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(57) Abstract :
The present invention relates to a hybrid quantum-classical computing system (100) for explainable artificial intelligence. The system includes a data preprocessing module (101) with a dimensionality reduction unit (102), a quantum circuit processor (103) with angle embedding encoder (104) and entangling layer assembly (105), a classical neural network classifier (106), and an explainability engine (107). The quantum processor encodes input data into qubits using parameterized rotations and extracts features through quantum measurements. The explainability engine generates gradient-based saliency maps and computes entropy metrics to assess feature importance. By leveraging quantum superposition and entanglement, the system enhances feature representation and improves interpretability. It achieves higher classification accuracy and more concentrated feature attribution, enabling clear identification of key factors influencing predictions in critical industrial applications.

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