

Alternative Approaches of Renyi Dimension Estimation

Ing. Martin Dlask

Description

The doctoral thesis deals with the field of fractal modelling, different approaches to fractal dimension estimation and data analysis.

The work is divided into thirteen parts including introduction and conclusion. After a very brief introduction, (two and half pages), chapters 1, 2, 3 follows, where author introduces a mathematical background of his work. Here, it is necessary to state, that this section is useful to put the issues into context. Thesis aims are formulated in chapter 4. Author focused mainly on processes parameter estimation.

Following chapters 5-9 are the main body of the work. They correspond to aims of the thesis and are focused on:

- New method of correlation dimension estimation.
- New method of Renyi dimension estimation.
- New method of Hurst exponent estimation.

This section of the work is very carefully written and all derivation are clearly described.

Chapters 10 and 11 introduces the results of the work and all mentioned methods were used in several "case studies". These chapters are focused on (i) testing on artificial dataset and (ii) application on real datasets. I have to state that all mentioned methods give satisfactory results and both methods and results are clearly described.

Formal part

The formal and graphical part of the work is very good having a precise logical structure. The language level is very good with minimum mistakes only.

Actuality of work

The chosen topic of the dissertation is highly topical from a research and practical point of view. The list author's publication (including 7 impact journals) testifies to the topicality of the topic of the work.

Comments and questions

The study is carefully written describing a very interesting research topic. I have following comments and questions:

- Unfortunately, I did not find a state-of-the-art in the thesis. Therefore, I would like to ask the author for a brief comment on similar research in last years.
- The first "application" is focused on EEG data and classification of Alzheimer disease and healthy clients. Is this approach applicable in clinical environment for diagnosis? Are the results comparable to other modern EEG classification methods?

Conclusion

The dissertation thesis is carefully written describing selected research topics and results of own studies. It is possible to summarize that the work is both from the research and formal point of view excellent and it forms a very good basis of further work.

Owing to facts presented above it is possible to state that the dissertation thesis of Ing. Martin Dlak presents important topics and it is possible to **recommend defense of the work**.

28. 5. 2022

Doc. Ing. Jan Mareš, Ph.D.

Department of Computing and Control Engineering
University of Chemistry and Technology
Technická 5, 166 28 Praha 6 - Dejvice