

# Review report of a final thesis

Czech Technical University in Prague

Faculty of Information Technology

**Student:** Mykyta Viazovskyi  
**Reviewer:** Ing. Jan Trávníček  
**Thesis title:** MCTS library for unit movement planning in real-time strategy game StarCraft  
**Branch of the study:** Web and Software Engineering

**Date:** 8. 6. 2017

<i>Evaluation criterion:</i>	<i>The evaluation scale: 1 to 5.</i>
<b>1. Difficulty and other comments on the assignment</b>	<i>1 = extremely challenging assignment, 2 = rather difficult assignment, <b>3 = assignment of average difficulty,</b> 4 = easier, but still sufficient assignment, 5 = insufficient assignment</i>
<i>Criteria description:</i> Characterize this final thesis in detail and its relationships to previous or current projects. Comment what is difficult about this thesis (in case of a more difficult thesis, you may overlook some shortcomings that you would not in case of an easy assignment, and on the contrary, with an easy assignment those shortcomings should be evaluated more strictly.)	
<i>Comments:</i> The assignment instructs the student to implement a library for AI agents playing real time strategy game StarCraft. The requirements on the library were specified only to support planing for unit movement. Also some discussion of basic use of library and possible extensions is part of the assignment.	
<i>Evaluation criterion:</i>	<i>The evaluation scale: 1 to 4.</i>
<b>2. Fulfilment of the assignment</b>	<i>1 = assignment fulfilled, <b>2 = assignment fulfilled with minor objections,</b> 3 = assignment fulfilled with major objections, 4 = assignment not fulfilled</i>
<i>Criteria description:</i> Assess whether the thesis meets the assignment statement. In Comments indicate parts of the assignment that have not been fulfilled, completely or partially, or extensions of the thesis beyond the original assignment. If the assignment was not completely fulfilled, try to assess the importance, impact, and possibly also the reason of the insufficiencies.	
<i>Comments:</i> The library is implemented and documented, however the text of the thesis does not show the basic use of the library. The connection of the library implementing the unit movement with the rest some other AI bot handling other aspects of game is only briefly covered in the text in chapter 5 (Testing). From the text, it is not clear whether the negamax algorithm is the graph search-based method mentioned in the assignment. I was not able to find original unmodified source codes which were used as a base implementation for the movement library and to which all the comments are referring to. Therefore I was unable to check the amount of code actually created by the student.	
<i>Evaluation criterion:</i>	<i>The evaluation scale: 1 to 4.</i>
<b>3. Size of the main written part</b>	<i><b>1 = meets the criteria,</b> 2 = meets the criteria with minor objections, 3 = meets the criteria with major objections, 4 = does not meet the criteria</i>
<i>Criteria description:</i> Evaluate the adequacy of the extent of the final thesis, considering its content and the size of the written part, i.e. that all parts of the thesis are rich on information and the text does not contain unnecessary parts.	
<i>Comments:</i> Definitely all the parts of the thesis text are necessary and the text length is satisfactory.	
<i>Evaluation criterion:</i>	<i>The evaluation scale: 0 to 100 points (grade A to F).</i>
<b>4. Factual and logical level of the thesis</b>	<i>75 (C)</i>
<i>Criteria description:</i> Assess whether the thesis is correct as to the facts or if there are factual errors and inaccuracies. Evaluate further the logical structure of the thesis, links among the chapters, and the comprehensibility of the text for a reader.	

**Comments:**

In the Chapter Library design, the limits of time to process 1, 10, and 320 frames is completely reversed. The image 4.1 with visualization of map graph does not show node for one of islands. Also the description of this image is mentioning incorrect numbers of nodes in mainland and number of islands. The implementation chapter contains information that I would classify as something that should belong to design (unit abstraction). The testing chapter; section 5.1 should by my opinion rather fit into implementation chapter. The testing chapter mentions the competitive play of bot with unit movement planing computation using MCTSCD algorithm and the same bot only with Negamax algorithm for unit movement planing. However later it is mentioned the in-game AI is also playing in measured games. The thesis does not contain any installation guide.

*Evaluation criterion:* The evaluation scale: 0 to 100 points (grade A to F).  
**5. Formal level of the thesis** 60 (D)

*Criteria description:* Assess the correctness of formalisms used in the thesis, the typographical and linguistic aspects, see Dean's Directive No. 14/2015, Article 3.

**Comments:**  
The Czech abstract contains many mistakes. Real-Time strategy should not be translated as "živá strategie" (where the correct translation strategie v reálném čase is used in keywords). The C++ in the abstract is missing C symbol. The word "algoritmus" is incorrectly spelled with y. The Monte Carlo Tree algorithm is in the abstract without space between Carlo and Tree, sometimes with capital C in Carlo and T in tree and sometimes lowercase through the text. There are some mistakes in the English text of the thesis. 2nd line of page 2, there are two verbs in the sentence "contributes" and "makes". There in my opinion should not be an article before the game name StarCraft. The Student StarCraft AI Tournament is abbreviated inconsistently to SS-CAIT or SSCAIT. The section 3.1 is followed by long vertical space. The class diagrams images are in bitmap format. The number of different unit movements is typed incorrectly as 4<sup>2</sup>00 times 24 times on page 20.

*Evaluation criterion:* The evaluation scale: 0 to 100 points (grade A to F).  
**6. Bibliography** 100 (A)

*Criteria description:* Evaluate the student's activity in acquisition and use of studying materials in his thesis. Characterize the choice of the sources. Discuss whether the student used all relevant sources, or whether he tried to solve problems that were already solved. Verify that all elements taken from other sources are properly differentiated from his own results and contributions. Comment if there was a possible violation of the citation ethics and if the bibliographical references are complete and in compliance with citation standards.

**Comments:**  
Correct.

*Evaluation criterion:* The evaluation scale: 0 to 100 points (grade A to F).  
**7. Evaluation of results, publication outputs and awards** 85 (B)

*Criteria description:* Comment on the achieved level of major results of the thesis and indicate whether the main results of the thesis extend published state-of-the-art results and/or bring completely new findings. Assess the quality and functionality of hardware or software solutions. Alternatively, evaluate whether the software or source code that was not created by the student himself was used in accordance with the license terms and copyright. Comment on possible publication output or awards related to the thesis.

**Comments:**  
The result is of the thesis a working part of a StarCraft bot. The code is sometimes inconsistent in formatting and style, which is expectable however it should be rare.

*Evaluation criterion:* No evaluation scale.  
**8. Applicability of the results**

*Criteria description:* Indicate the potential of using the results of the thesis in practice.

**Comments:**  
Such a bot could be extended and completely created by other students and later compete in similar competition of students bots for StarCraft.

*Evaluation criterion:* No evaluation scale.  
**9. Questions for the defence**

*Criteria description:* Formulate any question(s) that the student should answer to the committee during the defence (use a bullet list).

**Questions:**  
You mention only benefits of MCTSCD algorithm in comparison to the Negamax. Are there any benefits of the Negamax algorithm in unit movement planing?

*Evaluation criterion:* The evaluation scale: 0 to 100 points (grade A to F).  
**10. The overall evaluation** 78 (C)

*Criteria description:* Summarize the parts of the thesis that had major impact on your evaluation. The overall evaluation **does not** have to be the arithmetic mean or any other formula with the values from the previous evaluation criteria 1 to 9.

**Comments:**  
The implementation looks good. However the text should be better. I already mentioned issues in relevant evaluation criteria. I recommend the thesis for defense and I recommend to rate the thesis with 78 points and mark C good.

Signature of the reviewer: