THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Long-term evolution of seizure characteristics in a mouse model of epilepsy.**
Author's name:	**Richard Köplinger**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Circuit Theory
Thesis reviewer:	Apostolos Mikroulis, PhD
Reviewer's department:	Department of Cybernetics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment **ordinarily challenging**

How demanding was the assigned project?

The project hypothesizes that for electrographic seizures in a mouse model of epilepsy, the similarity of seizures reflects their temporal distance. A method is developed to characterise the progression of electrographic seizures over time. Starting from annotated mouse EEG recordings of seizures, signal parameters are extracted to be used as input to a seizure similarity analysis, adjusting for seizure length and tracking the seizure onset time. This introduces reasonable complexity to the assignment.

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 thesis provides a good proof-of-concept for the developed method. The analysis, the statistics, and the results appear as set forth in the goal statement.

Methodology **correct**

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

The main part of the analysis (DTW) is well suited to the task of comparing variable-duration waveforms. However, no information on the utilised dataset is tracked or shown (particularly the timeframe of the recordings in relation to the time of induction of the seizures is missing and could significantly affect the results of the analysis). Additionally, the rationale for the selection of the statistical analysis (reasoning for assuming a linear -rather than monotonic- relation between temporal distance and seizure similarity) is not clear.

Technical level **B - very good.**

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 design and execution of the analysis pipeline follow standard electrophysiology analysis practice and are performed correctly. The parameter use in Chapter 2.3 is ambiguous (which parameter is used and where) without referring to the code.

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?

Notation is used correctly, and the overall language use is good. The interpretations of the individual results segments are sometimes unclear (for instance what constitutes a "stable seizure pattern" is not explained). The structure follows the typical publication format, and the length is adequate for the information presented in the introduction, results and discussion/conclusion sections. The Methods section would benefit from a less fragmented structure, more information on the dataset used, and formulae for the calculated variables (Main Frequency and Similarity Index are not provided).

Selection of sources, citation correctness **B - very good.**

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 thesis cites prior research accurately, and the breadth of the sources is adequate for the work presented. The contribution of the presented work is clearly distinguishable from prior works, and the bibliography is presented in a standard format.

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.*
Please insert your comments here.

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

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

The thesis is well structured and reasonably well executed. However, the dataset is not documented adequately. The rationale for the methodology, especially where it deviates from prior sources is not clear enough. Furthermore, the analysis procedure is challenging to understand from the methods and the results alone without resorting to the supplementary information for the code.

Questions

- Are there more details about the dataset used? When were the recordings made in the time-frame of the experiments (especially with reference to the induction of the epilepsy model)?
- There is a lot of variability in the time from first to last seizure, and the total number of seizures between animals. What was the selection process for the parts of the dataset used in the analysis?
- What information do the seizure trajectory plots provide in the results? Does it relate to the matrix plots following them for each subject?
- The Person's correlation coefficient is used. Were any alternatives considered? Are the tracked variables known follow a linear relation?

The grade that I award for the thesis is **B - very good.**

Date: **2.6.2024** Signature: