Skoltech
Skolkovo Institute of Science and Technology

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Aleksei Shcherbak

PhD Program: Computational and Data Science and Engineering

Title of Thesis: Diagnosis of the human neurological movement disorders based on the analysis of heterogeneous data using ML methods

Supervisor: Associate Professor Andrey Somov

Name of the Reviewer: Prof. Nikolay Brilliantov

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Date: 07-11-2024**

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

The summary of issues to be addressed before/during the thesis defense

The scientific results are relevant and significant to the field of research. The utilized methods are relevant. The quality of the thesis is high, which is indicated by the fact, that the thesis results have been published in Q1 journals. The thesis is well written and possesses a good structure, so that it is easy to follow.

Still, I have the following questions and comments:

1. Could you please provide more details about the operation of the proposed time synchronization method? Does it use timing or sequence diagram? Is it already published or planned to be published elsewhere?
2. Typically, it is a good practice to discuss the obtained results in a comparison with the respective results of the relevant research work in the field. Although the state-of-the-art analysis has been performed, the respective discussion has not been provided. Could you please clarify this point – do similar research papers exists, and how your results differ from these of the other scientists?
3. It would be great to add a picture demonstrating schematically the data collection procedure and cameras position. Besides, there is no information about the functioning of smartphone-based application for the data collection.
4. In Chapter 7, in the results for joint sensors-video approach, the acronym “CI” was not explained.
5. The Conclusions section should be more clear and structured. In current conclusions, the focus jumps from sensors to video and back too frequently, therefore the text is difficult to perceive. Besides, although the analysis of the spiral-based method was performed as well, no attention was paid to this method in the conclusions. Similar criticism refers to the proposed time synchronization method.

Provisional Recommendation

X☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense*

☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate’s thesis according to the recommendations of the present report*

☐ *The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*