

I. IDENTIFICATION DATA

Thesis title:	Interpretable Lung Perfusion Imaging with Feature-Based Modelling of EIT's Cardiac-Related Signal
Author's name:	Bc. Annamária Miheličová
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	Diogo Silva, MSc.
Reviewer's department:	RWTH Aachen University

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
The project involved the assembly of a tabular dataset through the extraction of several features from high-dimensional, time-resolved data, the exploration and selection of the resulting features, and the training and validation of several statistical models. This made for a fairly heavy workload, although the complexity of the individual tasks is decreased by the flexibility of modern Machine Learning implementation frameworks.	

Fulfilment of assignment	fulfilled
<i>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.</i>	
The student's work covered all objectives and goals initially stipulated in a timely and extensive manner. While some results did not match the idealized expectations, the developments put forward by the student are an unavoidable and indispensable step towards the future success of the approach.	

Activity and independence when creating final thesis	A - excellent.
<i>Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.</i>	
In early stages of the implementation, the student needed more technical supervising given the lack of previous experience in the field. However, after a short adaptation period, the student started making independent decisions and explored research avenues beyond the supervisor's instructions.	

Technical level	B - very good.
<i>Is the thesis technically sound? How well did the student employ expertise in his/her field of study? Does the student explain clearly what he/she has done?</i>	
Despite having had little experience with the concepts involved in the thesis, the student developed solid theoretical understanding of the statistical and Machine Learning methods employed. The student is also able to express the ideas in a concise and understandable manner. However, particularly in the first instances of implementation, the student tended to make decisions with poor theoretical substance and rather relying on work ethic to employ several possibilities and empirically compare them in the end. This often led to avoidable efforts.	

Formal level and language level, scope of thesis	A - excellent.
<i>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?</i>	
The student complied with the scientific notation and formalism with little effort, and produced a document written at a good level of technical English. Text was also accompanied by meaningful and informative scientific illustrations, tables, and pseudocode.	

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 student delivered very extensive and pertinent literature research, particularly with regards to the different statistical and Machine Learning methods employed in the work. Mentions to previous work were, in comparison, not elaborated as extensively as expected. However, due to the novelty of the approach, a limited number of previous works directly relate to the student's work.

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.

The student was given a very challenging project, requiring solid scientific understanding and an above average learning rate. The student delivered a solid first attempt at a novel way of processing data in the field of perfusion monitoring with electrical impedance tomography. The thesis has delivered insight which will surely play a role in the future success of the technique.

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

The thesis work carries a significant amount of novelty considering the current state-of-the-art. It constitutes an extensive effort in a quite explorative direction, entailing a long workload which provided no assurances of great results.

Still, the student managed to cover a lot of possible variations and deliver very encouraging results in some aspects. In fact, the models created by the student manage to slightly outperform the state-of-the-art. Additionally, the student worked very diligently and produced a very good written thesis.

Particularly in the initial stages of the work, the student required close supervision to become familiar with the concepts involved in the work, and close orientation concerning which next steps should be taken. Also, given the technical focus of the work, more theoretical considerations pertaining to previous work have been comparatively lightly tackled.

Based on the extent of the project and the quality of the developed work, I recommend the grade below.

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

Date: **23.5.2024**

Signature:

Diogo Silva, M. Sc.