Aangeboden projecten: Details project

Non-local game hierarchy with a limited entanglement. (drs. Doutzen Abma)
21 Aug 2023

1.1 Proposal
Thesis project proposal

1.2 Project Title
Non-local game hierarchy with a limited entanglement.

1.3 Project Description

Non-local game (Ronald de Wolf, lecture notes Chapter 17) is a fascinating subject connecting quantum information, complexity theory and operator algebra. One such formulation is the complexity class MIP*, the set of problems which can be reduced to approximate the optimal success rate of a non-local game using quantum strategy. Surprisingly, MIP* was shown to be equivalent to the halting problem in one of the breakthrough results of the last decade (MIP*=RE) and, consequently, resolves one of the biggest conjectures within functional analysis (Conners embedding conjecture)!

This project will consider a more limited model, where the players are only allowed a bounded number of entanglements in their quantum strategy. This project aims to show a hierarchy of complexity classes (similar to the runtime hierarchy theorem) but for the amount of entanglement used.

Background required: Strong complexity background (Turing Machines) and strong quantum information background are strongly preferred but not necessary.

1.4 Work environment

QuSoft, Group A&C at CWI

1.5 Expectations

Background reading and performing research.

Duration

- MSc Information Studies and MSc Logic: 6 months

- MSc Software Engineering: 3 months

- MSc Computational Science: 8 months

1.10 Programmes
Master Logic (6 months), Master Computational Science (8 months)

1.11 Project Contact
drs. Doutzen Abma (doutzen@cwi.nl, Extern)

1.12 Number of Students
1

2. Research Tags

Please choose a maximum of three individual tags.
Note: it is not possible to submit the form if more than 3 research tags are selected

2.1 Amsterdam Machine Learning Lab

2.2 Computational Science Lab

2.3 Computer Vision

2.4 Digital Interactions Lab

2.5 Intelligent Data Engineering Lab

2.6 Information Retrieval Lab

2.7 Language Technology Lab

2.8 Multimedia Analytics Lab Amsterdam

2.9 Quantitative Healthcare Analysis

2.10 Theory of Computer Science — Algorithms and datastructures, Complexity theory

2.11 Complex Cyber Infrastructure

2.12 Security by Design

2.13 Multiscale Networked Systems

2.14 Parallel Computing Systems

2.15 Socially Intelligent Artificial Systems

2.16 Video and Image Sense Lab

2.17 Natural Language Processing & Digital Humanities

2.18 Theoretical Computer Science (ILLC) Algorithms and Complexity

2.19 Formal Semantics and Philosophical Logic