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Quantum SVM

Construct $|\vec{x}_j\rangle$ from training data

Create matrix $K = \vec{x}_i^T \cdot \vec{x}_j$

Create matrix J $= \begin{pmatrix} 0 & \vec{1}^T \\ \vec{1} & 0 \end{pmatrix}$

Construct matrix $\hat{F} = (J + K + \gamma^{-1} I)/trF$ (Eq. (5))

Eq. (5)

Write $|\tilde{y}\rangle$ as a function of $\hat{F}$ eigenvectors

Eq. (6)

Find the state $|\mathrm{b}, \vec{\alpha}\rangle = \hat{F}^{-1}|\tilde{y}\rangle$ with HHL algorithm

Schuld program

Construct $|\vec{u}\rangle$ from the parameters of (7)

Eq. (8)

Construct $|\vec{x}\rangle$ from data to be tested

Eq. (9)

Construct states $|\psi\rangle$ and $|\phi\rangle$

Calculate $P = |\langle\psi|\phi\rangle|^2$

- If $P > \frac{1}{2}$, $|\vec{x}\rangle$ is in -1
- If $P < \frac{1}{2}$, $|\vec{x}\rangle$ is in 1

Equations: https://arxiv.org/pdf/1307.0471.pdf

Schuld program: https://github.com/mariaschuld/phdthesis