THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Detection of Particular Objects in Images**
Author's name:	**Askar Kassymgaliyev**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	Ing. Michal Polic, Ph.D.
Reviewer's department:	CIIRC, AAG

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**

How demanding was the assigned project?

The project focuses on instance-level object detection, which is a less explored area compared to category-level detection. The goal to improve upon an existing method (OS2D) and potentially simplify it, adds a layer of complexity. The student must not only understand the current state-of-the-art but also innovate and test new approaches which is challenging for bachelor students.

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.

There are three points to fulfill: studying previously published paper (OS2D), reproducing reported experiments, and seeking performance improvements. All of them are well presented in the thesis.

Methodology	**outstanding**

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

The methodology is correct and widely used in research publications. Student reproduced the experimental evaluation of the baseline method, localized the slowest parts, and proposed, implemented, and tested new approaches to speed the algorithm up.

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 text is readable, clear, and technically sound. All the data required to reproduce the author's results are included.

Formal and language level, scope of thesis	**A - excellent.**

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?

Some parts deserve a little bit of a better-detailed explanation. For example, "that module" in the abstract refers to "TransformNet" but does not mention it. The equations do not have labels and it is hard to refer to them. The explanation in section 3.2 starts with the definition of "c" where there are missing brackets around the last tensor dimension, which is well shown for example in the description of Figure 3.4. Figure 3.1 follows the notation of the original OS2D paper which is slightly different from the author's notation. The equation in section 3.5.2 does not mention what the "s" parameter means even if it can be seen from equations. It is also a good practice to use single letters for a single variable instead of multiple once, e.g. "DIFF", and "CORR" that may be assumed as multiplications of matrices. However, I believe that any reader would be able to understand the text which is much better than the average text of a bachelor thesis.

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 citations follow the assignment and I found them correct.	

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 is valuable for further research in this research direction.

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 demonstrates a solid understanding of instance-level object detection, successfully reproduces the OS2D baseline experiments, and explores improvements by removing the spatial transformer network. While the proposed modifications did not significantly outperform the original method, the work is well-executed and documented, making it valuable for further research. Minor issues with clarity and notation are present but do not detract significantly from the overall quality.

Q:

1) The assignment describes the task as "how to detect particular objects given one or few examples" while the thesis focuses on using only a single example of a class and similar viewing direction in images where it should be detected. As the main problem was the rotation of detected objects (which is expected), did you try to use more images of a class?

2) Looking at Figure 3.3, what are the classes that are hard to detect and what are the easily detected once?

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

Date: **28.5.2024**   Signature: