Review of PhD thesis “Analysis of Time Series Data” by Ing. Thomas Vantuch

The thesis demonstrates a significant original contribution to the time series analysis, derived from real life data of partial discharge activity, using tools of data mining, machine learning and swarm based optimisation. The submission contains a substantial amount of material worthy of peer-reviewed publications, and in fact a number of papers has been already authored by the candidate.

Writing style of the thesis is clear and rigorous, relevant citations are provided, methods and techniques are clear and the results are properly analysed. The submission demonstrates technical competence in the field of time series analysis, including the use of appropriate research methods including discrete wavelet transform, optimisation of singular values, dimensionality reduction, synthesizing features using symbolic regression and signal representation using complex networks.

The candidate shown ability to conduct an original investigation and to test ideas, and a deep understanding of how his special theme is related to a wider field of knowledge. The candidate also shown appropriate ability in the organisation and presentaiton of the material in the thesis.

The work is good with regards to literacy, presentation and succinctness. I recommend that the candidate be admitted to the degree of PhD.

For future studies I would suggest the candidate to consider the following questions:

1. Name and describe the differences between more symbolic regression algorithms such as Grammatical evolution, Genetic programming and Analytical programming.
2. Describe the possibility of automatic detection of relevant areas in PD pattern signal.
3. Compare the mentioned complexity based indicators like approximate and sample entropy, 0-1 test for chaos with recurrence plots and LZ complexity.
4. What features were relevant the most and how it was evaluated in case of complex-network based experiment, when the higher amount of them was extracted.
5. Describe the possibility of LZC (complexity and compression) application in PD pattern detection.

Best wishes,

Andrew Adamatzky