

Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences

Subject

Analysis, description, summarization, and classification of multivariable time series in the framework of Granular Computing

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Project description

Multivariable time series call for a thorough analysis, summarization, interpretation and classification. Owing to the complexity of time series and a request to carry out a human-centric interpretation of results, all pursuits are to be realized at a suitable level of abstraction articulated with the aid of information granules. Information granules forming conceptual and algorithmic entities are established at a suitable level of abstraction and this level can be adjusted according to the requirement of the problem. The proposed approach entails several fundamental phases leading to the solution to the suite of problems of analysis of multivariable time series: (i) construction of information granules carried out on a basis of available experimental evidence (data), (ii) determination of relationships (mappings) among information granules reported for current and successive time moments (prediction), and (iii) evaluation of quality of results of prediction provided in the form of information granules of type-2 information granules. Classification schemes are realized with the aid of various classifiers developed at the level of information granules.

Bibliography

- W. Pedrycz, *Granular Computing: Analysis and Design of Intelligent Systems*, CRC Press/Francis Taylor, Boca Raton, 2013
- W. Pedrycz, F. Gomide, *Fuzzy Systems Engineering: Toward Human-Centric Computing*, John Wiley, Hoboken, NJ, 2007
- X. Zhu, W. Pedrycz, Z. Li, A development of granular input space in system modeling, *IEEE Transactions on Cybernetics*, 2019, 1-12, early access.
- Y. Shen, W. Pedrycz, X. Wang, Clustering homogeneous granular data: formation and evaluation, *IEEE Transactions on Cybernetics*, 49, 4, 2019, 1391 - 1402
- X. Zhu, W. Pedrycz, Z. Li, Granular data description: designing ellipsoidal information granules, *IEEE Transactions on Cybernetics*, 2018, to appear.

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