Improving Neural Belief Propagation (NBP) decoder for QLDPC codes

Master's Thesis

Project
In our recent work [1], we proposed a new approach for decoding Quantum Low-Density Parity-Check (QLDPC) codes using the Neural Belief Propagation (NBP) decoder with overcomplete check matrices, which has shown significant decoding gain. As the NBP model proposed in our work is relatively simple, it is interesting to investigate if it is possible to further improve the NBP decoder by employing some machine learning-based optimizations.


Tasks
1. Obtain basic knowledge in quantum error correction.
2. Implement some optimizations of the NN decoder.
3. Evaluation of the proposed optimizations.

Requirements
- Good programming skills in Python.