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Ground deformation time series prediction based on machine learning

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The problem of predicting terrain deformation time series from radar interferometry (InSAR) data is one of the biggest current challenges for the prevention and mitigation of the impact of geological risks (e.g. earthquakes, volcanoes, subsidence, slope landslides) that affect both urban (e.g. building movement) and non-urban areas. Generating spatio-temporal alert systems on the processes of deformation of the terrain based on predictive models is one of the great current challenges in the face of the prevention and management of geological risks. Within machine learning techniques, deep learning offers the possibility of applying prediction models of deformation time series on images using convolutional neural networks (Ma et al., 2020).

The objective of the present study is to develop a methodology to obtain predictive models of time series of terrain deformation from InSAR images using machine learning algorithms (e.g. deep convolutional neural networks). Data to train the algorithm will be time series of terrain deformation contained in InSAR images processed by the Geological Survey of Spain (IGME-CSIC). Different architectures and parameterizations of machine learning will be tested.

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Reference:

Ma, P., Zhang, F., Lin, H. (2020). Prediction of InSAR time-series deformation using deep convolutional neural networks. *Remote Sensing Letters*, 11:2, 137-145.