Ancient Egyptian Hieroglyphs,the AI, and a Possible Scenario for the Future of Egyptology (and Higher Education) [*]

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Abstract

The present study aims to examine the use of AI applications- The ancient Egyptians are the builders of the first civilization. Their megalithic monuments created up to five millennia ago and which endured until today still overwhelm us with their perfection and ingenuity due to the brilliant minds of the ancient Egyptian engineers and architects of those times who built them.

To build these spectacular monuments, the ancient Egyptians used the symbolic language of hieroglyphs, an original, authentic ancient Egyptian product, unique in history and which could only be deciphered in the 19th century CE, i.e. after almost five thousand years. This hieroglyphic language was used both for everyday speech and to express mathematical - algebraic and geometric - abstractions, necessary for precise calculations in construction, astronomy and everyday life.

Several questions arise:

- If this hieroglyphic language were invented today, to what extent could it be used as a software programming language?
- Can Egyptian hieroglyphs be used in coding?
- Moreover, what implications could the use of Egyptian hieroglyphs and their language have in artificial intelligence? Because it is known that until now, AI has started to be used successfully in Egyptology: for example, for the easier understanding of the written texts on damaged artifacts and monuments; to the translation of the texts, to the most faithful reconstruction of the portraits of the personalities of this civilization, to the analysis of the mummies and the composition of the materials, in archaeology, as well as in other related applications.

The possibility of introducing Egyptian hieroglyphs in programming languages paves the way for their use in other higher education disciplines.

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But not only that. This attempt can be duplicated using other languages of other ancient civilizations, languages that will already replace the classic European alphabet as a programming language. It is interesting to follow from this perspective the possible evolution of AI, both in Egyptology and at the level of higher education.

الملخص العربى

Introduction

One of the most resilient and well-preserved archaeological and linguistic corpora to remain from antiquity is the material culture of ancient Egypt. It is also one of the most commonly utilized vehicles to foster public interest in the humanities.

Nowadays, from fundamental Physics to natural language processing and clinical medicine, Artificial Intelligence (AI) and deep / machine learning applications are expanding across all scientific fields, with constantly amazing outcomes that profoundly affect our lives. Regardless of the issues surrounding its application, AI has the potential to both automate human activity and enhance human comprehension. AI is now starting to pervade various fields such as philology, archaeology, and the human sciences, albeit its precise function is yet unclear.

Using AI can revolutionize Egyptological studies, particularly language and hieroglyphic script.[1] There is a variety of areas of Egyptology where AI can be used successfully. Generally, AI may help in two major fields:

1. coding using the Egyptian hieroglyphs;

2. translating the hieroglyphs and helping the epigraphists.

AI can be helpful particularly due to several reasons:

- there are now over 50 digitized collections of Egyptian content, and they are all standalone websites without the capacity to search simultaneously or across them;
- material descriptions are usually excessively short or inaccurate, making it difficult to find certain and pertinent items within a collection;
- standards for Egyptological nomenclature have not yet been generally adopted;
- some digital collections provide multilingual search features and metadata, however many other museums only or mostly utilize their native tongue to describe their artifacts. Due to the

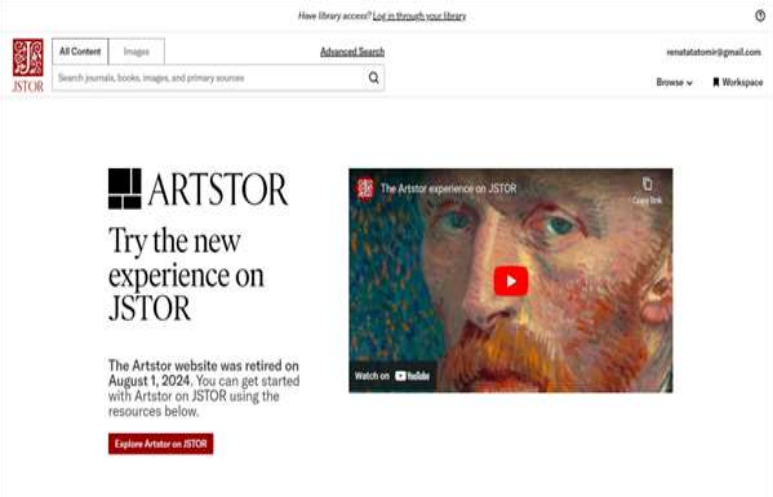
worldwide dissemination of Egyptian content, consumers may have to deal with metadata or even simple search capabilities in French, German, Italian, Danish, Dutch, or other languages. To these it must be added that the translations into a common language, such Arabic or English, are frequently either absent or not used on the entire website. Also, the accuracy of popular automated translators like Google Translate is still not high enough to consistently represent metadata, item descriptions, and technical terms.[2]

To solve some of these problems, a number of cultural aggregator websites have been developed, such as

Google Arts and Culture, https://artsandculture.google.com/

Europeana, https://www.europeana.eu/ro

Artstor, https://www.jstor.org/artstor



The inability to perform full-text searches of the metadata in common languages, the aggregators' focus on collection highlights rather than complete collections (e.g., Google), the difficulty in finding relevant objects in large datasets spanning multiple cultures, and the lack of a global focus for some sites (e.g., Europeana) are some of the challenges that those services still present for culturally specific disciplines like Egyptology.

The Global Egyptian Museum https://www.globalegyptianmuseum.org/ made an effort to get over a few of these obstacles. But that site hasn't been updated in more than ten years and only features a comparatively tiny collection of objects (14,975). Additionally, advancements in technology, especially in the areas of artificial intelligence and "smart," image-based searches, provide new opportunities

AI advancements, particularly in machine and deep learning, offer new possibilities for developing tools that assist experts in fields that seem to be distant from information technology. The field of ancient Egyptian hieroglyphic writing is one example of this.

In fact, right during this presentation we may witness AI applications; it is very likely that interdisciplinary researchers, from IT and Egyptology, are developing various algorithms proposing IT tools for academic research.[3]

Hereinafter I selected some examples of applications already in use, yet relatively new, which have already proven their validity for research and university teaching.

1. Coding using the Egyptian hieroglyphs

By far the application closest to the idea stated in the abstract is the one that encodes ancient Egyptian hieroglyphs used for numbers: **Explorer Academy**. And the creator explains in detail, visually, what

he intends. The results might have a greater impact to unravel various questions and issues in Egyptology. https://www.nationalgeographic.com/pdf/kids/photos/articles/Explorer-Academy/downloads/explorer-academy-hieroglyphs-code.pdf

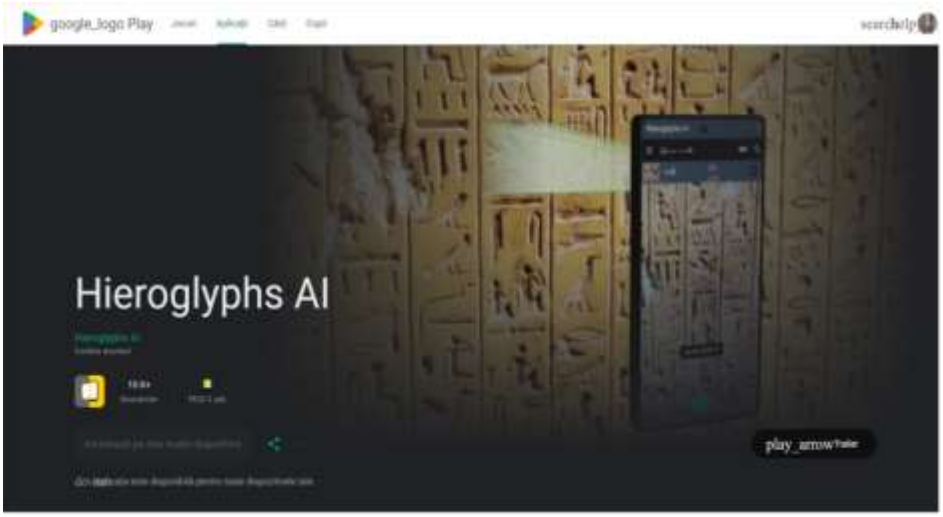
Another attempt to "code like an Egyptian" is **puzzlet/seshat**, https://github.com/puzzlet/seshat ,described as:

"Seshat is a programming language in Egyptian hieroglyphs. Its goal is to make programming easy for anyone who can read and write Egyptian hieroglyphs."

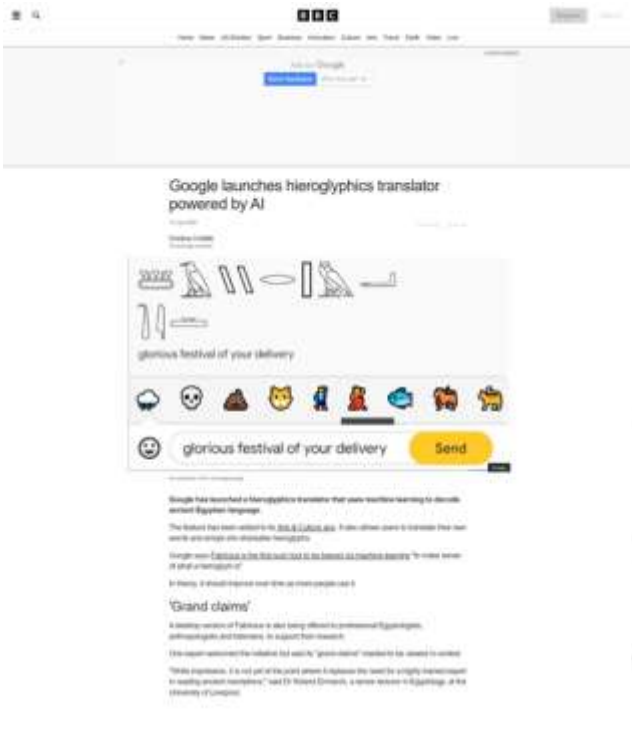
2. Translating the hieroglyphs and helping the epigraphists

There are AI applications currently used to translate ancient Egyptian hieroglyphs, such as:

Hieroglyphs AI, https://play.google.com/store/apps/details?id=ai.hieroglyphs.hieroglyphs_ai&pli=1



Artificial intelligence for the translation of ancient Egyptian documents



https://data.creative-words.com/en/artificial-intelligence-for-the-translation-of-ancient-egyptian-documents/ , described as a new study resulting from the collaboration between the CNR's 'Nello Carrara' Applied Physics Institute, the Department of Information

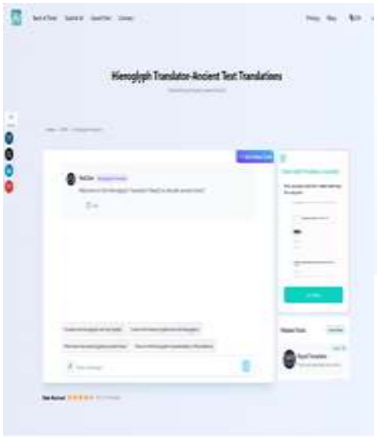
Engineering of the University of Florence and the CAMNES Research Centre highlights a new field of application for artificial intelligence: the translation of ancient texts.

As earlier as 2020, other applications have been developed to help epigraphists and for decoding ancient languages and scripts such as

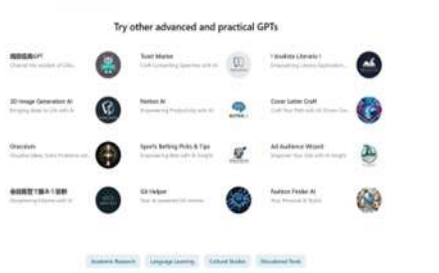
Fabricius Workbench, https://fabriciusworkbench.withgoogle.com/ , released as part of Google's Arts & Culture app

Hieroglyph Translator – Ancient Texts Translation,

https://www.yeschat.ai/gpts-2OToJT35Rx-Hieroglyph-Translator


Hieroglyph Translator-Ancient Text Translations


Using Hieroglyph Translator: A Guide
Start Free Trial
Select Translation Direction
Input Text or Upload Image
Customize Output
Review and Save


Try other advanced and practical GPTs


Overview of Hieroglyph Translator


Core Functions of Hieroglyph Translator


Frequently Asked Questions about Hieroglyph Translator
What is Hieroglyph Translator?
Can Hieroglyph Translator identify all ancient Egyptian hieroglyphs?
Is Hieroglyph Translator suitable for academic research?
How accurate is the translation from Hieroglyph Translator?
Can I use Hieroglyph Translator for creating educational materials?


Target Users of Hieroglyph Translator

Conclusion: the swift and precise analysis of Artificial Intelligence

AI, with its advanced visual perception and analytical capabilities, could offer new insights into the decipherment of ancient texts. This is already a potential reality as we advance into an era where AI is becoming increasingly sophisticated. The importance of AI lies in its impartiality. AI can examine ancient scripts - the hieroglyphs of Ancient Egypt, the cuneiform of Sumer, or the glyphs of the Maya and Aztec - with an analytical eye, unclouded by preconceived notions.

AI can process vast amounts of data at unbelievable speeds. It can analyze thousands of texts in a fraction of the time it would take a human scholar. It can recognize patterns, draw connections, and provide interpretations that might otherwise go unnoticed.

In harnessing this huge, amazing potential, we could foresee a revolution in the study of ancient scripts and in coding with their signs and symbols. Thus, we could uncover meanings long hidden, solve mysteries that have puzzled scholars for centuries, and gain a deeper understanding of our human past. The application of AI in this field could be a game-changer, a leap forward in our quest to decipher the enigma of ancient civilization scripts. However, that doesn't mean that human scholars would become obsolete. Being created by humans, AI would work in tandem with human expertise, enhancing our efforts, not replacing them. AI could help us see new possibilities, but it would still require human scholars to interpret and understand these findings in the broader context of human history.

Free from ideological or political biases, AI may have the potential to introduce a fresh dimension to our understanding of ancient civilizations.[4]

Notes:

1 Mattia De Cao, Nicola De Cao, Angelo Colonna, Alessandro Lenci, Deep Learning Meets Egyptology: a Hieroglyphic Transformer for Translating Ancient Egyptian, ACL Anthology 2024, https://aclanthology.org/2024.ml4al-1.9.pdf

2 Mahmoud Helmy *et alii*, An AI Based Automatic Translator for Ancient Hieroglyphic Language—From Scanned Images to English Text, Institute of Electrical and Electronics Engineers (IEEE), vol. 11, 2023, pp. 38796-38804, https://www.academia.edu/107517095/An_AI_Based_Automatic_Translator_for_Ancient_Hieroglyphic_Language_From_Scanned_Images_to_English_Text

3 De Cao, Mattia, Nicola De Cao, Angelo Colonna, Alessandro Lenci, Deep Learning Meets Egyptology: a Hieroglyphic Transformer for Translating Ancient Egyptian, ACL Anthology 2024, https://aclanthology.org/2024.ml4al-1.9.pdf

4 Kartal, K., The deciphering of Ancient Egyptian Hieroglyphic Text by AI -"OSIRIS" or "IŞIRIZ", GÜNEŞ DİL AKADEMİSİ 2024.

References

De Cao, Mattia, Nicola De Cao, Angelo Colonna, Alessandro Lenci, Deep Learning Meets Egyptology: a Hieroglyphic Transformer for Translating Ancient Egyptian, ACL Anthology 2024, https://aclanthology.org/2024.ml4al-1.9.pdf

Helmy Mahmoud et alii, An AI Based Automatic Translator for Ancient Hieroglyphic Language—From Scanned Images to English Text, Institute of Electrical and Electronics Engineers (IEEE), vol. 11, 2023, pp. 38796-38804, https://www.academia.edu/107517095/An_AI_Based_Automatic_Translator_for_Ancient_Hieroglyphic_Language_From_Scanned_Images_to_English_Text

Kartal, Kamil, The deciphering of Ancient Egyptian Hieroglyphic Text by AI -"OSIRIS" or "IŞIRIZ", GÜNEŞ DİL AKADEMİSİ 2024.