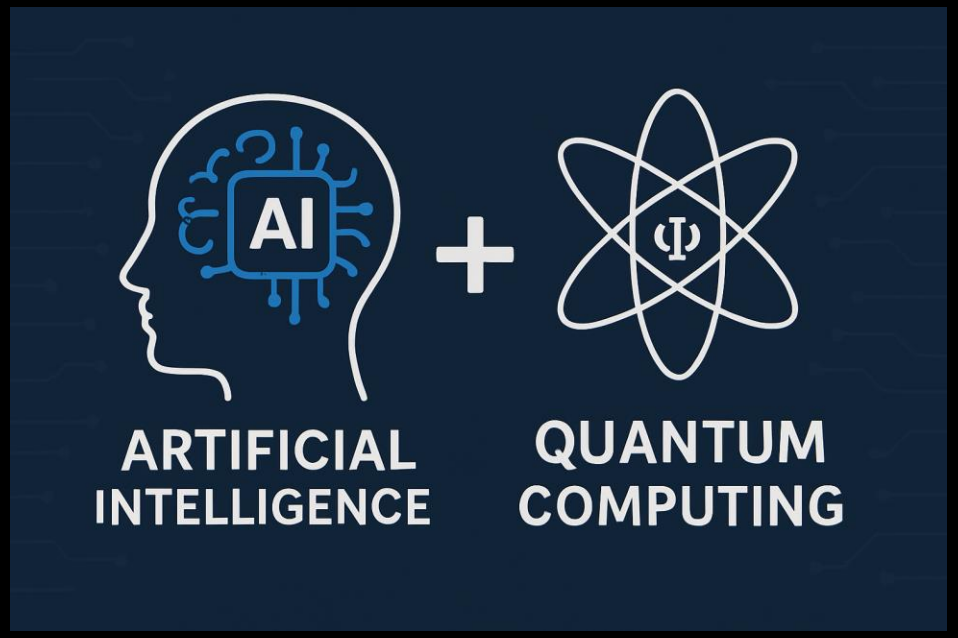


Team members: Matti Sarjala, Anna Nguyen, Antti Lankinen, Mehdi Rizi, Waseef Muhaimeen

AI + QUANTUM OPTIMIZATION APPLICATION TO HELP ON SITE TECHNICIANS TO RAPIDLY REPAIR ELEVATORS

Quanfi

- LINKEDIN: Quanfi: Overview | LinkedIn

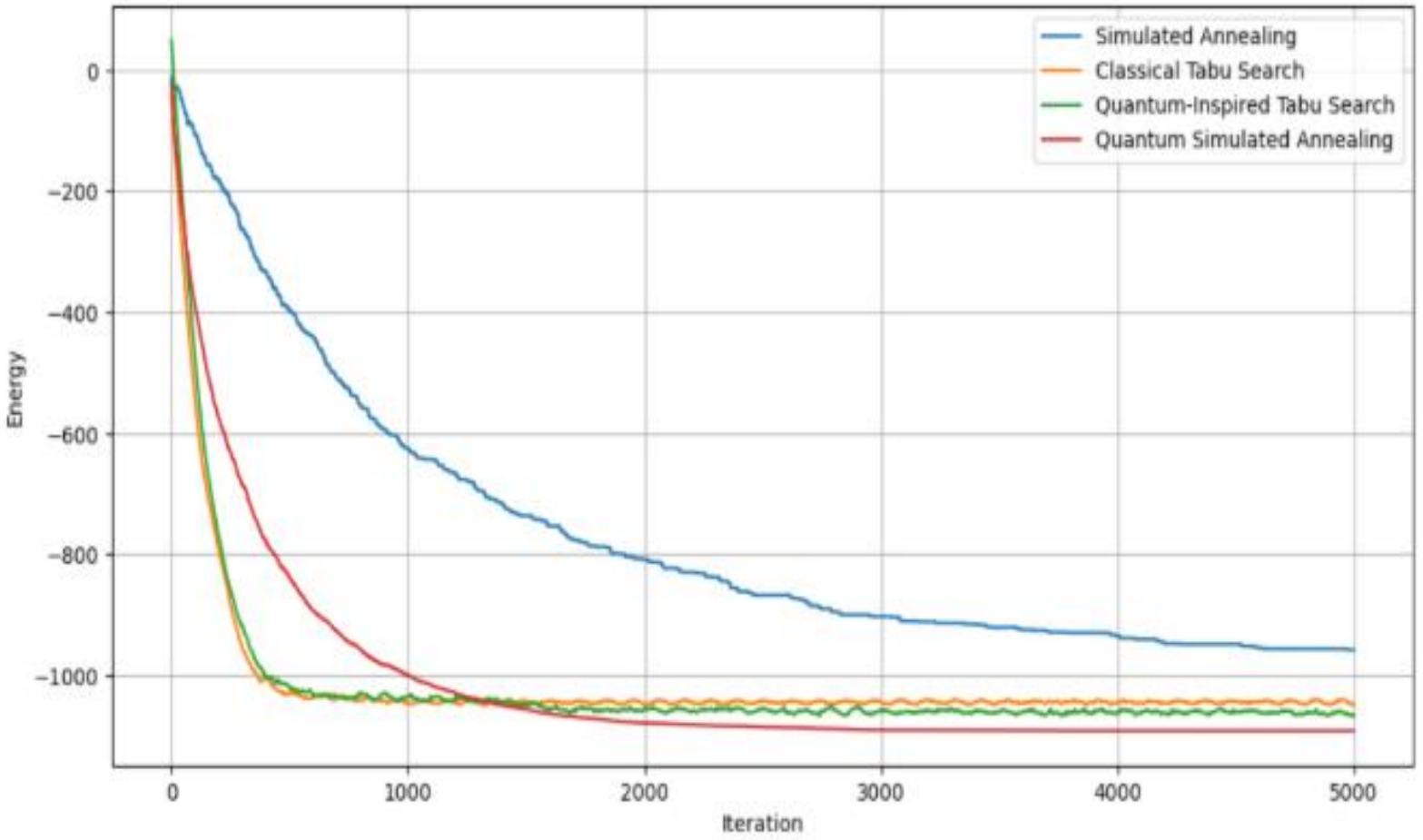
CHALLENGE

- IDEA: Elevators in hospital where time is critical to patients survival
- Life critical situations such that elevators are use to carry trauma or stroke patients to the OR
- It is important to keep seamlesss mobility

WHAT IS THE SYNERGY BETWEEN QUANTUM AND AI?

- AI **formulates** the problems for quantum optimization → Quantum algorithm solves the optimization problem
- AI **updates** the change in the problem specifications → Quantum algorithm runs again with updated rules
- AI can conduct sanity check for solutions → Good quality quantum optimization are solved
- Learn to how to better formulate problems that help clients more → Learning path for better quantum algorithms

OPTIMIZATION WITH CLASSICAL AND QUANTUM



Classical algorithms: simulated annealing and Tabu search

Quantum algorithms: quantum inspired Tabu search and quantum simulated annealing (GPU and CPU used.)

In this case , quantum simulated annealing leads to best result. In case of elevator, it means less repair time.

ESTIMATED KONE AI + QUANTUM OPTIMIZATION MARKET POTENTIAL THOUGH MICROSOFT

How to estimate the potential market size of quantum service for KONE?

Estimation 1: Quantum optimization market is estimated to be 32 to 52 billion globally in 2035 (source McKinsey Quantum Report). And KONE 10% of the market share of 116bn EUR in elevator industry. The quantum op market for KONE is EUR 30-50m in 2035. Early adoption for 2030 is EUR 12-20m.

Estimation 2: Adding AI and Quantum together, the synergy can increase by 20%. For KONE it means EUR 50 to 80m in 2035.

Estimation 3: Even more synergies with AI + Quantum with Innovation in Services

How to estimate the profitabilityy of quantum service for KONE?

Operating margin is currently 11% of EUR 11bn revenue. It can be reduced by 2% to 9%, meaning a reduction of at least 2.42bn per year.

AI UTOPIA

- AI **formulates** the problems for quantum optimization
- AI **updates** the change in the problem specifications
- AI can conduct sanity check for solutions
- Learn to how to better formulate problems that help clients more

QUANTUM UTOPIA

- Quantum algorithm solves the optimization problem
- Quantum algorithm runs again with updated rules
- Good quality quantum optimization are solved
- Learning path for better quantum algorithms

REALITY: AI NOT THERE YET, QUANTUM NOT THERE YET

THANK YOU FOR YOUR ATTENTION!

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