QUANTUM COMPUTING INSPIRED PAINTINGS: REINTERPRETING CLASSICAL MASTERPIECES

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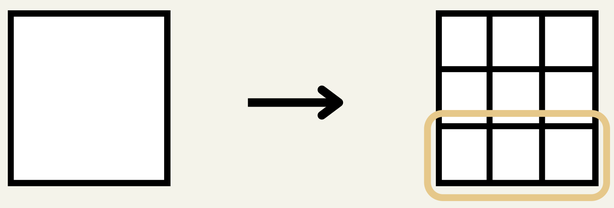
(QC-PAINT)

ABSTRACT

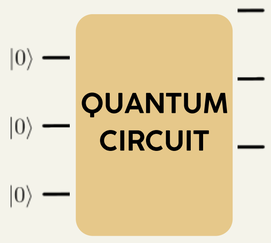
We aim to apply a quantum computing technique to compose artworks. From a classical subject to abstract forms, we seek to combine classical and quantum aesthetics through three art pieces. Our goal is not only to render digital media but to reproduce these works as physical oil paintings on wooden panels, completing a full circle between classical and quantum techniques and contributing to rethinking Art practice in the era of quantum computing technologies.

NUMERICAL METHODS

The original paintings are analyzed and divided partly or as a whole into a lattice.



The discrete units, the lattice tiles, are then encoded to qubits.

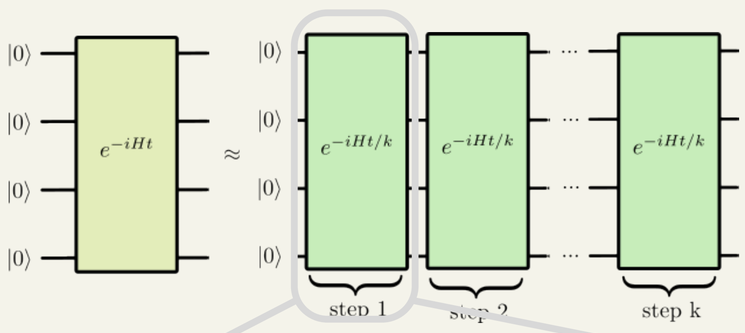


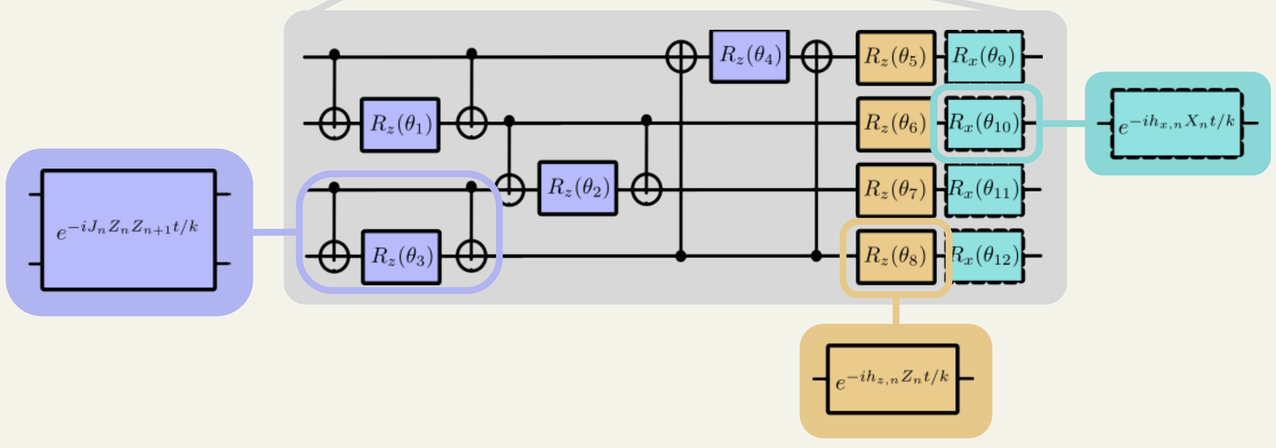
Ising Hamiltonian

$$H = \sum_{n=1}^{N} J_n Z_n Z_{n+1} + \sum_{n=1}^{N} h_{z,n} Z_n + \sum_{n=1}^{N} h_{x,n} X_n$$

time evolution (Trotterization)

$$|\psi(t)\rangle = U(t)|\psi(0)\rangle \equiv e^{-iHt}|\psi(0)\rangle \quad \text{with} \quad U(t) \approx \prod_{n=1}^{k} \prod_{n=1}^{N} e^{-iH_n t/k}$$

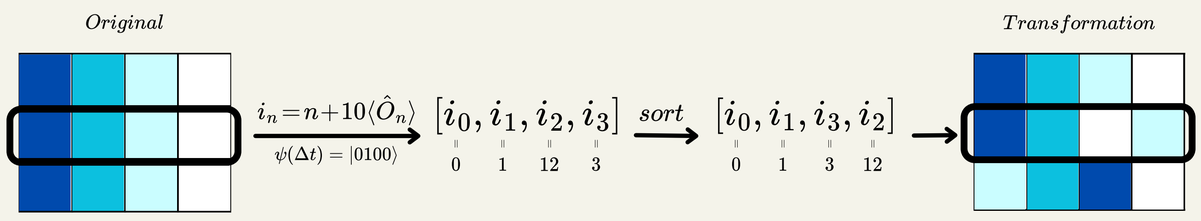




Observables

$$\hat{O}_n = \frac{(I - \sigma_n^z)}{2} \quad \text{with} \quad n \in [0, N-1]$$

- "Narciso" and "Les fils de l'homme": $i_n = n + 10 \cdot \langle\psi(t)|\hat{O}_n|\psi(t)\rangle$



- "192 Farben":

$$C_n(t) = \langle\psi(t)|\hat{O}_n|\psi(t)\rangle \cdot 192 \quad \text{with} \quad C_n(t) \in [0, 192)$$

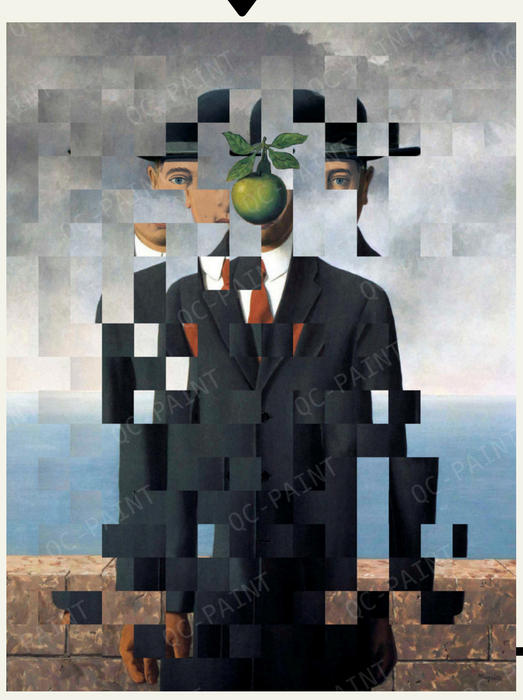
RESULTS

In our revisited version, a young boy is looking intensely at his reflection. He is observing a new chaotic shape, changed by the results of a quantum computation.

This newly disturbed water also engages in analogy to the wave function collapse, where the superposition of multiple eigenstates, gets reduced, by means of observation – as the boy does – to what we can actually observe and measure.

"*Quantum Transformation I: Caravaggio*" oil on wooden panel (size: 70 × 84 cm)
grid: (13x16)
device: ibm_kyoto (4096 shots)

FROM REALISM



"*Quantum Transformation II: Magritte*" digital image
grid: (20x16)
device: ibm_sherbrooke/ibm_strasbourg
(4096 shots)

We apply the quantum process to the entire painting (again, as the conceptual surface of reflection) displacing all of its elements, with the exception of the apple in front of the man's face.

With this process of displacement, we are led to imagine the features of the face that now become unveiled.

TO ABSTRACTION

We time evolve the grid of 192 colors.

The final resulting artwork depicts the same colors of the original composition but reordered with quantum results.

OUR PAPER:

"*Quantum transformation III: Richter*" oil on wooden panel (size: 75 × 100 cm)
grid: (16x12)
device: ibm_nazca (4096 shots)

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