

How mining and summarizing information on time series can be formed using fuzzy modeling methods

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In this lecture, we will focus on elaborating time series using fuzzy modeling methods. We will demonstrate that they can be pretty successful in time series processing and compete with the classical statistical methods. Besides classical tasks such as estimation of trend and its prediction, our methods provide information that can hardly be obtained using statistics. Namely, we automatically form an explanation of the forecast in natural language and also provide comments to the slope of time series in an imprecisely specified area. There are many other applications such as detection of possible structural breaks, reduction of the dimensionality, detection of "bull and bear" phases of financial time series, measures of similarity between time series, etc. A special focus in this lecture will be given to automatic summarization of knowledge about time series expressed in natural language (this is an application of our theory of intermediate quantifiers). The knowledge concerns either single time series (detection and characterization of monotonous segments, future trend, and summarizing information on them), or we can also generate summarizing information on a multitude of time series. We will also show syllogistic reasoning based on the latter.

The primary theoretical method used in our applications is Fuzzy Transform (F-transform) completed by selected methods of Fuzzy Natural Logic (FNL). The lecture will be accompanied by concrete examples.