Final Proposal for Algorithms Analysis and Design

Cuantum Qomputing

- Ishaan Shah - 2019111028
- Rahul Goel - 2019111034
- Rutvij Menavlikar - 2019111032
- Sriram Devata - 2019113007
- Tejas Chaudhari - 2019111013

Proposed Overview

Phase 1 (1/10/2020 - 15/10/2020)

Study the prerequisites of Quantum Computing: Probability, Linear Algebra and then start getting into the basics of Quantum Computing. This is the time to get comfortable with handling qubits and operating on them.

Phase 2 (16/10/2020 - 10/11/2020)

Each of us plan to take up one algorithm that we try to understand and implement during the initial stages. We do have in mind that these algorithms have varying complexities in their implementations and understanding.

Once we get into working with these algorithms, we'll have a better idea about them and then try to work out any load-balancing that we can do.

- Simon's Algorithm - Ishaan Shah
- Teleportation Algorithm - Rutvij Menavlikar
- Grover's Algorithm - Rahul Goel
- Shor's Algorithm - Tejas Chaudhari
- BB84 Algorithm - Sriram Devata

When we say *implementing* these algorithms, we plan to also include a short explanation of each algorithm in a relatively easy way to understand. The primary results of this project are going to be our implementation of these algorithms, and enable anyone in the future to use these implementations as a *black box*, where they give the relevant input and get the output of the respective algorithm and their documentation.

Qiskit looks like the way to go since it feels that other Quantum Computing languages would require us to put some time into getting acquainted with the language itself, whereas Qiskit exists as a module in Python. This allows us to allocate more time towards the algorithms and their implementations.

We will set up a GitHub repository and invite the TA(s) and Prof. Kannan Srinathan to have access to the work we're doing, along with the diaries, which we plan to have as Markdown files in the repository. Please do let us know if you would prefer any other medium for us to maintain our diaries.

Phase 3 (10/11/2020 - Project Deadline) (As much (If) as we can do)

Explore the real world applications of Quantum Computing in fields such as Optimization, Chemistry, Cryptography and Machine Learning. We also plan to study the limitations of Quantum Computers.