

## The effects of zoning methods on forecasting of the next earthquake occurrences, according to semi-Markov models

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### Abstract

Earthquakes are natural phenomena that can be viewed in three dimensions: time, space and magnitude. Earthquakes can be investigated not only physically, but also mathematically. In this study, semi-Markov models are applied, which can be considered as useful methods to analyze and forecast the occurrence of future earthquakes based on previous earthquake data. In the present study, the target region, Iran, is divided into zones, and each zone is examined as one of the semi-Markov model states. Several methods to determine the levels of forecasting error are then introduced and applied to the target area. The results of the application of these semi-Markov models to investigate and forecast the occurrence of future earthquakes are obtained and analyzed mathematically. A new zoning method is developed and compared with that of Karakaisis, through the proposed forecasting method. Moreover, the effects of the type of zoning and the number of zones on the forecasting error of the next earthquake occurrences are investigated using several algorithms.

### Keywords

Semi-Markov model, Transition probability matrix, Probabilistic forecasting, Deterministic forecasting, Forecasting error, K94 zoning

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### References

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
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