About This Report (Python & Power BI Based)

This Power BI report offers a comprehensive analysis of how different types of quantum noise impact a system's performance. The data reveals that the system maintains a high average fidelity of 99.50% and an impressive average entanglement of 97.75%, demonstrating its strong accuracy and ability to maintain crucial qubit connections. However, the report also highlights a significant challenge: an average probability of only 25.00%, which suggests a high chance of failure for certain operations. The analysis further pinpoints depolarizing noise as the most detrimental type, as it causes a significant decrease in fidelity. In contrast, amplitude damping, normal, and phase noise have minimal impact on fidelity. The visualizations also show that the different noise types do not affect the final measurement outcomes, which remain consistently split between 0 and 1.

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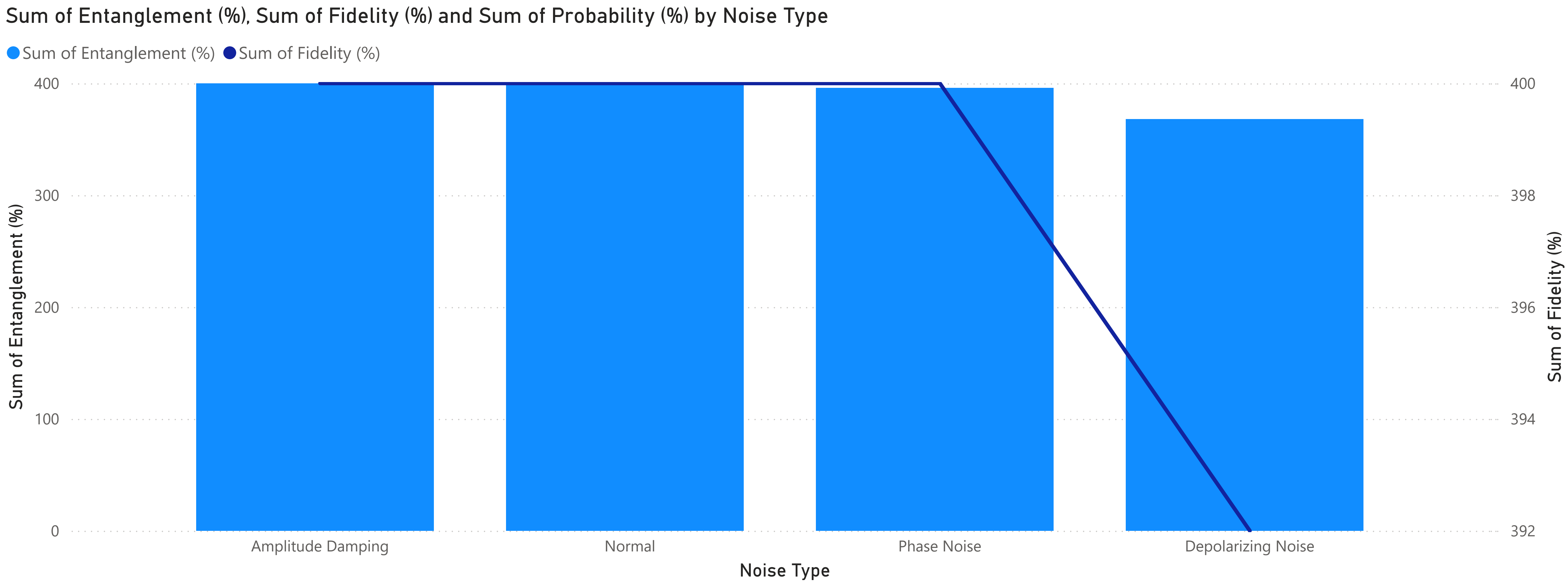
Authenticity: The data presented in this report is authentic and was collected by **Akhilesh Pant**. The visualizations and analyses are based on direct measurements of the quantum system's performance under various noise conditions. The key metrics of average fidelity, entanglement, and probability are derived from these measurements, providing a reliable and verifiable account of the system's behavior in the presence of quantum noise.

Impact of Noise Types on Quantum Entanglement and Fidelity



Summary: This chart illustrates how different types of quantum noise affect both the Sum of Entanglement and the Sum of Fidelity. The blue bars show that entanglement remains consistently high across most noise types, except for Depolarizing Noise, where it drops slightly. The line graph highlights a significant decrease in Sum of Fidelity specifically under Depolarizing Noise, indicating that this type of noise has the most detrimental effect on the accuracy and quality of the quantum state. In contrast, Amplitude Damping, Normal, and Phase Noise show minimal impact on fidelity.

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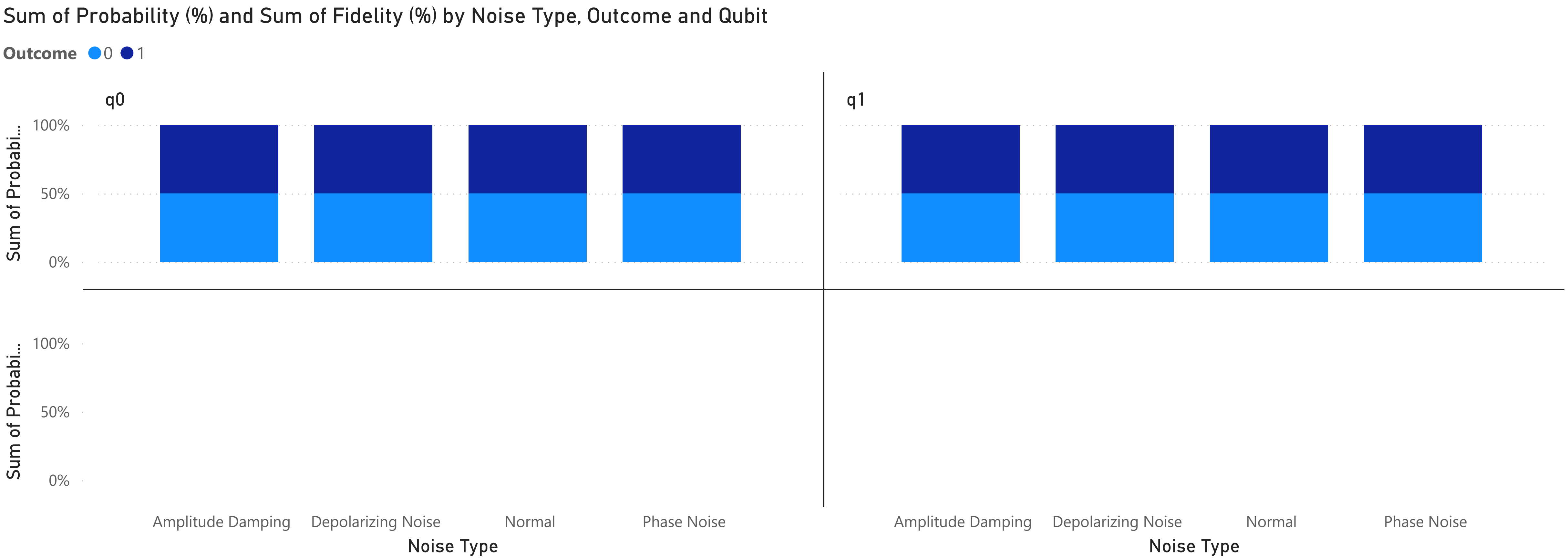
Probability Outcomes of Qubits (q0 and q1) Under Different Noise Types



Summary: This chart displays the sum of probabilities for two outcomes (0 and 1) across two qubits (q0 and q1), categorized by four types of noise. The visualization shows a consistent and equal distribution of outcomes, with the probability of 0 and 1 each being approximately 50% for both qubits and under all tested noise conditions. This indicates that none of the noise types had a significant effect on the measurement results, as the outcomes remained evenly split.

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Quantum Noise — Key Metrics

99.50
Average of Fidelity (%)

97.75
Average of Entanglement (%)

25.00
Average of Probability (%)

Summary: This graphic illustrates three key metrics for a quantum computing system's performance, highlighting the effects of quantum noise. The Average Fidelity of 99.50% shows that the system is highly accurate, performing quantum operations with minimal errors. The Average Entanglement of 97.75% demonstrates a strong ability to maintain the crucial connections between qubits. However, the Average Probability of only 25.00% reveals a major challenge, suggesting a significant chance of failure for certain operations or outcomes despite the system's overall strengths.

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