

## **WANING INFLUENCE OF HISTORY: WHY?**

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**Abstract.** In the past, history played an important role in education: students learned history of science, history of mathematics, etc. In the last decades, the influence of history has waned. In this paper, we provide a natural explanation for this waning.

**Keywords:** history, prediction, dynamical systems.

### **1. Waning Influence of History: Formulation of the Problem**

**History used to be important in all aspects of human endeavor.** In the past, history played an important role in human enterprise: students studying science learned a lot of facts from history of science, students studying modern languages learned historic languages like Greek and Latin, and everyone studied history itself. Studying history was considered important for making decisions.

**Lately, the influence of history has been waning.** In the last decades, however, the influence of history has been waning. Much less efforts and much less time is allocated to studying history, and it is no longer a universally accepted fact that knowing history is extremely important for decision making; see, e.g., [1,2].

**Why?** In this paper, we try to explain why the influence of history is waning.

### **2. Waning Influence of History: Analysis of the Problem**

**What are the main objectives of science and engineering?** In order to understand why, as time goes, the importance of history for solving everyday problems wanes, let us recall where these problems come from.

One of the main objectives of science and engineering is to predict the future – and to select the actions that lead to the most beneficial future. For example, science predicts the trajectory of a spaceship, and engineering helps find appropriate trajectory corrections that guarantee that the spaceship reaches its targets.

**How can we predict the future?** We assume that the future can be predicted, i.e., that it is possible to predict the future values  $x_i(t)$  of the corresponding

quantities  $x_1, \dots, x_n$  based on the past values  $x_i(t-i)$ ,  $1 \leq i \leq N$ , of these quantities  $x_1, \dots, x_n$  and of related quantities  $x_{n+1}, \dots, x_N$ .

If it is not possible to predict the *exact* future values of the corresponding quantities, at least we should be able to predict the *probabilities* of different future values – so in this case, the probabilities are the values  $x_i(t)$  that we are trying to predict.

In order to predict the future, we need to know how exactly the future values  $x_i(t)$  depend on the previous values, i.e., we need to know the dependencies

$$x_i(t) = F_i(x_1(t-1), \dots, x_N(t-1), \dots, x_1(t-T), \dots, x_N(t-T)), \quad (1)$$

for an appropriate value  $T$ .

How do we determine these dependencies? The only way to do it is to observe the history of this and similar systems, and to extract the desired dependence (1) from this history, i.e., from the observed sequences  $x_i^{(k)}(t)$ . In this case, we need to find the dependencies  $F_i$  for which

$$x_i^{(k)}(t) = F_i(x_1^{(k)}(t-1), \dots, x_N^{(k)}(t-1), \dots, x_1^{(k)}(t-T), \dots, x_N^{(k)}(t-T)) \quad (2)$$

for all observations  $k$ .

To find the dependencies  $F_i$ , we need to know many cases of prior behavior, i.e., we need to know the *history*. However, once the dependence (1) has been determined, we no longer need to know that many historical examples: it is sufficient to observe the few prior values of the quantities  $x_i$  for this particular system, and apply the formula (2).

Thus, we have the following natural explanation for the waning influence of history.

### 3. Waning Influence of History: A Natural Explanation

One of the main objectives of science is to predict future events. For this prediction, we need to know the past values of the corresponding quantities and we need to know how the future values depend on the past values.

The only way to learn the corresponding dependence is to use the observations of similar past situations. On this stage, history is very important – without it, we do not know the dependence and thus, cannot make predictions.

As we accumulate knowledge, we eventually learn the desired dependence. At this stage, to make a prediction, we no longer need an excessive knowledge of history – all we need is the history of this particular event. Thus, the influence of history inevitably wanes.

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