

## Trend curves for historic data

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### SUMMARY

We describe a numerical procedure to obtain trend curves for historic data or sampled signals using orthogonal expansions. The periodic Fourier case is generalized considering polynomial orthogonal series. The approximants chosen are of Legendre type, and perform a low-pass filtering to the data. Pointwise, uniform and mean-square convergences of the sums are studied and weak sufficient conditions for these types of approximation are found. The procedures ensure a good approach whenever the sampling frequency and the order of the sums are properly chosen. Additionally, we propose a numerical quantifier of the variation of the trend curve whose character is non-spectral. In the second part of the text we perform numerical simulations to test the method: the first one is associated with a standard Gaussian function, and the second involves a historic record of the Spanish stock reference index IBEX 35.

**Keywords:** Orthogonal expansions, Legendre polynomials, time series

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### References

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