIGMOD24**).
- Collaborated with Google DeepMind and Google Research to set up the first unlearning challenge (**NeurIPS23**).   Kaggle

MSc. In Computer Science - Tarbiat Modares University   **Oct 2014 - Mar 2017**
- **Dissertation**: Hand Gesture Recognition Using Deep Learning Models
- Proposed a 2D CNN based model for video HGR that outperformed 3D CNN in both utility and efficiency.   (paper)
- GPA: 3.67/4

BSc. In Computer Engineering - Isfahan University of Tech.   **Oct 2010 - Oct 2014**
- Project: Simulated CDMA signal modulation using Verilog for FPGA implementation.
- GPA: 3.15/4

PUBLICATIONS

1. **Kurmanji, M.**, Triantafillou, P., & Triantafillou, E. *Towards Unbounded Machine Unlearning*. NeurIPS, 2023.
2. **Kurmanji, M.**, Triantafillou, E., & Triantafillou, P. *Machine Unlearning in Learned Database Systems.* SIGMOD, 2024 (in revision).
3. **Kurmanji, M.**, & Triantafillou, P. *Detect, Distill and Update: Learned DB Systems Facing Out of Distribution Data.* SIGMOD, 2023.
4. Shanghooshabad, A. **M., Kurmanji**, M., Ma, Q., Shekelyan, M., Almasi, M., & Triantafillou, P. *Pgmjoins: Random join sampling with graphical models.* SIGMOD, 2021.
5. Ma, Q., Shanghooshabad, A. M., Almasi, M., **Kurmanji, M.**, & Triantafillou, P. *Learned approximate query processing: Make it light, accurate and fast.* CIDR, 2021.
6. **Kurmanji, M.**, & Ghaderi, F. *A comparison of 2D and 3D convolutional neural networks for hand gesture recognition from RGB-D data.* ICEE, 2019.
7. **Kurmanji, M.**, & Ghaderi, F. *Hand gesture recognition from RGB-D data using 2D and 3D convolutional neural networks: a comparative study.* JAIDM, 2019.

SELECTED PROJECTS

- **Understanding Difficulty of Unlearning**   (**in-progress, 2023**)
  - Led the project to comprehend the difficulty of machine unlearning, in collaboration with Google DeepMind
  - Implemented ideas from model pruning to study the models' parameters in unlearning
  - implemented ideas from disentangled representation learning to bring new insights to the problem.

- **Neurips 2023 Unlearning Competition**   (Kaggle, 2023)
  - Served as an organizer of the Neurips 2023 Machine Unlearning Competition.
  - Developed the unlearning baselines and the basic attack models, with a unified API.
  - Created a bot for annotating synthetic data (by humans) for test cases.

- **Unbounded Machine Unlearning**   (git, 2023)
  - Pioneered a project aimed at developing an unlearning algorithm for deep neural networks in large-scale settings.
  - Designed and implemented the algorithm inspired by optimization methods in Generative Adversarial Networks.
  - Performed comprehensive empirical evaluations using diverse sets of datasets, models, and test metrics.

- **Updatability of Machine Learning based Data Systems**   (git, 2022)
  - Designed, and developed an efficient adaptability framework using knowledge-distillation for generative models.
  - Employed robust and principled hypothesis testing to perform out-of-distribution detection.
  - Benchmarked SOTA learned DB models including Deep Autoregressives (DARN), Variational Auto-Encoders (VAE), and Mixture Density Networks (MDN).

EXPERIENCE

- **Teaching Assistant - University of Warwick**   **2020-present**
  - Machine Learning, Databases, Advance Databases: Seminars and project assessments
- **Data Engineer - ICT Research Institute**   **2019-2020**
  - Directed a team to build a complete data pipeline from data crawling from cloud resources to integration into a Hadoop platform.
  - Designed & implemented data workflows on Hadoop to perform data ingestion and ETL for the BI team.
  - Analyzed application portfolios, identifying dependencies & common infrastructure platform components, and assessing migration feasibility.
  - Prototyped and performed proof-of-concepts for state-of-the-art data solutions, including approaches like elastic search.
- **Machine Learning Engineer - Refah Retail Chain Stores Co.**   **2017-2019**
  - Modeled, and created a real-time vision-based customer counter model for store entrance & exit doors using MOG features and a light-weight Convolutional Neural Net.
  - Implemented a real-time vision-based in-store heat map generator for detecting crowded zones using a motion detector CNN.
  - Proposed and engineered a product recommendation solution using products' descriptions and customers purchases utilizing LSTM-CNN trained with embedded vector generated for Persian text.
  - Established customer behavior analysis through regression of customer return times using RNN for time series data enforced with customer purchase attributes.
- **Deep Learning Engineer - Sensifai**   **2016-2017**
  - Contributed to the development of an acoustic scene detection system with a transfer learning approach which enclosed a label generator using videos to train a 1D CNN with audio experts using PyTorch framework.
  - Implemented a music mood classifier from movie scenes using Convolutional Neural Nets fed by spectrogram features with varying windowing, with Pytorch.
  - Improved a parallelized module for massive dataset gathering from YouTube with preprocessing options such as normalization and voice extraction using Python multiprocessing libraries.

HONORS, AWARDS, AND SERVICES

Serving as an organizer of the NeurIPS 2023 Unlearning workshop.	NeurIPS, **2023**
WPCCS best presentation award.	**University of Warwick, DCS, 2021**
Computer Science Graduate scholarship worth over £25,000 per annum.	University of Warwick, **2020-2024**
Research and Innovation Grant worth over £15,000 per annum.	Huawei LTD Dublin, **2020-2024**
Offered Graduate Fellowship worth $30,000, and 20,000 per annum	Lehigh University, Wayne State University **2020**
Top-ranked master's graduate among 30 students.	Tarbiat Modares University, **2017**
Top 0.01% national exam achiever (300k applicants in the whole of Iran)	Bachelor's degree admission, **2010**

SKILLS

- **Machine Learning**: (un/semi-)Supervised, Generative Models, Language Models, Optimization, Machine Unlearning
- **Statistics**: Probabilistic Graphical Models, Statistical Inference
- **Programming**: Python, C++
- **ML Libraries**: Pytorch, Tensorflow, Keras,
- **MLOps & Cloud**: Git, Weight and Biases, Hugging Face, Colab, AWS
- **Databases**: Relational DB, SQL, NoSQL, Hadoop, HBase, Hive
- **Soft Skills**: Presentation and communication, Critical and Out-of-Box Thinking, teamwork, flexibility

REFERENCES

- Peter Triantafillou: Professor at the **University of Warwick** - p.triantafillou@warwick.ac.uk
- Fabian Pedregosa: Research Scientist at **Google DeepMind** - pedregosa@google.com
- Eleni Triantafillou: Research Scientist at **Google DeepMind** - etriantafillou@google.com