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Peer Review

Review of: "Turkey’s Earthquakes: Damage Prediction and Feature Significance Using A Multivariate Analysis"

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Review of "Turkey’s Earthquakes: Damage Prediction and Feature Significance Using A Multivariate Analysis"

General Overview

The paper is well-structured and provides a valuable contribution to earthquake damage prediction using machine learning. It addresses a critical problem, particularly in Turkey, which is prone to seismic activities. Below are my comments and suggestions for minor improvements:

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1. Abstract

- The abstract effectively outlines the study's purpose and findings. However, it could briefly mention the methodology, such as the use of Random Forest and other machine learning models, to give a complete snapshot.
- Suggested revision: Add a line like, "This study employed machine learning models, including Random Forest and neural networks, to analyze the significance of various factors."

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2. Introduction

- The introduction provides a good background on Turkey's seismic vulnerability and the importance of damage prediction. However, the transition to the study's objective can be smoother.
- Suggested revision: Instead of "Our study bridges the gap...", explicitly state, "This study aims to address the gap by employing machine learning techniques to predict earthquake damage and assess the significance of influencing factors."

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3. Methodology

- The methodology is detailed and clear. The use of specific datasets and the explanation of the death per capita calculation are strengths.
- Clarification needed: The use of a circular pattern for earthquake damage is simplified but valid. It might help to briefly

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justify why this assumption is reasonable in the context of this study.

- Suggested addition: Include a figure illustrating the circular pattern of damage to make the methodology more intuitive.

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4. Evaluation Metrics

- The use of MAPE and MAE is appropriate. The explanation for deviating from MSE is insightful.

- Improvement suggestion: Briefly discuss how these metrics were calculated and why MAPE is more suitable for percentage-based error assessments.

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5. Results

- The results are well-documented with detailed tables and clear performance metrics for each model.

- Suggested refinement:

 - Clarify why the Random Forest model outperformed others by providing more insights into its ensemble structure.

 - Highlight the significance of population density and magnitude as the most important factors with a brief interpretation of the results.

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6. Discussion

- The discussion highlights the study's limitations effectively, such as data limitations before 1950 and the challenge of predicting secondary disasters (e.g., fires, explosions).

- Suggested improvement: Expand on how future models might incorporate data from modern earthquakes to improve robustness.

- Include an example of how the model could be used in real-world disaster management scenarios.

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7. Related Works

- The section provides good context by discussing other machine learning applications in earthquake prediction.

- Suggested refinement: Briefly compare this study's approach to those cited, emphasizing its unique focus on Turkey's specific challenges.

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8. Conclusion

- The conclusion summarizes the findings well but could end with a stronger emphasis on the practical implications.

- Suggested addition: Highlight how the findings can directly inform policy or disaster preparation in Turkey.

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9. Figures and Tables

- Figures and tables are relevant but lack detailed captions. For example:

 - The captions for Figures 1 and 2 could explain how the importance scores were derived and their implications.

 - Tables 1 and 2 could benefit from a brief note on how the training and testing datasets were split.

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10. References

- The references are thorough and include relevant studies. Ensure all URLs and DOIs are active and correctly linked.

- Suggested improvement: Add more recent references (2020 onward) if available, particularly for machine learning applications in disaster prediction.

Additional Technical Comments

- Include a flowchart or diagram summarizing the model pipeline from data collection to prediction.

- Consider addressing how socioeconomic variables like population density can be updated dynamically to enhance real-time predictions.

- Include a brief justification for choosing 4500 epochs for neural network training, as this might seem excessive without context.

Final Remarks

The paper is a strong contribution to earthquake damage prediction. With minor refinements in methodology presentation, result interpretation, and figure captions, it can significantly enhance its impact and readability.

Refer to the following for a better flow of the paper:

https://link.springer.com/article/10.1007/s00354-023-00224-3

https://ieeexplore.ieee.org/abstract/document/10037658/

Intelligent Aquila Optimization Algorithm-Based Node Localization Scheme for Wireless Sensor Networks

https://publications.eai.eu/index.php/sis/article/view/4022

https://publications.eai.eu/index.php/ew/article/view/4329

https://publications.eai.eu/index.php/IoT/article/view/4317

Sivaparthipan, C. B., Anand, M., Agarwal, N., Dhingra, M., Raja, L., Victor, A., & Nirmal Doss, S. A. A. (2023). IoT-based patient stretcher movement simulation in smart hospital using type-2 fuzzy sets systems. Production Planning & Control, 1–16. https://doi.org/10.1080/09537287.2023.2217419

https://link.springer.com/chapter/10.1007/978-3-031-35081-8_3

https://publications.eai.eu/index.php/phat/article/view/4336

https://publications.eai.eu/index.php/phat/article/view/4312

https://ieeexplore.ieee.org/abstract/document/9596425/

https://link.springer.com/chapter/10.1007/978-3-031-35078-8_37

Attachments: available at https://doi.org/10.32388/TNHRUY

Declarations

Potential competing interests: No potential competing interests to declare.