On super computing.

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Abstract

We present some of the theoretical underpinnings of a super computer which is superior to the classical and quantum computer.

1 Introduction.

This short note is a consequence of a theoretical possibility entertained in [1] regarding extensions of the classical and quantum language. This very extension induces higher order memory and operational facilities which could eventually be used to build a modern type of computer which could simulate the human brain. Indeed, it is my suspicion that ordinary (quantum) computing falls short for this purpose and that higher order type relationships are needed to forsee for the necessary computing and memory facilities. It may be that these ideas are purely theoretical and will never be realized; in any case such computer will not be build in the next coming decades as only elementary types of quantum computers start to be developed.

2 The idea, the power of (quantum) bits.

In this section, we repeat some of the ideas and language spelled out in full detail in [1]. There, we spoke about elementary "identities" (particles, bits, qbits) possessing certain operations on their set of properties x. In particular, we had the operations $\wedge, \vee, \cup, \otimes_\alpha$ and potentialities thereof such that effectively $\wedge$ corresponds to the ordinary $+$ in quantum mechanics, $\vee$ corresponds to a statistical or density matrix description, $\otimes_\alpha$ *contains* the ordinary tensor product $\otimes$ and classical Cartesian product $\times$ as special cases and $\cup$ is a totally new operation allowing for disjoint descriptions of possibly the same identities. In principle, α could mean many things and is related to statistical properties of the entities; statistics different from Bose and Fermi can be constructed by means of non-trivial topological factors and we shall therefore keep the $\otimes_\alpha$ notation instead of the usual $\otimes$. For example, the salient feature about the $\cup$ notation is that one entity can undergo many different types of higher level relationships $\otimes_\alpha$ with different partners which is a denial of the indistinguishability of entities, something which one would expect to occur in a theory of the universe. So, for

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a total of n entities one can write down 2^n quantum tensor products $\otimes$ corresponding to all subsets of $\{1, 2, \ldots n\}$; in case some nontrivial α are involved due to for example some braiding of entities, this number will be (much) higher. Supossing that a one entity Hilbert space has dimension m, the total dimension equals

$$\prod_{i=1}^{n}(m^i)^{\left(\begin{array}{c} n \\ i \end{array}\right)} = m^{\sum_{i=1}^{n} i \left(\begin{array}{c} n \\ i \end{array}\right)} = m^{n2^{n-1}} \gg m^n.$$

The idea now is that the resulting theory will have higher order observables meaning that one can only access the relation between entities $\{i_1, \ldots, i_k\}$ for some $1 \leq k \leq n$ and all other relations are left intact. One can also have lower order observables meaning that in *every* other higher order tensor product, a projection on the same substate is made and (or) all other relations are destroyed. For the higher order observables, the full kinematical space can be acessed which implies a huge improvement in data storage and computing facilities, a revolution which is much bigger than the one from a classical to a quantum computer.

3 Afterword.

This is for now all just theory and it remains to construct detectors which are only sensitive to an emergent multi-entity state and leave the other states invariant. It might just be that those don't exist and only lower order observables can be measured. In that case, there is no substantial improvement over the quantum computer and the mystery of the functionality of the brain continues. However, there are no theoretical objections to the existence of such observables and perhaps this is the best indication that this idea might work out in the future indeed.

References

[1] J. Noldus, On the Foundations of Physics, Vixra.