

Earthquake Prediction using Deep Learning

Lekshmi Mohan¹ and Sanooja Beegam²

Student, Department of Computer Applications¹

Assistant Professor, Department of Computer Application²

Musalier College of Engineering & Technology, Pathanamthitta, Kerala

Abstract: Earthquakes are one of the most expensive natural disasters to which humans are subject and occur without prior notice, earthquake prediction becomes a very important and difficult task for humanity. Although many existing approaches make an attempt to deal with this problem, the majority of them characterize an earthquake for earthquake prediction using either feature vectors (implicit features) extracted by deep learning techniques or seismic indicators (explicit features) created by geologists. Combining these two types of features to enhance the performance of final earthquake prediction is still a challenge. To achieve this, we suggest DLEP, a deep learning model that successfully fuses explicit and implicit features for earthquake prediction. In DLEP, we use a convolutional neural network (CNN) to extract implicit features and eight precursory pattern-based indicators as the explicit features. After that, an attention-based approach is recommended to effectively combine these two categories of features. A dynamic loss function is additionally created to address the category imbalance in seismic data. Finally, experimental outcomes on eight datasets from various regions show that the proposed DLEP for earthquake prediction is more effective than several state-of-the-art methods.

Keywords: CNN, DLEP, Explicit features, Implicit features

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