Joel Oskarsson

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Research Interests

In my research I develop machine learning methods for data with spatial-, temporal- and graph-structure, including combinations of these. I am interested in how more traditional probabilistic methods in these domains can be combined with deep learning in order to derive new methods with useful properties. When evaluating and applying these methods to real-world problems I focus on applications within transport and vehicle systems as well as climate and weather modeling.

Publications

Joel Oskarsson, Per Sidén, and Fredrik Lindsten. Temporal graph neural networks for irregular data. In *Proceedings of The 26th International Conference on Artificial Intelligence and Statistics*, pages 4515–4531. PMLR, 2023.

Theodor Westny, **Joel Oskarsson**, Björn Olofsson, and Erik Frisk. Evaluation of differentially constrained motion models for graph-based trajectory prediction. In *2023 IEEE Intelligent Vehicles Symposium (IV)*, 2023.

Joel Oskarsson, Per Sidén, and Fredrik Lindsten. Scalable deep Gaussian Markov random fields for general graphs. In *Proceedings of the 39th International Conference on Machine Learning*, pages 17117–17137. PMLR, 2022.

Education

- In progress: **Doctoral Studies in Computer Science, Linköping University**, Linköping, Sweden, 240 ECTS
  Aug 2020 –
    - Part of the Division of Statistics and Machine Learning, Department of Computer and Information Science. Supervised by Fredrik Lindsten (main supervisor), Per Sidén and Jose M. Peña

- PhD project: *Probabilistic Deep Learning for Spatio-Temporal Data Analysis*
- Affiliated PhD Student in the Wallenberg AI, Autonomous Systems and Software Program

- **Master's program in Computer Science and Engineering (Swedish Civilingenjörsprogram), Linköping University**, Linköping, Sweden, 300 ECTS
Aug 2015 – June 2020

  - Master's thesis: Probabilistic Regression using Conditional Generative Adversarial Networks

- **Exchange Year, ETH Zürich**, Zürich, Switzerland
Sep 2018 – Aug 2019
First year of my master's as an exchange student at ETH. Courses mainly in machine learning and AI.

Employment

- **PhD Student, Linköping University**, Linköping
Aug 2020 –
Apart from my research, I spend 20% of my employment on teaching. Some notable teaching activities include:

  - Co-developing and running the online course *Foundations of Machine Learning*
  - Supervising 5 master's thesis projects
  - Assisting and correcting labs in courses on machine learning, computational statistics and python programming.

- **Teaching Assistant, Linköping University**, Linköping, Sweden
Multiple periods 2016–2019
Held lessons, seminars and lab-sessions for courses in mathematics, computer science and machine learning.

- **Summer Intern, Ericsson**, Linköping, Sweden
Jun-Aug 2018
Internship at Ericsson Research, working with GNSS positioning.

Specific Skills and Knowledge

- Extensive knowledge of models and algorithms for modern **machine learning and AI** applications. Specific expertise in:

  - Graph neural networks
  - Bayesian models and inference methods

- – Probabilistic deep learning

- Sound knowledge of good **software engineering** practices, acquired from courses and projects throughout my undergraduate studies.

- Programming languages and frameworks

  Knowledgeable in Python, PyTorch, PyTorch Geometric and SciPy/NumPy.

  Experience with R, Tensorflow, scikit-learn, Java, MATLAB and C++.

- Highly accustomed to working in **Linux** environments.