a place of mind
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Professor Jan Picek, Chair of the Habilitation Committee,
Faculty of Mathematics and Physics,
Charles University

Dear Professor Picek,

After thoroughly reading Dr. Maciak's habilitation dissertation, I would like to express my strong and unequivocal support for his habilitation. The body of work collected by Dr. Maciak forms a solid and coherent contribution to the field, which also attests to Dr. Maciak's mathematical and statistical expertise and achievements.

Given that Dr. Maciak' research has been published in international journals and that the corresponding papers are available to online search engines, the Turnitin plagiarism report indicates (as expected) a relatively high "plagiarism" score. This of course does not reflect actual plagiarism, but simply "hits" on Dr. Maciak's own work. Hence, the Turnitin report should be ignored (and regarded as a "false positive" test) for the purpose of this evaluation.

Dr. Maciak's approach to the problem of detecting and estimating change points is refreshing, and, as evidenced by the published work, fruitful and likely to produce further advancements in the near future. The unifying approach is to "overparametrize" the problem (by allowing for a change point at each available observation, for example) and then adding a "regularization" term to the estimating equations, so that only a few actual change points will typically be present in the estimated model. Interestingly, this procedure is applicable without having to specify the number of change points that are to be estimated. Dr. Maciak has used this approach very successfully in a number of different models, with varying degrees of complexity, from simple univariate observations ordered in "time", to models with covariates, and also flexible panel data models. In these contexts, "change point" need not mean a difference in behaviour over time, but rather, the presence of only a few groups of unique values for the many parameters. Furthermore, Dr. Maciak's has also been able to work rigorously with notably weaker regularity assumptions than previous results in the literature (e.g. without assuming Gaussian errors and allowing for possibly heavier tails in the response variable, which reflects what is typically encountered in practice).

Dr. Maciak considered different types of regularization, as appropriate for the specific type of "change" that is being modeled. As is the case in other contexts on which this strategy has been applied, regularized estimators may fail to be consistent (in the sense of identifying the true non-zero parameters). An often successful strategy to overcome this problem is to use an "adaptive" approach, whereby weights are included in the regularization term, which depend on previous estimators. In his research, Dr. Maciak takes advantage of this, and proves that adaptive

variants of his change point estimating equations yield consistent estimators. Results like these are evidence not only of Dr. Maciak's mathematical expertise, but also his "big picture" perspective, whereby he is able to take advantage and appropriately adapt what has been successfully tried in other contexts. This is an important skill to have in order to sustain a productive and relevant international scientific career.

In a second part of his research program Dr. Maciak focused on the problem of testing for the presence of change points. In a nice series of papers Dr. Maciak proposed tests that are appropriate, and of practical relevance (feasible). Not only did he prove formally that the tests are consistent (and thus can detect change points if they are present), Dr. Maciak also shows that the limiting distributions of these tests can be successfully approximated using the bootstrap. Although in the Statistics literature bootstrap estimators are often presented without mathematically rigorous justification, Dr. Maciak proved that indeed the bootstrap yields a consistent estimator of the distribution of the test statistic.

Dr. Maciak's habilitation dissertation is highly meritorious, and I enthusiastically recommend that it be approved. If you have any questions, please do not hesitate to contact me.

Sincerely,

Matias Salibian-Barrera
Professor
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