

Training quantum circuit to predict pixel values

The Quompletionists

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Image completion and pixel value prediction

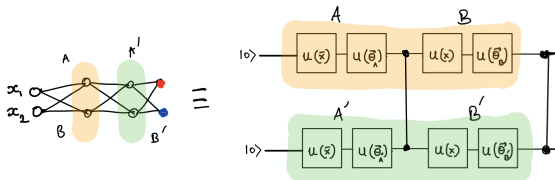
Image completion:



Our approach: QML to predict pixel value based on neighbouring pixels.

The “ansatzes” for the quantum circuit

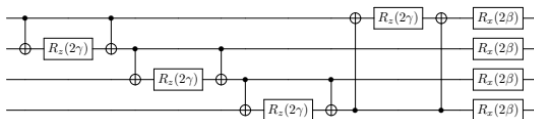
- Data-encoding based on *data-reuploading*¹ scheme.



0.87	0.63	0.34
0.22	0.58	0.77
0.45	0.21	?

$\mapsto x = [0.87, 0.64, 0.34, 0.22, 0.77, 0.45, 0.21, 0.58]$

- Variational circuit ansatz inspired by QAOA circuit.



¹arxiv.org/abs/1907.02085

The training and optimization

Bitstrings $j \in \{0, 1\}^n$ as color-values (e.g., *grayscale* $j = \sum_{k=1}^n 2^{-k} j_k$).

- QNode outputs “expected” color-values of state produced by PQC.
- Minimize squared difference between the above expectation value and the actual color-value of pixel.
- To predict pixel-value, one just measures outcome of trained PQC.

