Verification of DNNs with Marabou – Abstract

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As neural networks (NNs) become a critical part of our everyday lives, their unpredictability and opaqueness make their logical analysis both a challenging and a crucial problem. In this tutorial, we will explore Marabou, a tool for formally verifying deep neural networks (DNNs). Formal verification aims to determine whether a DNN satisfies a given logical property, providing rigorous guarantees about its behavior. The first part of the tutorial presents the theoretical foundations of DNN verification and an overview of Marabou's core algorithms. The second part focuses on the practical aspects of verification: defining verification queries, specifying properties of interest, and using Marabou to verify them through its various heuristics and solving modes. Finally, time permitting, we will explore the proof-producing version of Marabou, discuss the importance of proof generation for trustworthy verification, and demonstrate how Marabou's proofs can be independently checked.

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