

Software Engineering Seminar

Testing of Neural Networks

Description

Artificial *neural networks* are becoming increasingly more popular and are used in a variety of settings. A problem tied to neural networks is that they are usually very complex and hard to understand for developers. It may not necessarily be clear whether the neural network does exactly what it is supposed to do, and the usual testing approaches are not really suited to test neural networks systematically. Therefore, recently, different approaches and techniques have been proposed that aim to tackle this specific problem.

The student is to discuss and examine the approaches described in the given papers (and other similar techniques) with the main focus on [3].

References

- [1] Lei Ma, Felix Juefei-Xu, Fuyuan Zhang, Jiyuan Sun, Minhui Xue, Bo Li, Chunyang Chen, Ting Su, Li Li, Yang Liu, Jianjun Zhao, and Yadong Wang. Deepgauge: Multi-granularity testing criteria for deep learning systems. In *Proceedings of the 33rd ACM/IEEE International Conference on Automated Software Engineering*, ASE 2018, pages 120–131, New York, NY, USA, 2018. ACM.
- [2] Kexin Pei, Yinzhi Cao, Junfeng Yang, and Suman Jana. Deepxplore: Automated whitebox testing of deep learning systems. In *Proceedings of the 26th Symposium on Operating Systems Principles*, SOSP '17, pages 1–18, New York, NY, USA, 2017. ACM.
- [3] Youcheng Sun, Min Wu, Wenjie Ruan, Xiaowei Huang, Marta Kwiatkowska, and Daniel Kroening. Concolic testing for deep neural networks. In *Proceedings of the 33rd ACM/IEEE International Conference on Automated Software Engineering*, ASE 2018, pages 109–119, New York, NY, USA, 2018. ACM.
- [4] Yuchi Tian, Kexin Pei, Suman Jana, and Baishakhi Ray. Deeptest: Automated testing of deep-neural-network-driven autonomous cars. In *Proceedings of the 40th International Conference on Software Engineering*, ICSE '18, pages 303–314, New York, NY, USA, 2018. ACM.

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