ALEX BÄUERLE

Give AI some handles to grasp.

Ph. D. Student
Information Technology
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Interests

I love the new possibilities that neural networks are able to provide. However, these networks are often hard to understand and reason about, and make mistakes that human experts would not make.

With my background in visualization, I thus search for ways to make these networks more interpretable. This includes ways to convey their inner workings, reasoning about fairness, and working on broader acceptance, which all are only possible with a deeper, often visual understanding.

Education

Ph. D. Student, Information Technology, Ulm University — 07/2017 - today (expected end date Summer 2022)
Funded by the Carl-Zeiss scholarship under supervision of Prof. Ropinski

M. Sc., Media Informatics, Ulm University, Grade: 1.1 — 10/2015 - 06/2017
Masters Thesis: Bone Implant Visualization

B. Sc., Media Informatics, Ulm University, Grade: 1.2 — 10/2012 - 09/2015
Bachelors Thesis: Conception and Realization of a Mobile Application to locate People involved in Avalanche Accidents through Bluetooth Low Energy

Research

exploRNN — Explorable environment towards explaining recurrent neural networks to novices in this area. Including user studies that assess the effect of our novel learning environment (under submission).

Net2Vis — Tool to automatically create visualizations of neural networks directly from source-code. Users do not have to manually draw figures for their papers or blogposts, but can just copy their code into the application to obtain a publication-ready visualization (arXiv:1902.04394, under submission).

Berts Dreams — Explainable that lays out experiments on feature visualization for modern transformer-based language models. Provides insight into different experiments on text-based feature visualizations (VISxAI, 2020).

Training De-Confusion — Focused on how users could correct their potentially corrupted training datasets which they use for image classification tasks. We combined the training results of the network on incorrectly labeled data with visualization techniques to help users spot and eliminate errors in their training data (Computer Graphics Forum, 2020).

Automatic identification of crossovers in cryo-EM images of murine amyloid protein A fibrils with machine learning — Biomedical application of neural network techniques. Aimed at identifying important fibril crossover locations (Journal of Microscopy, 2019).

Work

Research Internship Google TensorBoard (June - September 2020) — Developing a TensorBoard plugin for investigating new correlation-based fairness metrics for large label spaces. Including novel visualization approaches for such datasets, and studies to assess the usability of the developed approach. Open-sourced (https://github.com/tensorflow/tensorboard/tree/master/tensorboard/plugins/npmi), and research papers in preparation.

Research Internship Google PAIR (May - August 2019) — Developing and visually analyzing deep-dream processes with BERT. In this three-month project, we focused on visually analyzing deep dreaming for the NLU-model BERT. The techniques developed could be applied to other models as well. The code has been open sourced, and an explainable published (https://github.com/PAIR-code/interpretability/tree/master/text-dream).

Teaching

Teaching Assistant in Deep Learning for Graphics and Visualization — Holding the deep learning visualization lectures and exercises.

Teaching Assistant in Computer Graphics — Held the exercises that had to be done by the students; held some of the lectures.

Supervision of multiple Bachelors and Basters Theses — Supervised multiple students throughout the course of their final thesis work.

Seminar and Project Supervision — Supervised multiple students throughout their project and seminar work.

Skills

Machine Learning: Tensorflow, Keras, PyTorch
Visualization: Javascript, D3, Python, TypeScript, OpenGL/C++
Other: Swift

Interests

My main hobby is skiing. I am leading the instructors of my local skiing club, where we organize multiple courses each winter. Also, I am an instructor for the skiing association of the state Baden-Wuerttemberg (Germany), and the German Skiing Association (DSV), teaching others how to become skiing instructors.