Review of: "Multi-hazard spatial modeling via ensembles of machine learning and meta-heuristic techniques"

Lixia CHEN[1]

1 China University of Geosciences Wuhan

Potential competing interests: The author(s) declared that no potential competing interests exist.

General comments

The manuscript proposed ensemble models to model multi-hazard susceptibility for a province in Iran. The work is useful for local management of natural hazards. However, many modifications have to be done to promote the quality. Please be informed that the following questions should be answered and corrected in the revision version.

Special comments

1. The data about historical hazards is not clear. Also, the authors are suggested to describe the type and mechanism of landslides and floods, which is very important for the authors and readers to identify the reliability of the work.

2. In terms of hazard factors, the authors used almost the same factors for landslide and flood, which clearly have different fundamental mechanism. Also, the determination of factors is just from others' paper (reference 59) but not based on the analysis or understanding of the hazards in the study.

3. The classification process is not clear for each factor in Table 3. The threshold value of each class can not be explained from typology. The lithology with the highest weight needs to be explained and described in the paper. Also, obvious misunderstanding on the influence to hazard can be found from the weights in Table 3. For example, slope class with degree from 5 to 10 has the highest weight in the study, but it is not corresponding with the knowledges from the geological engineers. Slopes with about 25 degrees are the most vulnerable area to be unstable. Similarly, the factor of distance to road can not be explained either.

4. The advantages of natural multi-hazards are explained well including considering the interaction with each other. However, the authors just simply overlay three hazards via Equation 1 without interaction analysis.

5.As to the multi-hazard mapping method, the author just simplified the susceptibility class into 0 and 1, which leads to the other question is that there is no necessity to use the comprehensive ensemble modes in this study.