Priestley-Subba Rao (PSR) test user guide

A test of stationarity to check, if statistical properties do not change with time. Stationarity in a strict sense is the strongest form of stationarity. It means that the joint statistical distribution of any collection of the time series variates never depends on time, the mean, variance and any moment of any variate is the same whichever variate. The second order stationarity is often consider for normal use. In this case a constant mean, a constant variance, and an autocovariance that does not depend on time. To check if a time series is stationary in second order mean a Priestley-Subba Rao (PSR) Test is used.

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Step by Step

In order to use the **PSR test** application the user must upload a time series data available in the workspace. This is the mandatory input to the application. The time series data can be easily created with other tools available on the EPISODES Platform, as described below.

The workflow for **PSR test** application:

1. Choose a catalog (or extract part of the catalog with Catalog Filter) from a selected episode.

2. Add to user workspace the Catalog to Vector converter application. It allows to extract vectors of time and time–correlated attributes of user's choice from the seismic catalog.
   Select the seismic catalog to be used and choose the parameter to be analyze (e.g. Mw).

Figure 1. Input of GDF to Vectors converter application.

The application generates two files: time_vector.mat and time_correlated_param_vector.mat. These are input files to the Time Series Builder application that user should use next.

2. Add the **Time Series Builder** to the workspace. This application allows the user to generate data series based on time vector and time-correlated parameter vector files created in the previous step. Please check detail in the Chapter Time Series Builder user guide.

As a result Time_series.mat appers.

3. Add **PSR test** application to the workspace. The mandatory input is the time series file generated in the previous step.

In the following parameters the User needs to specify:

- *Number of tapers (min. 5)*
- *Number of block (2, 2)*
- *Statistical significance (0, 1)*

- *Data normalization using mean value*
- *Data normalization using tapered series*

Press the ![RUN] button to initiate the process.

4. Outputs

- P value T - p value interaction between times
- P value I+R - p value interaction with residuals
- P value T+I+R - p value of total interaction

Interpretation of results - if the interaction of I+R is not significant, we conclude that tested time series is a uniformly modulated process and if T is significant that mean the process is non-stationarity.
If the interaction of I+R is significant, we conclude that tested time series is non-stationary and non-uniformly modulated.

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