May 19, 2024

Dear Editor,

Thank you and thanks to the reviewers for the thorough feedback during the second round of comments. We are pleased that the previous revision of the manuscript shows significant improvements. We provide the manuscript with tracked changes and updates so that our improvements are visible to you. We also outlined below the way that we took each concern and addressed it or explained it in this letter.

Comments from the Editors and Reviewers:

Reviewer #1: Overall there are significant improvements that the authors made to this paper. The authors have clarified their writing in the introduction, better separated out their methods and results, and have clarified the conclusion which now allows me to better understand their contribution. The main sticking point I still have is about the descriptions of the datasets and the methods. They are much improved from the first version, but they still need clarification to make sure all audiences can understand what the authors did in the study so others might employ this same methodology to other cases.

Major points re: Methods:

1.      When describing the Homeland Security dataset the authors need to make sure to explain that it is points and explain the points. That they are points gets explained, but later and emphasized later, I think this should come earlier. Also, are these centroids within a parcel? Perhaps this isn't something the authors know since this isn't their dataset, but if they are able to better describe the points, it would be helpful to the reader.

- In 4.2), which is the first section of the paper introducing HIFLD dataset, we already mentioned that HIFLD includes “points” but to emphasize more, we added more explanation.

- HIFLD points are not centroids. Each point marks the approximate access location of a mobile home park.

2.      When describing the "geometries" that come from MapSwipe the authors need to make sure to use the common GIS terminology of polygons. The differences in dimensionality (points = 0 dimensions & polygons = 2 dimensions) will help clarify some of the issues the authors note later. My view is that instead of using "geometries" the authors should use the term polygon or polygon geometries to make this very

- We changed the “geometries” to “polygons” as suggested.

3.      There isn't much real discussion about the "crosschecking" the authors did (first paragraph of 5.1). Did just one person go through all 11,586 polygons to compare that with the ArcGIS basemap? How long did this take? Considering this is what allows the authors to compare the datasets later, this piece of the methods is not well explained.

- We added more discussion and an illustration to clarify the crosschecking process and how long this process has taken.

4.      Next, the authors start to talk about relevant and irrelevant geometries, but then later use True positives, true negatives, false positives, and false negatives. Could those terms be used in this paragraph (paragraph 1 of 5.1) instead of "relevant" and "irrelevant"?

- We replaced “true positives” and “false positives” instead of “relevant” and “irrelevant” in the first paragraph of section 5.1).

5.      Also having trouble following the last sentence of that paragraph, "we excluded screening areas out of the aggregated geometries…" what does this mean? What are the screening areas?

- We revised the sentence.

6.      A lot of the last paragraph of 5.1 seems like it might fit in the description of the datasets

- Revised.

7.      In 5.1 the authors are comparing the MapSwipe polygons to the ArcGIS basemap, correct? And in 5.2 they are comparing the MapSwipe polygons to the Homeland Security dataset? I just want to make sure I am understanding this correctly. All of this could be more clearly articulated in the two sections.

- Absolutely. In the first round, we detailed the process of preparing parcel-level data from the MapSwipe-generated aggregated results by crosschecking with the ArcGIS basemap. In 5.2 we evaluate the MapSwipe data through crosschecking with HIFLD data. For more clarity, we revised that section.

8.      In section 5.2 the authors talk about an imbalanced dataset, but don't really explain what that means right away so it becomes a bit difficult to follow. Basically I think the authors need to explain the imbalance first, which isn't well defined. Is the imbalance in that there are not an equal number of TP, TN, FP, & FN for each location? Or is it imbalanced across locations?

- Thank you for this comment. We revised the sentence to clarify the meaning of imbalance in our study which is about the difference between the proportions of FT and FP.

9.      Next in that same section (5.2) in paragraph 2, the authors start to talk about the measures they used to analyze data quality (SNS, ACC, and F1). The descriptions of these are not super clear from the getgo. It seems that these measures are meant to deal with the imbalance, but then the authors note that F1 is still biased. Just having difficulty deciphering what they are saying about why we should use these and what they offer.

- We revised this section significantly.

Minor points throughout paper:

1)      Introduction:

a.      "six times greater than other people" . What people are the authors referring to? Arizona residents? US pop? World pop?

- Revised to “than individuals residing in other types of housing within the state”

b.      Add the conversions of all Fahrenheit measures to Celsius in parentheses to make appropriate for international audiences.

- We added equal degrees in Celsius. Thank you for this comment.

c.      "AC" -> write out "air conditioning"

- Revised.

d.      Still confused about the term "label". Do the authors mean "represent"?

- Labeled data consists of images paired with corresponding labels or categories indicating the object each image represents (for example, labeled data for MMHC includes images representing MMHCs). These labeled data are crucial to train the machine learning models for the accurate MMHC classification process. Since there is a lack of reliable and efficient labeld data of MMHC, in this paper we suggest the use of MapSwipe could contribute to creating labeled data which could be then used in training data for machine learning models.

- We added more explanation to clarify the meaning of labels in mapping MMHC. Moreover, we replaced “classify” where it is appropriate to enhance the clarity.

e.      "Sometimes from the 'top'" rephrase to say "Sometimes from aerial and/or satellite imagery"

- Revised.

f.      "units on parcel vary between about ten" rephrase to "units on parcel can range from about ten"

- Revised.

g.      "very analogous to" -> maybe rephrase to "can look like"

- Revised

h.      "immediately juxtaposed", what do the authors mean here?

- Revised to “Sometimes the units are separated by distinct parcels, each with its own designated space and sometimes they are clustered closely together within a single parcel”.

i.      What does "bootstrap" mean in this context?

- It means that our study tries to “INITIATE generating MMHC ground truth data”.

2)      Literature Review

a.      "This overview is thus relatively comprehensive, and encompasses what we believe are nearly all studies conducted from the inception of MapSwipe in July 2016 until the present, and given that the first published articles began appearing in 2016" perhaps remove the last piece of this sentence because it makes it confusing.

- We changed this sentence to make it less confusing as follows: This overview is thus relatively comprehensive and encompasses what we believe are nearly all studies conducted from the inception of MapSwipe in July 2016 until the present.

b.      I really appreciate the authors’ edits on the last paragraph of the literature review. It does a lot to improve the justification and some of the issues that were not clarified in the first version.

3)      Case Study

a.      Figure 1: Make the borders of Arizona more prominent (thicker) so that the state polygon stands out, right now it is very difficult to see.

b.      Figure 2. The projection of this map looks incorrect for Arizona. Change to a more appropriate projection for the state (State Plane is fine or if AZ has its own projection, use that)

c.      Figure 2, some of the labels are oddly placed. Move the following labels:

i.      The label for Page should be within the polygon of Arizona. Bottom right of the point will work best.

ii.     The label for Casa Grande should be moved to the bottom left of the point and right justified.

* We considered all the comments for Case study in our revision.

4)      Datasets

a.      "generate aggregated data" this term is used a lot to explain the data that comes out of MapSwipe and needs to be clarified since it is a confusing term. How is it aggregated? I assume it is aggregated from several YouthMappers but it is just a confusing term.

- MapSwipe provides results at the tile level, where each individual tile receives contributions from at least three different users who labeled the tiles as “yes” or “maybe”, or “no”. These individual contributions are aggregated using a “majority voting approach”. For example, if three out of five volunteer mappers classified a tile as “yes”, the aggregated label for that tile would be “yes”.

b.      "classify a tile as"YES " and "Maybe ". I think the "and" should be changed to "or" because I assume the mappers cannot classify a tile as both Yes AND Maybe.

- Correct. Revised.

5)      Methodology

a.      Section 5.2 "concepts of metrics" are these the SNS, ACC, and F1?

- Yes. Revised.

6)      Results

a.      Where is Fig 4?

- As it is mentioned in the caption and labeled on the map, Fig 4 (now is Fig 5) shows the city of Phoenix.

b.      The authors call Fig 5 the spatial representation of the confusion matrix. Is this the right terminology?

- “confusion matrix” is a standard terminology used to evaluate the classification performance. Spatial representation of the confusion matrix in Fig 5 refers to the distribution of the elements of the confusion matrix (TP, TN, FP, FN) over one of the study areas.

c.      6.2. "identifying MMHC and assess" , "assess" should be changed to "assesses"

- It already says “assesses”.

d.      "error of redundancy" I wasn't clear on what the authors meant here.

- Revised to: …it was due to redundancy (i.e., when two points were used to represent a singular Mobile home park) in HIFLD.

e.      "page" in parentheses is not capitalized and I think the authors are referring to the city.

- Revised.

7)      Discussion

a.      I'm not following the sentence that starts with "However, these false positives can fill an existing…" Please rewrite.

- Revised.

b.      What do the authors mean by "…the projects reveals significantly shorter duration between the first project and the last one expectedly shows the role of active learning…"? What is the first project? Who is learning? Are the YouthMappers doing one of the locations and then moving on to another?

- Revised. Yes, volunteer mappers are doing a project and after completion of that they are moving on to another project.

c.      What do the authors mean when they say that "MapSwipe… data is between 10-25% of the total initial data"? I assume the authors are trying to say that they are adding this much data to the existing dataset (Homeland Security data), is this correct? Make sure this is clear in this sentence.

- Revised to:  “This study reveals that leveraging MapSwipe speeds up the process of identifying missing MMHC on the map and saves a considerable time compared to manual digitization approaches. Crowdsourcing covers detecting the entire state while the authors only validate the results from MapSwipe, which is about 10% to 25% of the entire state.”

d.      Last paragraph of Section 7 goes back to using the term "missions"

- Edited.

8)      Conclusion

a.      What do the authors mean again using the term "labeled" in the sentence that begins "Moreover, results could train…"

- Changed to “classified” data.

Reviewer #2:

Introduction:

Add the population figures for Maricopa County, Arizona.

Change "…645 heat-related death in 2023 …"

to

 "…645 heat-related deaths in 2023 …"

* Revised

"This means that MMHC residents in Arizona experience heat associated mortality rates about six times greater than other people."

wrt other people in Arizona, or the USA generally?

* “Other people” revised to “individuals residing in other types of housing within the state”.

Change " … to consistently run AC. …"

to " … to consistently run air conditioners. …"

* Revised.

"Based on 2023 heat death report data from Maricopa County, 95% of all indoor heat

Manuscript - anonymous deaths happened among individuals aged 50 years or older."

Provide reference to this statement.

* Added the in-text citation

"According to the Household Pulse Survey by the U.S. Census Bureau, …"

Cite reference.

In which year was the survey done?

* We used the 2022 version for this study. We added the citation.

"…Sustainable Development Goals (SDGs), particularly Goal 3 - Good Health and Well-Being, and Goal 13 - Climate Action …

Cite reference.

* Citation added.

"…as United Nations acknowledges, …"

Cite reference.

* We revised the sentence.

"…The open data available for MMHC …"

State where the Open Data is located (URL).

* We added citation and URL.

Literature Review

"We evaluate how using MapSwipe—"

Provide link to MapSwipe (URL).

* We added the link.

Case Study

" … Heat was responsible for 2,429 mortality cases in Arizona between 2010 and 2020 and the number of heat deaths has increased annually. …"

Cite reference.

* Cited.

" … It is also one of the fastest growing counties in the USA for the past decade. …"

Provide figures for this.

* The citation has been provided. While the focus of this study is on Arizona as a whole, not just Maricopa County, we acknowledge your concern about introducing Maricopa County. Therefore, we have revised Figure 1 to display the location of Maricopa County within the state, ensuring alignment with the main focus of the study.

" … The existing open map records and zoning documents …"

Data Sets

State what these are.

* Changed to “The existing public records and official documents related to mapping and zoning regulations.”

- " Homeland Infrastructure Foundation-level Data (HIFLD) also known as Homeland Security

Infrastructure Program (HSIP) includes more than 455 National foundation-level geospatial datalayers that cover national critical infrastructure for the USA and USA territories."

Cite references for HIFLD and HSIP.

* Cited.

State what "FEMA" stands for (for international readers).

* Revised.

We thank the editor and reviewers again for the contribution of your feedback to ensure the quality of our paper. We believe we have improved the manuscript significantly and have addressed the concerns point by point in a comprehensive manner. We eagerly look forward to your assessment and the eventual publication of our study.