Doughnut Pattern recognition Pior to large earthquakes

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We present pattern recognition of clustered earthquakes by using Self-organizing feature maps (SOFM), which can be successfully used to build a statistical model for generating earthquake catalogs to make good short-term prediction of large earthquakes by shape of their clusters. The approach is based on statistical patterns of seismicity by using artificial neural net models is to provide good generalization to exhibit several intriguing precursory phenomena with fast computational tools. SOFM neural networks can visualize a clear seismic patterns anomaly that is observed preceding the large event such as doughnut patterns, precursory swarms, and seismic quiescence before large earthquakes. The algorithm for recognition of clustered earthquake with statistical properties of precursory seismicity patterns could be useful to detect symptoms typically preceding major events. The main advantages of SOFM are learning capability for developing new solutions to problems that are not too well defined and adaptability to deal with computational complexity. The results have been confirmed of 90% strong events took place at some nodes recognized by these clusters prior to their occurrence.