

Automated Discovery and Optimization of Quantum Error Correction Codes Using ML

Course: IITM-DA6300(QML)

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Update

1. Depolarizing Noise Model Implemented:

- Introduced a realistic quantum noise (depolarizing noise) using Qiskit Aer.
- Applied both 1-qubit and 2-qubit depolarizing errors.

Cont...

2. Simple Reinforcement Learning (RL) Agent:

- Implemented a basic RL agent with a Q-table mapping syndrome outcomes to corrective actions.

Cont...

3. Simulation With/Without Noise:

- Simulation with/without Noise
- Simulated the QEC circuit with and without noise to show the impact of QEC.
- Compared measurement results to demonstrate effectiveness of error correction.

Cont...

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Cont...

4. Error Correction via RL:

- Used syndrome results from noisy simulations as input to RL agent.
- Agent recommends correction actions based on observed syndromes.

What's Next?

- Train and show reward curve
- Prove that RL improves QEC