0.1 Computing

The natural set of questions towards **Computer Science** at the first glance might be "*what is computer?*" and "*why is it a science?*".

The first question seems to be easy. When this first section is written at 2019, computers are pervasively everywhere. If someone is learning computer, he/she must have known, seen, or at least heard of computer as an object. The second question seems to be harder. Though science is also pervasively everywhere, it is more of an abstract concept but not a physical object.

Starting from the easier question and diving deeper, the "computer as an object" with colourful interfaces that plays music, runs games, displays webpages, …, does not seems to be intuitively aligned with the conceptual description — "the thing that computes". An inevitable (and puzzling) gap emerges from the concept and the real world appliance.

Let's keep this gap in mind as it is the foundation of theoretical computer science, and we will discuss it all the way through the entire journey. But at the moment, if assuming that the conceptual and the real computer must be pointing to the same thing, then "*What is computing?*"

Imagine that you are a lion on African grasslands trying to hunt migrating zebras. You are quite confident that a single lonely zebra is a perfect target. But taking on multiple zebras are dangerous and can result in severe injuries or even death. Now, you as a lion has some zebras within sight. How can you tell if going on a hunt now is a good chance, or a dreadly move?

Here let's take *zebra* as a type of animal. The *some zebras* within sight are objects of the type zebra. There are several attributes associated with *some zebras* — size, height, shape, colour of furs, and so on so forth — but they are for other scenarios. One attribute particularly important to this scenario, to you as a lion, and to this topic, is the **number**. Considering number as attributes of the objects *some zebras*, from past experience, you can get the number of *some zebras* by counting, and make decisions for your hunting. Practically, you can add *1* each time by seeing *1* object of the repeated type *zebra* in objects *some zebras* (I do not assume the animal lion counts the same way). In this case, number and counting are nothing more than useful tools for everyday decision making.

Counting [1] is the origin of Mathematics, dating back to pre-historical notches made in bones (notched bones found at Border Cave in South Africa, around 44,000 BCE) [2]. The skill of counting not only belongs to human, but animals too [3]. To start small and simple, the first *computing* we have done is to recognise the precise repeated patterns by counting. To describe the precise repeated patterns, we use numbers.

1. There is a lot more to say on counting and on Mathematics but here I deliberately avoid presenting and/or explaining too much unless necessary. The same applies to many other concepts/domains/sub-domains presented later, until further knowledge is gained. ↩

2. Sci-News.com (2012). Artifacts point to modern culture 44,000 years ago. Retrieved from http://www.sci-news.com/othersciences/anthropology/article00496.html↩

3. Stanislas Dehaene, Varieties of numerical abilities,Cognition, Volume 44, Issues 1–2, 1992, Pages 1-42, ISSN 0010-0277, https://doi.org/10.1016/0010-0277(92)90049-N. (http://www.sciencedirect.com/science/article/pii/001002779290049N)↩