Computation – The Eternal Companion of Nature

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Abstract The widely understood meaning of computation is any type of calculation that includes both arithmetical and non-arithmetical steps and that follows a well-defined model. We call this definition conventional/artificial computation (CC) which is man-made, narrow, and non-exact, in general. in operands and operators.

Mechanical or electronic devices which perform computations are known as computers. An especially well-known discipline of the study of computation is computer science. The word "Computing" is a term related to the study and use of computers.

In fact, CC is just an exceedingly small window of the most gigantic computational activities that are going on nonstop in the universe exactly in which all the operands and all the operations/activities — not known to humans — including arithmetical ones are also errorless (without our being conscious of the activities).

We call these activities viz. the internal activities involving the operands — universal/natural, non-man-made, ever error-free, and ever parallel — *universal* (or natural) *computations* (UC)

The word *Nature* has different meanings in different contexts, A broader meaning could be "the phenomena of the physical world/universe collectively, including plants, animals, the landscape, and other features and products of the earth/universe as opposed to humans or human creations."

However, in our context, we include both man-made and non-man-made phenomena in constituting the Nature since living humans and all their activities are parts of Nature or, equivalently, the mother nature herself. Strictly speaking we, the humans, are also animals and definitely not beyond Nature.

Both CC and UC come under computational mathematics (CM) which follows the CM rules. By CCM and UCM we imply conventional computational mathematics and universal computational mathematics, respectively. *CCM may be viewed as an extremely small subset of UCM.*

Vital differences between CCM and UCM are (i) the precision (word-length of the input operands and that of the output results/resulting operands) and (ii) computational accuracy.

CCM deals with ever finite precision and hence practically ever erroneous input operands and ever erroneous resulting operands. UCM, on the other hand, deals with infinite precision that includes, of course, the finite ones. The infinite precision operands and the infinite precision output results/resulting operands in UCM are absolutely errorless.

We imply Nature as omnipresent (present everywhere at the same time), omnipotent (having unlimited power), and omniscient (knowing everything).

With the foregoing information, we have attempted to focus on the behind-the-scene computation viz. the UC which is going on all the time nonstop for all eternity keeping the recent CC by humans in the background.

This focus is for a better appreciation of the giganticness, exactness (usually uncapturable by humans), and parallelism. Also, we discuss the computing speeds, memory requirements, and memory/storage permanency/unerasability for both CC and UC for us to be aware of Nature's unlimited contribution not only for our very survival/existence but also for our development and decline/death which is a necessity for any living/non-living entity that has been created.

It may be mentioned that laws of Nature, most of which are not precisely known to humans, can never be violated nor can Nature be destroyed by any means such as creating pandemics, exploding all the nuclear bombs, any amount of global warming, asteroid bombardments, and even the death of galaxies such as that of our Milky Way galaxy.

The common sense/convincing proof of the foregoing statements is that we have not yet found any law of Nature, which has been violated; it will not be too wrong to say, by extrapolation, that we will not be able to find one in future.