

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 depolarizing noise on both **single-qubit** and **two-qubit gates** to simulate realistic quantum noise.
- Used **Qiskit Aer's NoiseModel** to apply **parameterized depolarizing errors** to quantum circuits.

Cont...

2. Basic Quantum Error Correction (QEC) Circuit:

- Designed a **simplified QEC circuit** (3 qubits, 3 classical bits) to test error correction.
- Implemented **encoding using Hadamard and CNOT gates**.
- Added **syndrome measurement** to detect errors.

Cont...

3. Simulation of Noisy QEC Circuit:

- Simulated the circuit using **Qiskit's AerSimulator** with noise injection.
- Measured the **probability distribution of output states** to analyze noise effects.

What's Next?

- Implement a full QEC code with stabilizer measurements.