Global seismic data set is retrieved from USGS NEIC epic database. This data set spans the period 1973/01/01 - 2011/06/14. The matrix 35603x8 is extracted from USGS NEIC epic database.

Data set is first de-noised using wavelet packets 2-D. The most optimal de-noising results can be obtained with biorthogonal spline bases (bior3.7, bior3.9, bior6.8) and reverse biorthogonal spline bases (rbio3.7, rbio3.9, rbio6.8). In this sense, neic_epic_global data set is reformulated as an blind image de-noising task. Residual errors are estimated to be very small.

Seismic global spatio-temporal teleconnections can be seen by running script seismic_teleconnections_som.m. This script generates SOM neural network of dimensions 30x30, i.e. SOM neural network 8 x 900 x 900. It takes about 9.7 hours to train this SOM neural network of dimensions 30x30 for 1000 epochs on HP 6830s notebook (2.2 GHz, 3 GB RAM/3gb switch), Matlab R2010b, WindowsXP/SP3. (Script seismic_teleconnections_som_100neurons_100epochs.m runs for about 2.7 minutes, generates 100 clusters, but accuracy of identified seismic teleconnections is very low).

Seismic global spatio-temporal teleconnections can be found in row vector variable **clusters**. The rationale: the seismic event from March 11, 2011 of magnitude 9 is stored in row 34777 in database. In row vector variable **clusters** in the 34777th place is stored a certain cluster value out of 900 clusters. All places in row vector **clusters** which have the same cluster value have spatio-temporal teleconnections with event in 34777th place.

There are 15-17 global seismic events (M>2) daily and 450-500 global seismic events (M>2) monthly. So in about one month there will be about 36000x8 data set. The hybrid learning algorithm WP-DRNN-LWPR will be applied on this data set. In this case, wavelet packets 2-D are used for de-noising and data compression (wpdec2 generates row vector and wprec2 reconstructs matrix 36120x8 back, but with additional predicted 120 rows).

USGS NEIC epic global database will contain more than 84200 samples by the year 2020. So after 2020, highly accurate global seismic predictions will be possible for 200 rows in advance, with confidence interval bounds, i.e. 11-12 days in advance, with confidence interval bounds.

I. Jaganjac