THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Nash Equilibria for Regression Models over Strategic Data**
Author's name:	**Larionov Viacheslav**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	Mgr. Miroslav Pištěk, Ph.D.
Reviewer's department:	Institute of Information Theory and Automation of the CAS

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment — **challenging**

How demanding was the assigned project?

The bachelor thesis builds upon the latest findings in the field and applies them newly to a Bayesian game.

Fulfilment of assignment — **fulfilled**

How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.

The assignment has been completely fulfilled, as confirmed by the results presented in Section 3.2. Especially, goals achieved in Section 3.2.5 were only optional in the assignment.

Methodology — **correct**

Comment on the correctness of the approach and/or the solution methods.

The solution methods were chosen correctly as the used algorithms both converged in several iterations, and the obtained solutions were close to each other. From the real-world application perspective, a comparison of the algorithms' rate of convergence in terms of CPU time is missing. The environment of the numerical simulation was fully specified.

Technical level — **A - excellent.**

Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?

The thesis is technically sound: the author understood the problem well, implemented non-trivial algorithms from scratch, and used appropriate numerical techniques to fully analyse the obtained results.

Formal and language level, scope of thesis — **C - good.**

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

The thesis is well-organized and extensive. The level of the English language is good taking into account that it is probably the first scientific text of the author written in a foreign language. However, the manuscript should have been redacted once more. Manifold minor errors ("Let X is…"; "until the change in the profit … is greater than ε") are easy to overcome. More confusing is inconsistency in the used terms; in Definition 2.1 "agents" are used first, but then immediately referred to as "players", and later also as "participants". In Chapter 3, parameter λ_i is first called "accuracy", then "noise", and eventually "precision" in the axis titles of many figures (so „Precision of equilibrium" probably means „Accuracy λ_i in the equilibrium"). Another issue is that figures are referred to only by numbers ("...depending on perturbation 3.7", instead of, e.g., "...perturbation, see Figure 3.7"). Next, below Definition 2.8 "argmax" is used instead of "argmin" and the payoff matrix in Table 2.1 implies opposite signs in the definition of function $c_2(a_1,a_2)$ – indeed, we use cost functions instead of utility functions used in the original Wikipedia example. In Chapter 2 the ex-ante loss function is denoted EL_i, whereas L_i is used in Chapter 3. The provided source code is well structured, a few more comments on its functionality would be helpful.

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Selection of sources, citation correctness **A - excellent.**
Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?
The author thoroughly studied current sources (including a publication from 2021), and the acquired knowledge is presented in a clear manner in Chapter 1 and Chapter 2. His own work is then presented separately in Chapter 3.

Additional commentary and evaluation (optional)
Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

The thesis focuses on the problem of strategic data distortion, which is explored through the lens of game theory. It examines two algorithms (Double Oracle and Iterated Best Response) to address this problem and presents several numerical experiments to validate these algorithms. Finally, the algorithm of Iterated Best Response is newly applied to a more realistic model of a Bayesian game with incomplete information.

This up-to-date topic holds potential for numerous practical applications, and the author has demonstrated his capability for conducting independent and high-quality scientific research. However, I would encourage him to exercise greater caution regarding formalism and the use of notation when presenting his future results.

I suggest posing the following questions:

- The rates of convergence of the two used algorithms (Double Oracle, Iterated Best Response) are compared only in terms of the number of iterations. What would be the result if compared in terms of the consumed CPU time? And why?
- Based on the discussion in Section 2.2, it seems that for potential convex games, the Iterated Best Response algorithm is a strictly better choice than the Double Oracle algorithm. Are there some problems (games) where the opposite statement holds true?

The grade that I award for the thesis is A - excellent.

Date: **8.6.2023** Signature: