Memcomputing: storing and processing at the same time

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Abstract

Memcomputing was recently proposed as an alternative to turing paradigma of computation. The difference here is that the computation and the storage is done within the same architecture. In order to achieve that, memcopmuters use memelements, which are two-terminal electronics components with resistive, capacitive, and inductive characteristics. Memcomputers are mathematically proved able to solve NP-hard problems from turing computers.

Keywords: Memcomputing,

1. Introduction

Commercial computer architectures are based on a turing machine (**?**). These computers can generally be split into two main computing tasks: storing and processing. In order to handle these tasks, different implementation patterns were proposed, for instance, the von-Neumann architecture. As technology evolved, storage became cheap and processing demand rose to exponential levels. That is, memories and processors might have different working speed. Thus, the mode of operation of these architectures imposes a limitations, which are collectively known as the *von-Neumann bottleneck* (**?**).

There are already some suggested alternatives to these limitations, including parallel computing and quantum computing. Parallel computing are implemented by using multiple core processors. While parallel computing can minimize the von-Neumann bottleneck issue in one computing unit, when considering scaling the whole workstation it might need specialized units such as *graphic processing units* (GPUs). These means more complexity on the infra-structure besides considering limitations of the specialized units themselves. On the other hand, quantum computers are promising in the sense that they are an unique computing platform with intrinsic massively parallel computing scheme. However, even considering the most recent improvements in the field, a practical quantum computing can not outperform a tradicional one yet.

2. History and Background

3. Getting Started

4. Resource Constrains

5. Conclusions

References