Scientific writing automation applied to the mathematics of learning

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Abstract— The purpose of this article is to shed light on the relation between scientific writing automation and the mathematics of learning, being the former applied to the latter. It is expected this research helps finding a rigorous way into the study of learning from a mathematical perspective, like previous research related to this.

Index Terms— learning, mathematics, mathematics of learning, scientific writing automation.

1 INTRODUCTION

LEARNING has been a target of much research throughout the years, hoping to find more insights in relation to this phenomenon. However, the means to reach this goal have been diverse and sometimes divergent.

The approach used in this article is scientific writing automation applied to the mathematics of learning. This approach has already been used and conceptualized in previous research (Alvarez, 2019, 2020). In this case, we try to connect the concept of scientific writing automation and apply its efficiency to the mathematics of learning.

In a way, this research tries to go one step further from previous research based on scientific writing automation. As stated in previous articles, scientific writing automation seems to have a life on its own, and the application of its potential to scientific phenomena seems promising, to say the least.

Next section develops the theory underlying the ideas to be worked on in this article.

2 LITERATURE REVIEW

2.1 Scientific writing automation

Scientific writing automation is a set of automatic skills, related to writing. It develops by means of practice and study (Alley, 2013; Alvarez, 2019; Chikuni & Khan, 2008). Although its automatic nature could potentially mean it has a genetic root, it does not seem to be an in-born quality (Alley, 2013; Alvarez, 2019).

Regarding conception, scientific writing automation seems to be a well-defined automatic technique. This technique has three basic underlying aspects: thought, structure, and style (Alvarez, 2019; Chikuni & Khan, 2008; Peat *et. al.*, 2013).

Besides, this kind of automatic writing seems to be human-exclusive (Alvarez, 2019).

2.2 Mathematics of learning

According to Poggio and Smale (2003), the mathematics of learning can aim at explaining learning theory and ultimately how learning works in the brain.

If we conceive the mathematics of learning as integration (Alvarez, 2020), we can tell it has to do with new elements entering the mind (Alvarez, 2020; Fink, 2013; Selnes & and Sallis, 1999).

3 DISCUSSION

3.1 Initial considerations

Taking as a starting point the concept of scientific writing automation, we can use its efficiency to immediately relate it to the mathematics of learning.

At first sight, it would seem that the relation between both concepts is a robotization of the concept of learning, in a rigurous way through its mathematization. However, it is not that so since all that the concept of SWA does is to create the appropriate mechanism to formulate scientific ideas with enough precision and formality.

That being said, it is time to make the concept of SWA work for the goal of this article: to produce a formal and precise formulation of the mathematics of learning (Alvarez, 2019; Poggio & Smale, 2003), to understand more in-depth the phenomenon of learning.

In that sense, we can speculate on the right method to do this. Maybe we could produce a mathematical algorithm of learning, to see how it works whether to explain or generate some phenomena related to learning.

However, the idea of an algorithm for the purpose of explaining the mathematics of learning, in itself looks dubious. Not only that but the idea of an algorithm for scientific ideas in the context of scientific writing automation, has already been discarded (Alvarez, 2019).

If the idea of an algorithm has been put aside, then what ideas are left to consider? There is the slight possibility an algebraic approach could shed some light somehow to the phenomenon of learning from a mathematical perspective.

What would an algebraic approach to the explanation of the mathematics of learning look like then? If we focus on L as learning and M as mathematics, in a very rudimentary sense, we could try some logical processes derived from that, maybe related to something else.

Let us say we have the following sample:

M_L

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At first sight this looks very simple. However, it is counter-intuitive. If it is counter-intuitive, then it may not be that simple and it may yield interesting and probably unexpected insights.

We know expressions of this kind are hard to deal with, in terms of calculation, if not impossible. However, if we consider the following equivalence, we may find some interesting results:

$$M_L = M_1$$

In this case we equal the mathematics of learning to some mathematics of another value, in this case a number but it counts as a concept too, potentially speaking. In that way we provisionally conclude M_1 is equal to the mathematics of learning.

We know mathematics is used to explain a great array of phenomena, whether this set is infinite or not. If we assume this set is infinite, we may be talking about the mathematics of learning plus the mathematics of something else, and so on.

Previous idea can be expressed as it follows:

$$S_M = M_1 + M_2 + M_3 + M_4 + M_5 + ...$$

In this case we have a set S about mathematics (M). This set is composed by the potentially infinite number of mathematics applied to different phenomena. If M_1 is the mathematics of learning, it belongs to a higher group of mathematical applications to a potentially infinite number of phenomena.

At first sight, this does not look like much. However, a second look at it will tell us it is quite striking. The reason for stating this is the fact that, although intuitively and initially logical, we could conceive the mathematics of learning as a subset of learning. However, it ends up being a subset of mathematics.

Even with this conclusion, everything still looks pretty obvious. However, the consequences for future research and the conception of these concepts may be a little greater than we thought of initially.

The reason for previous statement is that if a) learning has a mathematical explanation and b) that mathematical explanation does not belong to learning but to a higher set of mathematics, then the mathematics of learning and specially learning itself, have a mathematical root which is deep in nature.

So far we have explained the nature of learning in mathematical terms and the potentially mathematical root of the phenomenon of learning. However, we have not gone deep into the relation between SWA and the mathematics of learning, which although implicit, has not been developed in this article in a direct way.

Next section covers the relation between scientific writing automation and the mathematics of learning.

3.2 SWA and the mathematics of learning

How can we relate the concept of SWA to the mathematics of learning in a satisfactory way? One way is to speculate on the linguistic nature of scientific texts, an idea looking dubious at first sight. However, for the purpose of this explanation it may work.

Then, let us assume scientific texts are nothing more than language (Marshall, 2014). If that is true, then writing a scientific text is only a generation of language with syntactic and semantic content (Chomsky, 1957; Glanzberg, 2020; Marshall, 2014).

In that sense, scientific writing automation may make it possible to generate a scientific text automatically (Alley, 2013; Alvarez, 2019; Chikuni & Khan, 2008).

We know an article on the mathematics of learning is a scientific text. Therefore, SWA applied to the mathematics of learning may create a scientific text on the topic mentioned with a high level of precision and efficiency.

However, there may still be something hanging in the air. That may have to do with the nature of a mathematical explanation, in this case for learning, applied by scientific writing automation.

At first sight, previous point would look like a dead end. And it is, from one perspective. However, from another point of view, it may yield interesting insights on the nature of language and its relation with mathematics.

We cannot state mathematics has a linguistic root, and we know that. That would be too much of a statement. However, in the case of this article, the application of SWA to the mathematics of learning would seem to yield insights in that direction.

How do we solve this apparently contradictory theoretical situation? A possible answer in this case is to assume the application of SWA to a mathematical explanation of learning, creates a theoretical microcosm, a special abstract limbo, in which mathematics has a linguistic root, and in this way, an automatic writing of this nature is then able to produce a mathematical explanation of learning (Alvarez, 2019; Poggio & Smale, 2003).

Not only that, but this special kind of abstract space we are talking about, may allow for the conception of a weird but still valid kind of phenomenology, in which the mathematics of learning can be fully generated by and under the laws of scientific writing automation.

In that sense, if SWA is able to produce the mathematics of learning in this special space, or at least an alternative proposal to the topic, then we have found a theoretical machine to produce theory related to the mathematics of learning.

We are very optimistic this kind of approach may produce useful theoretical work, not only in the area of the mathematics of learning, but science in general as well. And in a more ambitious way to put it, the very field of mathematics.

4 CONCLUSION

In this article, we explored the relation between scientific writing automation and the mathematics of learning. It was found the mathematics of learning may not belong to learning but mathematics. It was also found the mathematics of learning, and potentially mathematics, may have a linguistic root, within certain theoretical constructs, allowing for interesting phenomenological conceptions.

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