

Optimizing Quantum Machine Learning with Amplitude and Phase Encoding Techniques

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Abstract : Quantum machine learning represents a frontier in computational technology, promising significant advancements in data processing capabilities. This study explores the significance of data encoding techniques, specifically amplitude and phase encoding, in this emerging field. By employing a comparative analysis methodology, the research evaluates how these encoding techniques affect the accuracy, efficiency, and noise resilience of quantum algorithms. Our findings reveal that amplitude encoding enhances algorithmic accuracy and noise tolerance, whereas phase encoding significantly boosts computational efficiency. These insights are crucial for developing robust quantum frameworks that can be effectively applied in real-world scenarios. In conclusion, optimizing encoding strategies is essential for advancing quantum machine learning, potentially transforming various industries through improved data processing and analysis.

Keywords : quantum machine learning, data encoding, amplitude encoding, phase encoding, noise resilience

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