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Quantum Machine Learning for Image Classification in Healthcare: Algorithms, Applications, and Future Prospects

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One of the incentives for quantum machine learning (QML) is its potential to achieve significant computational advantages, such as exponential speedups and improved accuracy, over classical machine learning (ML) by using quantum phenomena. QML goals to solve problems too complex for classical computers, enabling richer data representations, more efficient algorithms, and the ability to tackle large, high-dimensional datasets. This could revolutionise in fields of medical image analysis, enabling through advanced simulations, improving the accuracy and speed of analysis, and creating more precise predictive models for disease spread and patient outcomes. In this work, we systematically review studies published between 2020 and 2025 that apply QML, identified through database searches and screened using PRISMA guidelines. The review analyses the evolution of QML datasets and evaluation strategies used in this field, highlighting their strengths and limitations. Preliminary findings illustrate that most applications remain at the proof-of-concept step and are constrained by limited quantum hardware and dataset availability. To advance the field toward clinical relevance, this work identifies key research priorities, including the development of standardised, quantum-ready image datasets, unified evaluation protocols, hybrid quantum–classical model optimisation, and the co-design of algorithms and hardware. Focusing on these areas will make it clear that QML provides valuable benefits for diagnostics, personalised care, and healthcare operations.

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