

Quantum Bits

- Basis Set with $\{0, 1\}$
1 qubit
- Basis Set with $\{00,01,10,11\}$
2 Qubits
- Basis Set with $\{000,001,010,011,100,-,101,110,111\}$
3 Qubits

Quantum Gates

Quantum Circuits

Quantum Circuits (copy)

Quantum Algorithms

- Deutsch-Jozsa Algorithm
- Bernstein-Vazirani Algorithm - determine a secret number stored inside a box
- Simon's Algorithm
- Quantum Fourier Transform - transforms computational basis to the Fourier basis
- Quantum Phase Estimation - uses phase kickback to write the phase
- Shor's Algorithm - famous for factoring integers in polynomial time
- Grover's Algorithm - Unstructured Search
- Teleportation

Pauli Gates

$X 0\rangle = 1\rangle$	$Y 0\rangle = i 1\rangle$	$Z 0\rangle = 0\rangle$
$X 1\rangle = 0\rangle$	$Y 1\rangle = -i 0\rangle$	$Z 1\rangle = - 1\rangle$
$X +\rangle = -\rangle$	$Y +\rangle = -i -\rangle$	$Z +\rangle = +\rangle$
$X -\rangle = +\rangle$	$Y -\rangle = i +\rangle$	$Z -\rangle = - -\rangle$
$X i\rangle = - i\rangle$	$Y i\rangle = i\rangle$	$Z i\rangle = i\rangle$
$X -i\rangle = i\rangle$	$Y -i\rangle = - i\rangle$	$Z -i\rangle = -i\rangle$

Quantum Machine Learning

- SVM
- Clustering
- Classification
- QNN
- Linear Models