Report on **Bachelor Thesis**

Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague

Student:	**Daniel Pacák**
Advisor:	**prof. RNDr. Jan Ámos Víšek, CSc.**
Title of the thesis:	**Least Absolute Deviations**

OVERALL ASSESSMENT *(provided in English, Czech, or Slovak):*

Please provide your assessment of each of the following four categories. The minimum length of the report is 300 words.

The thesis concerns the topic of least absolute deviation estimator in linear regression analysis. The manuscript covers the topic from several perspectives. The author presents basic definition and discusses several key results, such as existence, uniqueness and suitable numerical methods, further accompanied by authors own calculations on academic example(s) to illuminate the theoretical results. From this perspective, all seems fine and the thesis serves as a nice standalone introduction to the topic for the interester reader. However, I have many serious comments regarding this thesis, see below.

Contribution

It is rather unusual for a student of Economics and Finance program to submit a thesis which provides little to no link to these fields. This thesis is written as a pure mathematical text, resembling a graduate text for students of mathematics (statistics) with no interest in application in particular fields. I find this very strange, supervising mostly mathematical oriented theses myself, I always force my students to present mathematical topics and results with a strong stress on applications in various fields of economics.

Moreover, I find the presented material written in the way that it is rather difficult to distinguish the real contribution of the author. The thesis contains several full proofs. Many of those, however, are results known for decades. In several, not so rare cases (mainly in the first half of the manuscript), the author does not provide any reference to the original text as to identify where the original proof can be found and this practice for me is very close to plagiarism. In cases such this, it is common practice at least not present the result as „theorem" but merely as „proposition". Moreover, some of the presented proofs are trivial and concern results which are part of standard first/second-year university courses (e.g. Lemma 1). On the other hand, the author is not consistent in presentation of proofs and some proofs towards the end of the manuscript are being omitted.

Further, I find the presented simulations inadequate as the student chose a simulated for himself rather too good data for a small-dimensional problem. One would be more interested large number of different test problems of also medium or large dimesion to the assess properly the performace of the numerical methods. In the presented case, I wonder, if the achieved results on chosen academic example are in line of theoretical results by a mere coincidence not having anything to do with a generic case (which is not a rare thing in numerical mathematics).

Methods

The author presents mathematics in a skilled way. On the other hand, no reference included in the manuscript published was in last 10 years. Although I am not an expert in this field, I was convinced by several strange formulations of the author (see below), that the presented thesis is a compilation of out-dated results, which were by now for sure superceded in the literature. This effect is further emphasized by the lack of usual literature overview chapter, which is missing here. I am familiar with a

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modern version of some notation (e.g. mathematical analysis literature shifted in the past two decades from presented notation of directional derivative to $f'(x,h)$, where x is a reference point and h is the direction).

As mentioned earlier, I find some claims of the author wrong (or involving oldfashioned arguments). E.g., on page 16, he claims that for a non-smooth AD function, no useful formula for solution can be written down. There is a large and still growing field of non-smooth optimization theory where derivatives are replaced by subgradients of other generalizations of the classical derivative and there are already hundreds of papers deriving solutions to special classes of non-smooth mathematical programs along with a vast number of specialized numerical methods which inherently work with non-smoothness of the objective or in the constraints.

Literature

Literature review is completely missing and the list contains outdated references. Moreover, the list of cited references seems corrupted and papers by Ellis 1998 and Schlossmacher 1973 are not listed with a separate number. Further, some listed references are not included in the text (e.g. Dutter 1975) while some mentioned in the text are not included in the list of references (Sielken and Heartely 1973, mentioned on page 25). From this perspective, the work with literature is a disaster.

Manuscript form

The graphical layout and presentation of mathematics is nice, although, on occasions, some mathematical variables are not slanted in the text. On the other hand, English is often corrupted by misprints and serious grammar mistakes.

Questions for the defense:
  (1) In the proof of Theorem 2, the author selects K as a closed interval based on monotone sequence c_n and a constant 42. Why 42? Similarly, later in the proof, the author uses a constant 16. It feels very arbitrary and left unexplained. Does the proof work WLOG of the choice of 42 and 16?
  (2) Theorem 12 and 13 concern breakdown points for two distinct types of estimators. In both cases, the breakdown point is $1/(n+1)$, yet, the subsequent interpretation is different (see text below proof of Theorem 13). Could you illuminate?

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SUMMARY OF POINTS AWARDED *(for details, see below):*

CATEGORY		POINTS
Contribution	*(max. 30 points)*	11
Methods	*(max. 30 points)*	15
Literature	*(max. 20 points)*	3
Manuscript Form	*(max. 20 points)*	12
TOTAL POINTS	*(max. 100 points)*	**41**
GRADE	*(1 – 2 – 3 – 4)*	**3**

NAME OF THE REFEREE: RNDr. Michal Červinka, Ph.D.

DATE OF EVALUATION: *September 7, 2017*

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Referee Signature

EXPLANATION OF CATEGORIES AND SCALE:

LITERATURE REVIEW: *The thesis demonstrates author's full understanding and command of recent literature. The author quotes relevant literature in a proper way.*

Strong	Average	Weak
20	10	0

METHODS: *The tools used are relevant to the research question being investigated, and adequate to the author's level of studies. The thesis topic is comprehensively analyzed.*

Strong	Average	Weak
30	15	0

CONTRIBUTION: *The author presents original ideas on the topic demonstrating critical thinking and ability to draw conclusions based on the knowledge of relevant theory and empirics. There is a distinct value added of the thesis.*

Strong	Average	Weak
30	15	0

MANUSCRIPT FORM: *The thesis is well structured. The student uses appropriate language and style, including academic format for graphs and tables. The text effectively refers to graphs and tables and disposes with a complete bibliography.*

Strong	Average	Weak
20	10	0

Overall grading:

TOTAL POINTS	GRADE		
81 – 100	1	= excellent	= výborně
61 – 80	2	= good	= velmi dobře
41 – 60	3	= satisfactory	= dobře
0 – 40	4	= fail	= nedoporučuji k obhajobě