

Dec 07, 2023

Subject: Revision and resubmission of manuscript PCIArchaeology #338

Dear Editors,

We want to thank you for the opportunity to revise and update our paper entitled "Transforming the CIDOC-CRM model into a megalithic monument property graph". We would also like to thank the reviewers for their availability and their constructive comments. We believe that the suggestions have been beneficial, and we appreciate the insightful comments on revising all aspects of the paper.

We have revised the paper accordingly. The changes are described below, and the revised manuscript has been uploaded into the system. The comments prompted by the reviewers that were specific notes - on grammar, typos, insertion of enriching descriptions, and more, were revised accordingly.

We hope the revised manuscript will better match the expectations. We thank you again for the interest shown in our research.

Sincerely,
The authors

REVIEWER 1

- In this article, a motivation for organizing archeological data in knowledge graphs is presented. The motivations and justification are well presented. But it is not a novelty per se.
 - Thank you for acknowledging the clarity of our motivations and justifications. While we understand that organizing archeological data in knowledge graphs isn't novel on its own, our approach offers a unique perspective. Specifically, to our knowledge, there are no studies using Native Graph DataBases (NGDB) based on CIDOC-CRM to represent architectural components of archeological monuments as we proposed, particularly in terms of instance analysis and their relationships. Our choice of Neo4J, a native graph database, was strategic. While our initial focus was on monument data representation, we've designed our approach for future landscape data integration, given Neo4J's aptitude for handling complex relational analyses. Since the article's first version, we've incorporated spatial and landscape data, validating our methodology's effectiveness and scalability. We believe our proposed infrastructure provides a solid foundation for future integrations and expansions.

- It is based on an interesting case study, the presentation/explanation of the model could be improved for a publication, some elements are missing, (such as Fig.2), or are not clear (Fig. 1).

and

- Fig 2. is referred to in the text, but not found in the paper, if that was referring to Table 2, it does not seem to show or exemplifies the terminology but presents references to vocabulary source.
 - Thank you for your feedback on our manuscript. To address your concerns, we made several adjustments. First, the original reference to "Figure 2" was an oversight, as we've transitioned the information from that figure into the main text for better clarity. We apologize for any confusion this might have caused and appreciate you bringing it to our attention. For Figure 1, we recognized its initial lack of clarity and have improved its presentation. Considering its significance, we opted to provide a different explanation to better capture and convey its multiple relevant details. In addition to these changes, the methodology section has been refined for clarity, employing more straightforward language and elaborating on our model. We hope these revisions comprehensively address your concerns, enhancing the paper's overall quality. We remain open to further feedback and are grateful for the chance to refine our work.
- Session titles, "Requirements" and "Methodology" are not quite appropriate for their session's contents.
 - Thank you for highlighting the inconsistency between the titles and the section's content. Given your feedback, we've renamed the "Requirements" section to "NGDB Explanation". We believe this title accurately captures the depth at which

we discuss the concept and need for a Native Graph DataBase. As for the "Methodology" section, we've ensured its content aligns more closely with the title by segregating discussions related to the study area into a separate section. We've also honed the "Methodology" section to detail the process for our Knowledge Graph implementation strictly, ensuring it's aptly reflective of its title. We believe these changes better address your concerns and thank you for your invaluable feedback.

- A brief overview of the literature is given pointing out the differences in their proposal of KGs. However, they pose a too strong claim that no work was found for the representation of buildings and architectural remains in archaeology, especially aiming at the extraction, reusability, and interpretation of the information by machines, while Santos 2022 and Gergatsoulis et al. 2022 are intended for that.
 - Thank you for highlighting the oversight in our literature review. You're correct in pointing out the contributions of Santos 2022 and Gergatsoulis et al. 2022 to the representation of buildings and architectural remains in archaeology. Our intent was to underscore the uniqueness of our approach, particularly employing NGDB in tandem with CIDOC-CRM. While other works, like the ones you cited, address this domain, they might not specifically explore the combination of NGDB and CIDOC-CRM for pattern analysis. We acknowledge the significance of accurately situating our work within the existing research landscape. To rectify this, we revised our manuscript to both recognize the mentioned studies and better delineate the distinct facets of our method. Your detailed feedback has been invaluable in enhancing our paper's clarity and rigor, and we're genuinely appreciative.
- It could be helpful if the "Requirements" section includes also examples of representing and querying architectural monument data and the trade-offs involved in choosing Neo4j (or any NGDBs) for the study.

and

- It would be interesting to quantify the elements represented in the graphs, corresponding to the 94 dolmens analysed, including missing data, and also present some query examples, or discuss future applications in more concrete scenarios.
 - Thank you for your suggestions. In response, we've significantly revised the "Overview of the Approach" section. We added an example for a query and incorporated specific results from the analyses returned in the Knowledge Graph. Furthermore, I've detailed the representation of elements related to the 94 analyzed dolmens, including addressing any missing data. Your feedback was instrumental in enhancing the depth and clarity of this section, and I believe these additions will provide readers with a more concrete understanding of our approach and its applications.

- The authors claim: In this paper, we only use CIDOC-CRM definitions and it is not discussed its extensions for Archaeology. Here a justification of this decision, and/or a comparison with such extensions would be required.
 - Thank you for drawing attention to our decision to exclusively utilize CIDOC-CRM's core definitions. The objective behind this choice was to illustrate the potential of CIDOC-CRM in capturing monument data even without relying on specialized extensions. We understand the merit in contrasting these choices and we contemplated such a comparison. We refined our manuscript to articulate this decision more transparently.
- The CSV is available in Github, which is nice, but it requires seeing the CSV to have a better idea of the model, a description would be important.
 - Thank you for highlighting the need for a detailed understanding of our model. To address this, we've added a thorough description of each column in the CSV on the repository into the GitHub, ensuring that the model's intricacies are apparent even without direct reference to the manuscript.
- “Megalistimo Alentejano” and other non-English words should be in italic, for example, and the definition could be more clear for non-Portuguese speakers.

and

- “Archaeologica Letter” has a typo and it’s not the correct translation for Carta Arqueológica.

and

Typos:

- ... its components it’s based ...
- ... interest in standartised access ...
- ... it’s based at the E22... -> based on?
- ... that allow describe the monumento ...
 - Thank you for your feedback. We have thoroughly revised the English throughout the manuscript, with a particular focus on the points you highlighted. We appreciate your attention to detail and have made the necessary corrections to ensure clarity and accuracy.

REVIEWER 2

Introduction

- The opening sentence appears to be quite a broad statement. In fact, similar information is available in databases from numerous archaeological services throughout Europe. However, the accessibility of these databases presents a separate issue.
 - Thank you for pointing out the breadth of our opening statement. We recognize that various archaeological services in Europe maintain structured databases. In light of your feedback, we have refined our initial statement to underscore the frequent reliance on unstructured texts in many archaeological contexts. The manuscript has been updated to better represent this nuance, and we appreciate your guidance in ensuring its accuracy.

Requeriments

- This section provides an update on existing methods for creating graphs. It is too technical for an archaeology article, what it is not a real issue. However, I don't understand how it fits into the structure of the paper, as it is closely related to the methodology
 - Thank you for pointing out the concerns regarding the section's technical nature. While we aimed to simplify the explanation of NGDB and Neo4J, we believe it's essential to retain these details to justify our technology choice. This specific choice of technology underpins the unique aspects of our approach. We've attempted to strike a balance between clarity for a wider audience and conveying the importance of our methodological decisions. Your feedback is invaluable, and we've ensured our rationale is evident in the revised text.

Related Literature

- The cited literature may be sufficient, although many works are missing. A thorough review is certainly not expected, but the selection seems to be very carefully chosen to demonstrate the novelty of the work.
 - Thank you for drawing attention to our literature citations. Our objective was to highlight papers aligned with our approach, specifically in regard to the representation of immovable archaeological monuments through CIDOC-CRM. The innovation in our approach lies in using an NGDB to represent megalithic monuments, integrating them into a CIDOC-CRM-based framework, emphasizing both representation and the analysis of instances and relationships. While we aimed to be thorough within this niche, we understand the vastness of the field and that some relevant references might not be included. Our selection was driven by the desire to highlight the novelty of our approach rather than omitting pertinent works. We genuinely appreciate any suggestions for key literature that would further enhance our paper's depth and context.
- I find the last sentence of the section especially 'striking' for its imprecision, where it is claimed that none of the works have addressed a representation of architectural elements in Archaeology. As far as I know, it seems that some of these works have indeed addressed it. See for example Table 2, which contradicts your statement. Furthermore, the statement appears to be rather generalistic once again, likely not taking into account a more thorough literature search.
 - Thank you for pointing out the inconsistency in our statement. We acknowledge the oversight and understand the importance of accurate representation in our assertions. Given your feedback, we have refined that particular statement to ensure it accurately mirrors the broader scope of existing literature. We're grateful for your keen observation and have diligently amended our manuscript for precision.

Methodology

- Bueno Ramírez 2013 is mentioned in the text, but is not cited in the bibliography. I find it striking once again that a reference to a Spanish author is used, when in fact the

quantifications of megaliths come from Portuguese authors, some of them at the University of Évora, for example, Leonor Rocha.

- Thank you for highlighting the oversight regarding the reference to Bueno Ramírez 2013 and the emphasis on Spanish authors. We understand the importance of acknowledging the significant contributions of Portuguese researchers. We've made the necessary revisions to our manuscript to appropriately credit and emphasize the pivotal work of these researchers in the context of megalith quantifications in the region. Your feedback has been instrumental in ensuring our paper more accurately represents the academic landscape.
- "Megalitismo Alentejano" is a Portuguese expression. It is not necessary to use Portuguese instead of English in this case, but if that is the choice it should be in italics.

and

- "Orthostats" is slabs in English.

and

- The English in this section appears to be awkward in many senses. The description of what a dolmen is supposed to be is unclear. Perhaps someone who is not a specialist in the field would not understand from the description what we are referring to.

and

- "Archaeologica Letter" is a direct translation from Portuguese and doesn't make any sense in English.
 - Thank you for highlighting these concerns related to language and terminology. Based on your feedback, we've undertaken a comprehensive revision of the manuscript to address these issues. Firstly, we've translated the term "Megalitismo Alentejano" into English and ensured that all non-English terms used in the manuscript, including those from Portuguese, are now italicized for clarity. We've retained the term "orthostats" based on terminologies from established sources like the FISH thesaurus. While we acknowledge "slabs" as a translation, "orthostats" has specific connotations in the archaeological context, which we felt was important to maintain. The section describing dolmens has been enhanced to ensure it is comprehensible even for readers who might not be specialists in the field. We believe this will make the content more accessible and clearer. Your feedback has been instrumental in refining the language and ensuring that the manuscript is both precise and reader-friendly. We are confident that these changes improve the overall clarity and accuracy of the content.
- At the end of the 'Data Model' section, a dolmen is explained again, even though it has already been described earlier. The description doesn't seem to be very 'critical'; it is once more overly general and doesn't take into account the peculiarities of Portugal.
 - Thank you for highlighting the redundancy in the explanation of dolmens. We have restructured the sections to avoid repetition. The description of dolmens is now consolidated in the case study section, where we've also incorporated details specific to the peculiarities of dolmens in Portugal. The methodology section has

been revised to focus solely on our process of implementation. We believe these changes provide a clearer and more organized presentation of our work.

Overview of the Approach

- I understand that the role of this section is purely methodological; it describes the implementation of the model and does not offer tangible results.
 - Thank you for pointing out the nature of that section. While its primary purpose was methodological, detailing the model's implementation, we've taken your feedback into account. In the revised version of the manuscript, we have included tangible results returned from our query. This addition provides more concrete insights. Your feedback has been invaluable in enhancing the depth of our paper.

Conclusion and Future Work

- I believe the conclusions merely repeat ideas already articulated in previous sections and do not offer anything beyond generalities that are not really useful for assessing the impact of the proposal
 - Thank you for drawing attention to the structure of our conclusions. In light of your feedback, we've revised this section to not only reiterate the study's primary points but also to emphasize the distinct contributions and implications of our work. We've strived to elaborate on the potential impact of our proposal and provide a clearer perspective on the direction of our future research. This ensures the conclusion stands as a reflection of our work's value and its trajectory, rather than just repeating prior sections. Your insights have been instrumental in refining the paper's closing remarks.

General comments

Illustrations

- A map with the study area seems mandatory
 - Thank you for emphasizing the importance of visual representation. In response, we've incorporated a map illustrating the study area as Figure 1 in the revised manuscript. This addition should enhance clarity and offer readers a clearer spatial context for our research. Your feedback has been vital in ensuring the comprehensiveness of our work.

Honestly, I understand the good intentions behind the work, but I think it suffers from many issues. It is not a proper case study; it's merely a technical proof of concept where too many elements are being attempted to be tied together, which is ultimately not reflected in either the results or the conclusions. I don't see how this structure can aid semi-automatic remote sensing (of which, by the way, many references are missing), for example. I also don't see how this can translate into a tool for interpreting the past, which is what we archaeologists are looking for. I only see its technical utility with proper development, but not its repercussions.

The structure of the paper appears to be somewhat complex. The text seems to reflect two distinct perspectives: one that is technical and proficient in the use of ontological modeling tools, and

another that aims to explore these tools' applicability in the field of Archaeology. Unfortunately, the latter aspect seems quite underdeveloped in comparison to the former. This discrepancy creates a certain level of conceptual ambiguity and imprecision in terminological translation. There are also moments where the paper leans towards generalizations and may benefit from more rigorous bibliographic support. Additionally, there is no discussion comparing this work to others, such as the study by Santos et al. 2022, which focuses on the same area. Does this work represent an improvement or does it complement the previous research? Additionally, I observed that there could be more reflection on the potential utility of the tool in question. In conclusion, while the technical aspects of the paper are well-developed, the overall structure might benefit from clarification. This leads me to think that the article may be more appropriately aimed at an audience specialized in semantic models.

The data table raises several questions, both in terms of its design and the information it contains. Some of its contents appear to be 'constants,' such as the units of measurement. The treatment of chronology also seems to be less than optimal, especially considering the specific characteristics associated with this type of burial sites. The data are limited and often puzzling, such as the unknown status of the funerary chamber for all the sites.

I would suggest reviewing the English in the sections dedicated to Archaeology for clarity and accuracy. It may also be beneficial to delve deeper into the concepts, avoiding broad generalizations. A thorough review of the bibliography and its relevance could also add value to the work. Additionally, I recommend a careful reconsideration of the paper's overall structure for improved coherence.

- Thank you for your comprehensive feedback. Your detailed comments provided a critical perspective, prompting us to re-evaluate our paper. We've undertaken significant revisions, addressing both the technical depth and its archaeological applicability. We've refined our methodology, the overview of the approach, and the conclusion to accentuate the practical significance of our system for archaeologists. While maintaining technical depth, we've worked on bridging the gap between the tool's capabilities and its direct implications for interpreting the past. Concerning the table, we wish to clarify that it was constructed based on the available data from the cited sources. We recognize that there are gaps in the data (explained in the current version of the paper). Your notes on the English language and terminological precision were taken seriously, and we've made a thorough review for clarity, especially in sections dedicated to archaeology. In summary, your observations were instrumental in re-aligning our work with the intended audience, ensuring a balance between technical exposition and archaeological significance. We believe the revised manuscript will provide a clearer and more coherent read, bridging the mentioned gaps and addressing your concerns.