Quantum Science & Engineering Center

Quantum Computing Seminar Series

Snack &

GEORGE MASON UNIVERSITY

Dr. Will Maxwell

Naval Surface Warefare Center - Dahlgren

Quantum Algorithms for Computing Betti Numbers

Monday, March 23, 2023 | 12:30-1:30PM | 3301 Exploratory Hall / Zoom

Abstract

In topological data analysis (TDA) we are given a collection of data points and are asked to find the topological features of the data. This involves constructing a topological space out of the data and computing its Betti numbers. This problem has recently received a lot of attention from the quantum algorithms community. Exponential speedup for TDA was conjectured for quantum computers, however, recent hardness results imply this is unlikely. In this talk, we survey the LGZ algorithm for quantum TDA and discuss its limitations. We then consider an alternative approach to computing Betti numbers on quantum computers using the span program model. The complexity of this algorithm is parameterized by the effective resistance and capacitance of a topological space which are high dimensional generalizations of the same concepts for electrical circuits.

Zoom link: https://go.gmu.edu/qcseminar

About the Seminar Series

The Quantum Computing Seminar Series are a series of working seminars organized and hosted by QSEC's quantum computing subgroup on Mondays. These events are free and open to the public. More information is available on QSEC's Computing Events and Mathematical Sciences Department's Quantum Computing Seminars. For any questions, contact qsec@gmu.edu.

Light snacks and coffee will be provided at the beginning of the seminar.