

Quantum Annealing and Experience with D-Wave Systems

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Abstract—¹This survey paper is an exploratory paper for D-Wave systems and using their Ocean Software. D-Wave systems offer adiabatic quantum computing through quantum annealing, we plan to use this to evaluate their examples. —tobechanged

Index Terms—Quantum Computer, Quantum Annealing, Optimization Algos

I. INTRODUCTION

Quantum computing takes advantage of the strange ability of subatomic particles to exist in more than one state at any time. Due to the way the tiniest of particles behave, operations can be done much more quickly and use less energy than classical computers. In classical computing, a bit is a single piece of information that can exist in two states – 1 or 0. Quantum computing uses quantum bits, or ‘qubits’ instead. These are quantum systems with two states. However, unlike a usual bit, they can store much more information than just 1 or 0, because they can exist in any superposition of these values. A universal gate quantum computing system relies on building reliable qubits where basic quantum circuit operations, similar to the classical operations we all know, can be put together to create any sequence, running increasingly complex algorithms. Whereas, a quantum annealer systems work best on problems where there are a lot of potential solutions and finding a “good enough” or “local minima” solution, making something like faster flight possible. Currently, IBM is the only company that has made universal gate quantum

computer commercially available but the biggest drawback is the number of qubits it provides for computation. On the other hand, D-Wave, the most famous quantum annealer is currently able to provide 2000 qubits for computation. D-Wave’s Ocean software stack provides a chain of tools on GitHub that implements the computations needed to transform an arbitrarily posed problem to a form solvable on a quantum solver.

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A. Universal Quantum Computer

Subsection text here.

1) *Gates based*: Subsubsection text here.

2) *Adiabatic QC*: Subsubsection text here.

II. USING ANNEALING FOR PROBLEMS

Subsubsection text here.

III. D-WAVE SYSTEMS AND USING ITS SDK

Subsubsection text here.

IV. EXPERIMENTATION

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A. Experimentat Algo 1

Subsubsection text here.

B. Experimentat Algo 2

Subsubsection text here.

C. Experimentat Algo 3

Subsubsection text here.

¹about IBM supported class

V. EXPERIENCE AND OBSERVATION

Subsubsection text here.

VI. FUTURE STEPS

Subsubsection text here.

REFERENCES

- [1] H. Kopka and P. W. Daly, *A Guide to L^AT_EX*, 3rd ed. Harlow, England: Addison-Wesley, 1999.

APPENDIX

A. *First Appendix*

1) *First Subsection In Appendix:*