I. Overall Evaluation

The thesis of the Ph.D. candidate Tomáš Kocyan, entitled *Adapting Case-Based Reasoning for Processing Natural Phenomena Data*, deserves the Ph.D. degree in Computer Science. The work, which addresses an important concept in Computer Engineering, is certainly of great interest and is very relevant to today’s computing world. The thesis is written and presented according to the requirements of the scientific standard.

The PhD student’s technical contribution is his successful attempt to adapt the CBR – Case-Based Reasoning methodology for processing natural phenomena data. He worked out a robust mechanism for retrieving characteristic patterns from a data collection. His new ideas and algorithms with their implementation together with the implementation of the known algorithms and methods in the studied area are all done carefully and have given promising results. His implemented algorithms and the developed by him software are practical in their nature and can definitely be used in future works. His methodologies were based on one or more of the methods: DTW – Dynamic Time Warping, SAX – Symbolic Aggregate approximation, VE – Voting Experts in addition to his own ideas and algorithms as a combination of one or more of them. One of his interesting modifications and approaches is the
combination of the algorithms VE and DTW in the process for extracting the characteristic patterns from distortion time series focused on the measuring of natural phenomena. There are more than other six practical and useful algorithms and methods written, developed and implemented by the author – they all are introduced in the thesis.

II. Student's Scientific Contribution – Publications and Activities

Mr Tomáš Kocyan is the coauthor of 22 publications, 13 of them are directly related to the thesis subject. All are either in a high rank journals (Web-of-Science indexed), book chapters or in proceedings of international conferences. This means he belongs to a scientific research group which is recognized internationally. In the publications, the PhD student presented his interesting valuable achievements.

Moreover, the author has other academic activities – three projects and five grants. He started coauthoring grants in 2008 and two of the projects have not yet finished.

III. Comments on the Manuscript

The author has introduced his work and results very well. All the necessary factors that give the feature of the thesis are given. The figures, tables, examples, and mathematical equations are very well illustrated – there are 85 very well accomplished figures. The structure of the manuscript is very clear and the subjects are discussed in detail. The bibliography is rich and the references are well selected and cited in the manuscript.

Queries

The author has put his efforts to make the manuscript well readable and clear to understand. However, during the oral examination, I would appreciate his explanation of the following aspects:

- Tables 4.1 and 4.2 and Figures 4.4 and 4.5 show the test results of author’s investigation while processing categorical data. According to the author, why or how is it evident that the algorithm decreases precision $P$ whilst increases recall $R$ at its lowest input length values?
- The theory and equations in chapter 4 are all good in explaining and illustrating the author’s approach, but no reference citation at all. They do not belong to the author’s original work either.
- The author’s publications show many multi-author works. In all of those related to the thesis, he is the first author. However, I would value a simple statement about his role or at least his percentage involvement in those publications.
IV. Concluding Remarks

I can conclude Mr Tomáš Kocyan’s dissertation “Adapting Case-Based Reasoning for Processing Natural Phenomena Data” is absolutely sufficient for a Ph.D. thesis and that the Ph.D. degree be awarded, subject to satisfactory performance at the oral examination.

The manuscript presentation is illustrious – clear engineering character of the thesis, thoroughly mathematical models and, above all, the new algorithms with their professional implementation by him.

I therefore commend the Author Mr Tomáš Kocyan on his excellent work and suggest awarding him and distinguishing his thesis.

Khalid Saeed