

I. IDENTIFICATION DATA

Thesis title:	Heuristic evaluation functions for imperfect-information chess
Author's name:	Matěj Šesták
Type of thesis :	Bachelor's thesis
Faculty/Institute:	Faculty of Electrical Engineering
Department:	Department of Cybernetics
Thesis reviewer:	MSc. Dominik Andreas Seitz
Reviewer's department:	Department of Computer Science

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	B
<i>How demanding was the assigned project?</i>	
The assignment's difficulty was moderately high. The student was required to implement the domain of Dark Chess and Kriegspiel himself while still having access to previously existing code that needed to be adjusted to fit his purposes. Furthermore, a novel way of dealing with the domain's unique properties had to be developed, implementing a new loss function as well as integrating convolutional neural networks into the existing pipeline.	

Fulfilment of assignment	B
<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>	
All of the assigned tasks have been fully completed. The student even went beyond the requirements and extended the tasks to include an additional experiment (chapter 5.3) which showed satisfactory results. Although all of the showcased domains did fulfill the requirement of being "strategically interesting", showing a domain which has a mixed Nash equilibrium in the trunk would have been a clear A in regards to this criterium.	

Activity and independence when creating final thesis	A
<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>	
The student proved to have a very positive attitude and was remarkably independent as well as reliable, which made working with him very pleasant. Weekly consultations were always well prepared, problems discussed and time limits were met.	

Technical level	A
<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>	
The thesis contains all the necessary and relevant theoretical background. It furthermore paints a clear picture of the problems that need to be solved. The tasks and concepts were concisely explained which also enables non-experts to understand the problem in a clear manner. The student even included a glossary which can be used by non-expert readers to look up key concepts which are required to understand the corresponding content.	

Formal level and language level, scope of thesis	A
<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>	
Formal criteria and mathematical notation is used correctly. The thesis gives a clear scope and walkthrough of the thesis in the introduction and in the end concludes with a concise summary of the findings, relating to the introduction. The order of content is logically built upon each other and guides the reader through the problem that is to be solved. The used language is clear, the English is without mistake. The detail of the thesis is sufficient and the student gives a clear outlook and recommendation of how to proceed the research.	

Selection of sources, citation correctness**A**

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 clearly proves to have spent considerable time researching related work and being well aware of alternative approaches to the problem. All of the related work has been cited, advantages and limitations were explained and compared to his employed approach. The main work the thesis is based on has been extended in a unique manner and proves that the thesis goes beyond just replication of previous results. The citations meet scientific standards and were done correctly.

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 well written, extends previous works and fits well into current research done on solving large imperfect-information games. It distinguishes itself from other work in the field due to its very unique domains and provides a useful basis for researchers interested in building online play agents for imperfect-information chess variants which is definitely a strength. A slight weakness of the thesis is the lack of mixed Nash equilibrium trunk strategies of the used domains and deeper trunk depths, but due to the properties and size of the used domains this limitation seems very understandable. The student competently implemented the required domains and experiments.

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 duration of the thesis the student continuously progressed and quickly showed results after having implemented and debugged the necessary infrastructure. After initial consultation about the non-trivial theory behind the project he proved to have well understood and internalized the necessary concepts. After having fulfilled all the assigned tasks ahead of time we agreed he would extend the thesis to include the experiment showcased in 5.3. The student demonstrated that he is capable of working scientifically and I recommend awarding the bachelor's degree.

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

Date: 01.06.2020

Signature:

