

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:	Cybernetics
Thesis reviewer:	Georgios Toliás
Reviewer's department:	Cybernetics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	extraordinarily challenging
<i>How demanding was the assigned project?</i>	
<p>Replacing the spatial transformers and resampling in the OS2D approach with the discussed simpler, faster and more intuitive variant is novel and would constitute a useful approach. If achieved without performance losses, it could worth publishing the results in a quality conference. In that view, the final goal of the assignment is super challenging. It involves understanding of a variety of concepts and methodologies, familiarization with a complex implementation, a good amount of new implementation and critical thinking to make new things work. There are also practical bottlenecks that were not foreseen in advance and require quite some engineering to be surpassed, i.e. GPU memory constraints and slow training for a larger number of class template transformations (N).</p>	

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>	
<p>The primary goals regarding understanding, reproducing, and analyzing the prior work (O2SD) have been achieved. The final goal of is achieved to a reasonable extend given the high challenging factor. The achieved performance is well below the O2SD performance, yet the thesis work managed to train a model design that significantly departs from the initial one and suggests a new paradigm. The achieved results suggest that introducing a higher number of transformations (N>3) would be needed. The impact of N (N=1 vs N=3) is shown to be large. I believe a much higher value of N would be required, which was not tried because of the engineering bottlenecks.</p>	

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>	
<p>The student demonstrated a very good level of independence and a positive approach throughout the thesis process, and showing progress. Regular consultations were well-prepared and productive, highlighting the student's ability to work autonomously while maintaining effective communication. Although there may have been a slow start in the initial stages, which potentially limited the exploration of the latest findings, Askar significantly developed throughout the thesis period and achieved a higher level of maturity in his approach.</p>	

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>	
<p>During the consultations Askar demonstrated a very good and in depth level of understanding of the assignment and the relevant methods. For myself, as an advisor and due to our consultations, the thesis describes properly what was done, but my feeling is that for an external reader, some more would require a more in depth description to be perfectly clear.</p>	

Formal level and language level, scope of thesis	B - very good.
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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 thesis is well organized with a language and English that is satisfactory. Askar chose to avoid lengthy descriptions and managed to go directly "to the point" in a successful and a compact way in many parts of the manuscript. In some of the technical parts though, a more in depth description would be better. The mathematical notation has some flaws, which one might be able to disambiguate from the context though.

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 most relevant references are included, but a more in depth analysis would be helpful, eg. for analysis of particular objects but in other tasks like retrieval and for more generic object detection approaches.

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.

During the work on the assignment, Askar had to cope with implementation bottlenecks and had to come up with solutions or the next step during moments that nothing was working (getting trained) yet with the newly designed model. He managed to progress and surpass difficulties, often in an independent way. The fact that the thesis does not include results superior to the SoA is not a failure, especially given the high level of difficulty in the assignment. It remains unknown whether the proposed direction can surpass the current state of the art. Nevertheless, the results of the thesis indicate that further investigation of the proposed approach for a larger number of N is worth doing. This is a valuable lesson. The experiments with more transformations were not performed mainly due to the lack of extra time and the engineering bottlenecks and not due to the capacity or work of the student. The overall work loses some points due to the manuscript that could be better to convey the work to an external reader, but given all the above, I find A to be appropriate overall.

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

Date: **3.6.2024**

Signature: