EREN BOZKURT

Quantum Computing

SOFTWARE LANGUAGE

Python

I have advanced skills in Python, particularly in using specialized Python libraries for quantum computing such as Qiskit and TensorFlow Quantum. I can create quantum circuits, execute quantum algorithms, and process quantum data. For example, using Qiskit, I can create quantum algorithms like Shor's algorithm, which is utilized to efficiently calculate the factorization of large numbers. I can also develop a quantum leap algorithm using Qiskit, leveraging the uncertainty principle of quantum mechanics to solve a problem. Additionally, with the TensorFlow Quantum framework, I can train a machine learning model to run on a quantum computer, which can be employed to model quantum systems.

QUANTUM ALGORITHMS

1. **Grover's Algorithm**

Theoretical Knowledge and Application: I possess a deep theoretical understanding of Grover's search algorithm. I have comprehended the mathematical foundations of this algorithm and have the ability to demonstrate the superiority of quantum computing by applying it to various problem sets.

Optimization Skills: I have experience in reducing problem dimensions and optimizing quantum circuits.

2. **Shor's Algorithm**

Factoring Proficiency: I have dedicated significant efforts to studying Shor's factoring algorithm. I understand the potential of quantum computers in decomposing large numbers into their prime factors, and I possess the ability to effectively factor numbers using this algorithm.

Mathematical Analysis: Having grasped the mathematical foundations of Shor's algorithm, I can combine theoretical knowledge with practical application by solving various number theory problems.

3. **Deutsch-Jozsa Algorithm**

Quantum Oracle Usage: Through my work on the Deutsch-Jozsa algorithm, I possess the ability to understand and apply this algorithm, demonstrating the superiority of quantum computers over classical computers.

Quantum Parallelization: I have a comprehension of how quantum parallelization works in the algorithm and the capability to showcase its advantages by applying it to various problem sets.

4. **Quantum Fourier Transform**

Fourier Transformation Skills: Through my work on the Quantum Fourier Transform (QFT) algorithm, I have the ability to understand and apply the capability of quantum computers to perform parallel Fourier transformations.

Quantum Phase Estimation: I have experience with the Quantum Phase Estimation (QPE) algorithm, which is a subset of QFT. I possess the ability to effectively estimate the phases of complex numbers using this algorithm.

THEORETICAL COMPETENCIES

1. Quantum Algorithms

Mathematical Foundations: I possess a profound understanding of the mathematical foundations of fundamental quantum algorithms such as Grover's Algorithm, Shor's Algorithm, Deutsch-Jozsa Algorithm, Quantum Fourier Transform, and Variational Quantum Eigensolver.

Quantum Gates and Circuit Design: With my theoretical knowledge of quantum gates and circuit design, which form the basis of quantum algorithms, I can comprehend how these algorithms are implemented.

2. Qubit and Quantum Mechanics

Qubits and Superposition: I have the ability to understand qubits, the fundamental building blocks in Quantum Computing, and comprehend the concept of superposition, a key aspect in quantum states.

Entanglement: I understand the phenomenon of entanglement between qubits and know how this entanglement is utilized in quantum algorithms.

3. Quantum Information Theory

Comparison of Quantum Bit (Qubit) and Classical Bit: I have a thorough understanding of the differences between qubits and classical bits, including mastery of topics such as superposition and the relationship between measurement and quantum states.

Quantum Teleportation: I understand the quantum teleportation protocol and can evaluate how this protocol works from a quantum computing perspective.

4. Quantum Circuit Design

Quantum Gates and Circuit Design: With my theoretical knowledge of quantum gates and circuit design, I can create and optimize quantum circuits.

Quantum Parallelization: I have a solid understanding of the theoretical foundations of parallelization, a key advantage of quantum algorithms.

5. Quantum Information Theory

Quantum Communication: I understand quantum communication protocols and possess theoretical knowledge of transmitting quantum information.

Quantum Error Correction: I comprehend quantum error correction codes and protocols, and I can apply these theories to enhance the precision of quantum computers.