View Reviews

Paper ID
14

Paper Title
Global Flood Prediction: a Multimodal Machine Learning Approach

Track Name
Papers/Proposals

Reviewer #1

Questions

1. Submissions are in two tracks: “Papers” and “Proposals.” “Papers” should describe work that is in progress and/or deployed, but not yet published in another peer-reviewed conference or journal. “Proposals” should contain detailed descriptions of ideas for future work. The guidelines for submissions are on the workshop website at https://www.climatechange.ai/events/iclr2023 . Please confirm that you have read these guidelines
Agreement accepted

2. Does this submission follow submission guidelines? Specifically, is it anonymized and within length limits? Does the submission use this workshop's style format? (Available here: https://www.climatechange.ai/events/iclr2023#call-for-submissions) (Length limits are: 4 pages for the "Papers" track and 3 pages for the "Proposals" track, excluding references; appendices beyond these limits are allowed but reviewers are not required to read them. To find a particular submission's track, go to your main reviewer console, click on the submission ID, and see the authors' response under "Track.") Please note: If a submission violates these guidelines, please proceed with the review nonetheless; however this will be taken into account when making final decisions.
Yes

3. Please summarize the objectives and methods of the submission. (approx. 2-5 sentences)
This work proposes a multimodal ML approach for flood risk prediction, which combines geographical information (text-based) with historical natural disaster data (time series). The multimodal framework uses exploits transfer learning techniques, and experiments show that combining text and time series outperforms a single-modality approach.

4. Is the problem being solved relevant to climate change (mitigation, adaptation, or climate science)? How important is it to solve this problem (in terms of reducing greenhouse gas emissions or helping society adapt to a changing climate)? (approx. 2-5 sentences)
Yes, flood-forecast is a very relevant topic.

5. Are the techniques well-matched to the problem? Is ML necessary, or might simpler (or existing) tools be sufficient? (Feel free to indicate “N/A” if the submission primarily presents a dataset, and does not present specific ML methods.) (approx. 2-5 sentences)
Yes, the deployed ML technique is well matched, in particular the transfer learning step due to the lack of data given the problem at hand.

6. How effective is the submission in addressing the problem at hand? (Please evaluate potential effectiveness if the submission is in the “Proposals” track.) (approx. 2-5 sentences)
The idea of using multimodal models for flood prediciton is definitely interesting, in particular incorporating geo information, which allows the model to identify locations that have similar properties and thus improve prediciton.
It is however not clear what is the architecture of the the final down-stream task.
It would be interesting to include a discussion including ClimaX model for weather and climate and see any option to include it.

7. Do the authors properly frame and contextualize their work within the prior work in ML and/or the relevant application domain? (approx. 2-5 sentences)
Details of architecture fro the downstream task are missing. Further if the event is considered to be just per year, or by date as well? In this context eg, Transformer Hawkes Process paper might be of interest.

8. Do the authors describe the potential impact of the work (including any potential side effects) as well as its pathway to impact? (Please see https://www.climatechange.ai/events/iclr2023#addressing-impact for more discussion on this aspect.) (approx. 2-5 sentences)
yes.

9. How clear and accessible is the submission overall? Are the goals and methods described with an appropriate level of detail? (approx. 1-3 sentences)
The submission over all is clear written. However, the authors do not discuss the consequences of relative " small data" for the defined problem at hand.

10. For submissions in the “Proposals” track, is this a feasible project to be carried out? (N/A if submission is not a proposal)
Medium

11. Overall rating of climate change relevance, feasibility, and impact.
High

12. Overall rating of ML relevance and quality.(“N/A” if submission presents a new dataset instead of an ML method)
Medium

13. Overall rating of submission clarity and accessibility.
Medium

14. Please summarize your overall assessment of the submission, referring to the submission guidelines at https://www.climatechange.ai/events/iclr2023 . (approx. 2-5 sentences)
The paper is well written, detaiils on ML methodology are missing and a proper discussion on problems with the considered dataset (small/imbalanced), and how well the model is explainable, and where it fails to understand better the causes - conceptual or data (lack of data/ imbalanced etc). Further a possible discussion towards duration of the drought that could be included viia additional features.

15. Overall rating
Borderline

16. Please rate your expertise in the climate change domain area of this submission, picking the closest match.
I have closely read papers on this topic, and written papers in the broad area of this submission.

17. Please rate your expertise in the ML area of this submission, picking the closest match.
I have closely read papers on this topic, and written papers in the broad area of this submission.

18. Please rate your confidence in your evaluation of this paper, picking the closest match.
I tried to check the important points carefully. It is unlikely, though possible, that I missed something that could affect my ratings.

Reviewer #2

Questions

1. Submissions are in two tracks: “Papers” and “Proposals.” “Papers” should describe work that is in progress and/or deployed, but not yet published in another peer-reviewed conference or journal. “Proposals” should contain detailed descriptions of ideas for future work. The guidelines for submissions are on the workshop website at https://www.climatechange.ai/events/iclr2023 . Please confirm that you have read these guidelines
Agreement accepted

2. Does this submission follow submission guidelines? Specifically, is it anonymized and within length limits? Does the submission use this workshop's style format? (Available here: https://www.climatechange.ai/events/iclr2023#call-for-submissions) (Length limits are: 4 pages for the "Papers" track and 3 pages for the "Proposals" track, excluding references; appendices beyond these limits are allowed but reviewers are not required to read them. To find a particular submission's track, go to your main reviewer console, click on the submission ID, and see the authors' response under "Track.") Please note: If a submission violates these guidelines, please proceed with the review nonetheless; however this will be taken into account when making final decisions.
Yes

3. Please summarize the objectives and methods of the submission. (approx. 2-5 sentences)
The objective of the paper is to predict multi year global flood risks using a novel multi-modal approach which combines text and statistical data. The paper shows the potential of ML for multi-year flood predictions and hence supports long-term planning of disaster risk management.

4. Is the problem being solved relevant to climate change (mitigation, adaptation, or climate science)? How important is it to solve this problem (in terms of reducing greenhouse gas emissions or helping society adapt to a changing climate)? (approx. 2-5 sentences)
The problem being addressed is very relevant for climate change adaptation since floods are costly and destructive natural disaster and will be affected in both intensity and frequency by climate change (depending on future warming pathways).

5. Are the techniques well-matched to the problem? Is ML necessary, or might simpler (or existing) tools be sufficient? (Feel free to indicate "N/A" if the submission primarily presents a dataset, and does not present specific ML methods.) (approx. 2-5 sentences)
There are plenty of tools for flood forecasting. However, we know that many global scale flood models have inherent uncertainties. The proposed methodology is an improvement to existing ML approach in the domain and furthermore it is at global scale which could be of interest for development agencies as well as insurance//reinsurance companies.

6. How effective is the submission in addressing the problem at hand? (Please evaluate potential effectiveness if the submission is in the "Proposals" track.) (approx. 2-5 sentences)
The submission is effective, though there is little information on how to use this approach with climate models. We know that some limitation of probabilistic approach are indeed in the adequacy of these models for future climate in particular after mid-century. This is not something explicitly addressed or discussed in the paper.

7. Do the authors properly frame and contextualize their work within the prior work in ML and/or the relevant application domain? (approx. 2-5 sentences)
Yes the authors give a good provision of ML work that is relevant to their methodology and objectives.

8. Do the authors describe the potential impact of the work (including any potential side effects) as well as its pathway to impact? (Please see https://www.climatechange.ai/events/iclr2023#addressing-impact for more discussion on this aspect.) (approx. 2-5 sentences)
The potential impact of the work is not described in greater details but it is implicit that such prediction skills on global level and multi.year will benefit flood risk management.

9. How clear and accessible is the submission overall? Are the goals and methods described with an appropriate level of detail? (approx. 1-3 sentences)
The paper is very clear and overall the methods are described with great detail.

10. For submissions in the "Proposals" track, is this a feasible project to be carried out? (N/A if submission is not a proposal)
High

11. Overall rating of climate change relevance, feasibility, and impact.
Medium

12. Overall rating of ML relevance and quality.("N/A" if submission presents a new dataset instead of an ML method)
High

13. Overall rating of submission clarity and accessibility.

High

14. Please summarize your overall assessment of the submission, referring to the submission guidelines at https://www.climatechange.ai/events/iclr2023 . (approx. 2-5 sentences)
The objectives of the paper are relevant to climate change adaptation and the methodology is interesting. The approach to ML for global flood prediction is good. However, an explicit presentation of the potential of this approach and its suitability to be robust beyond historical floods is questionable. It will be interesting to see how the approach perform with data from climate projections.

15. Overall rating
Accept (Poster)

16. Please rate your expertise in the climate change domain area of this submission, picking the closest match.
I have closely read papers on this topic, and written papers in the broad area of this submission.

17. Please rate your expertise in the ML area of this submission, picking the closest match.
I have little background in the area of this submission.

18. Please rate your confidence in your evaluation of this paper, picking the closest match.
I tried to check the important points carefully. It is unlikely, though possible, that I missed something that could affect my ratings.

Reviewer #3

Questions

1. Submissions are in two tracks: “Papers” and “Proposals.” “Papers” should describe work that is in progress and/or deployed, but not yet published in another peer-reviewed conference or journal. “Proposals” should contain detailed descriptions of ideas for future work. The guidelines for submissions are on the workshop website at https://www.climatechange.ai/events/iclr2023 . Please confirm that you have read these guidelines
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2. Does this submission follow submission guidelines? Specifically, is it anonymized and within length limits? Does the submission use this workshop's style format? (Available here: https://www.climatechange.ai/events/iclr2023#call-for-submissions) (Length limits are: 4 pages for the "Papers" track and 3 pages for the "Proposals" track, excluding references; appendices beyond these limits are allowed but reviewers are not required to read them. To find a particular submission's track, go to your main reviewer console, click on the submission ID, and see the authors' response under "Track.") Please note: If a submission violates these guidelines, please proceed with the review nonetheless; however this will be taken into account when making final decisions.
Yes

3. Please summarize the objectives and methods of the submission. (approx. 2-5 sentences)
This study seeks to investigate how to use machine learning for long-term planning in natural disaster management, and proposes a novel multi-model approach that utilizes natural language processing techniques to combine both text and statistical data.

4. Is the problem being solved relevant to climate change (mitigation, adaptation, or climate science)? How important is it to solve this problem (in terms of reducing greenhouse gas emissions or helping society adapt to a changing climate)? (approx. 2-5 sentences)
Yes, long-term forecasts of flooding at the global scale and on a multi-year horizon are very important for planning, mitigation, and adaptation in response to climate change impacts.

5. Are the techniques well-matched to the problem? Is ML necessary, or might simpler (or existing) tools be sufficient? (Feel free to indicate “N/A” if the submission primarily presents a dataset, and does not present specific ML methods.) (approx. 2-5 sentences)
Yes, the techniques are well-matched to the problem and ML models are also useful for this problem, although I don’t understand what data is actually extracted from the natural language processing portion (e.g. what

Wikipedia information is actually extracted? The whole paragraph as shown?). Why weren't other existing topography/GIS datasets used in this study? Wouldn't there be a large number of potential grid points dropped in sparsely populated areas with no Wikipedia pages? How are multiple Wikipedia pages within the same 1x1 deg. box utilized?

6. How effective is the submission in addressing the problem at hand? (Please evaluate potential effectiveness if the submission is in the "Proposals" track.) (approx. 2-5 sentences)
I think the submission is generally effective at addressing the problem at hand, but I think clarification is necessary for narrowing the scope of what kinds of floods are being predicted. (Given the 1x1 deg. resolution, this model is only capable of predicting spatially large floods, likely only in places that are already populated). I also am not convinced that the baseline comparison is fair, since I think including topographic information in any format is potentially one of the most important predictors for long-term flood forecasts, regardless of whether a single- or multi-model approach is used. I would be more interested to see a comparison of utilizing existing techniques for quantifying topography (such as surface roughness?) versus natural language processing.

7. Do the authors properly frame and contextualize their work within the prior work in ML and/or the relevant application domain? (approx. 2-5 sentences)
Yes, the authors very nicely frame and contextualize their work in the introduction.

8. Do the authors describe the potential impact of the work (including any potential side effects) as well as its pathway to impact? (Please see https://www.climatechange.ai/events/iclr2023#addressing-impact for more discussion on this aspect.) (approx. 2-5 sentences)
Yes, the impact of providing emergency managers with better guidance provides a very clear positive impact, and I am very curious in learning more about how to apply natural language processing towards Earth Science (including climate change) applications. I would also like to see more discussion on limitations of the current results, because based on my understanding of the experimental design, I don't think this model is capable of generating predictions in very sparsely populated areas (that may or may not become populated in the future) and it likely misses small-scale floods (like flash floods or ice jam floods) as well. I am also curious if certain types of flood causes are more predictable than others (eg are monsoonal floods more predictable than tropical cyclone storm surge floods?), and would love to see that analysis in future work.

9. How clear and accessible is the submission overall? Are the goals and methods described with an appropriate level of detail? (approx. 1-3 sentences)
The introduction and impact sections are nicely written and very clear (with the exception of what the intended scope of types of floods being predicted is). However, I did not fully understand the experimental design (I especially need more details on dataset contents and construction). Finally, while the new natural language processing technique is very interesting, I am not convinced that it would provide benefit over existing geographic/topographic data sources for this problem.

10. For submissions in the "Proposals" track, is this a feasible project to be carried out? (N/A if submission is not a proposal)
N/A

11. Overall rating of climate change relevance, feasibility, and impact.
High

12. Overall rating of ML relevance and quality.("N/A" if submission presents a new dataset instead of an ML method)
Medium

13. Overall rating of submission clarity and accessibility.
Medium

14. Please summarize your overall assessment of the submission, referring to the submission guidelines at https://www.climatechange.ai/events/iclr2023 . (approx. 2-5 sentences)
I think this is an appropriate and impactful submission for this conference, and I am particularly interested in learning more about how to utilize natural language processing and multi-model approaches for Earth Science (including climate change) applications. However, I think the intended scope of forecast capabilities needs clarification and the experimental design may need refinement to better demonstrate the impact of the presented novel approach.

15. Overall rating
Accept (Poster)

16. Please rate your expertise in the climate change domain area of this submission, picking the closest match.
I have closely read papers on this topic, and written papers in the broad area of this submission.

17. Please rate your expertise in the ML area of this submission, picking the closest match.
I have seen talks or skimmed a few papers on this topic, and have not published in this area.

18. Please rate your confidence in your evaluation of this paper, picking the closest match.
I tried to check the important points carefully. It is unlikely, though possible, that I missed something that could affect my ratings.