

I. IDENTIFICATION DATA

Thesis title:	Digital signal preprocessing for content recognition improvement
Author's name:	Aytaj Sabitova
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Measurement
Thesis reviewer:	Jiří Novák
Reviewer's department:	RETIA, a.s., University of Defence in Brno

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	extraordinarily challenging
<i>How demanding was the assigned project?</i>	
<p>The topic of the thesis "Digital signal preprocessing for content recognition improvement" is very demanding, requiring advanced knowledge in digital signal processing (DSP) and automatic speech recognition (ASR). The project involves technical and research complexities, experimental design, software development, and analytical skills. Ensuring the ethical use of ASR systems, including privacy and personal data protection, is also crucial. Overall, the project requires a wide range of professional skills and a careful approach.</p>	

Fulfilment of assignment	fulfilled with minor objections
<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>	
<p>The thesis meets the assigned tasks very well, and the primary objectives have been successfully achieved, including the design and characterization of procedures and the creation of recording databases. Some parts, such as the analysis of ASR system errors, could be more detailed. The sections focused on theoretical background are extensive and could be shortened in favour of a more detailed analysis of the results. Overall, the thesis provides a comprehensive overview and careful analysis, but a more balanced focus on practical applications would further improve it.</p>	

Methodology	outstanding
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
<p>The author used the correct approach by providing a comprehensive theoretical overview of DSP and ASR, which allowed for an in-depth understanding of the issue. The implementation of methods like the Fourier transformation and filtering for the signal preprocessing was well chosen, as was the use of MFCC and LPC for feature extraction. The use of available tools demonstrates the practical application of theoretical knowledge. The careful experimental approach and detailed analysis of results confirm the correctness of the chosen methods. Overall, the author effectively applied theoretical knowledge in practice and achieved the goals of the thesis.</p>	

Technical level	B - very good.
<i>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?</i>	
<p>Based on the information and outputs in this thesis, the student seems to have used knowledge from her study program in Cybernetics and Robotics at a high level. The thesis demonstrates a deep understanding and application of advanced DSP and ASR methods integral to her field. The use of modern tools like Descript, iZotope RX 10, and Audacity and the thorough execution of experiments shows good utilization of professional knowledge. The explanations of methods and results are clear, though some data processing procedures could be more detailed to enhance clarity and completeness. The level of detail in the practical part of the thesis is noticeably lower than in the theoretical part. Overall, however, the thesis demonstrates the ability to apply theoretical knowledge in practice, which is essential.</p>	

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 formalisms and the notations in the thesis are mostly used correctly, but some technical terms should be better explained for greater clarity. The thesis is logically organized and sufficiently extensive, with a clear structure and good coverage of both theoretical and practical aspects. The English is generally satisfactory, but it contains several stylistic and grammatical errors, likely due to the complexity of the topic and the fact that the author is probably not a native speaker of English. Some sentences are rather complex and could be simplified. Overall, the thesis is of a high standard, but better explanation of terms and a language review would further improve it.

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 thesis adequately references previous work on the topic, demonstrating a very good understanding of existing research. The selection of sources is appropriate and covers a wide range of relevant studies. The student clearly distinguishes her own contributions from earlier work in the field, making it easy to recognize the new insights and methods she has introduced. The bibliographic citations appear to meet the required standards, being correctly formatted and comprehensive. In a few isolated cases, there are minor inconsistencies in the formatting of citations and the extent of information provided. Overall, the citations are of a high standard and contribute to the overall presentation of the thesis.

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 thesis addresses the highly complex topic of digital signal preprocessing for content recognition improvement and is overall at a very high level. From the presented outputs, it is clear that the practical experiment required significant effort in preparation, execution, and implementation of the results, demonstrating the author's high level of expertise. The thesis brings new insights and methods that can be useful for further research in DSP and ASR. Although there are a few stylistic and grammatical errors, the overall quality of the work is very high. The presented shortcomings should serve as feedback for the student's future professional career.

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.

Aytaj Sabitova's thesis appears to be complex and demanding. The author demonstrates a high level of technical skills and a deep understanding of DSP and ASR. The practical experiment, which included the preparation, execution, and implementation of the result, as well as data cleaning, standardization, noise removal, and subsequent analysis, using various audio processing and ASR tools, shows her ability to handle complex tasks and bring new insights. Although there are some stylistic and grammatical errors, and some parts of the technical description could be more detailed and specific for better reader understanding, these non-critical shortcomings do not detract from the overall quality of the work. These presented shortcomings should serve as feedback for the student's future professional career. The final evaluation is based on the average of the individual assessed parts of the review, with greater weight given to the "Technical level" chapter, which I consider the most important given the focus of the work, the field of study, and the potential contribution.



THESIS REVIEWER'S REPORT

Questions:

1. What specific challenges did you face during the practical experiment, and how did you address them?
2. What do you consider to be the main contribution of your thesis?
3. Do you see any potential for further research or applications based on the results of your work? If so, in what direction would you like to proceed?

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

Date: **2.6.2024**

Signature: