FACULTY
OF INFORMATION
TECHNOLOGY
CTU IN PRAGUE

# Review report of a final thesis

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| **Reviewer:** | Ing. Marko Šidlovský |
| **Student:** | Martin Skala |
| **Thesis title:** | Analysis of progression in lung cancer patients |
| **Branch / specialization:** | Artificial Intelligence 2021 |
| **Created on:** | 2 June 2024 |

## Evaluation criteria

### 1. Fulfillment of the assignment

- ▸ [1] **assignment fulfilled**
  [2] assignment fulfilled with minor objections
  [3] assignment fulfilled with major objections
  [4] assignment not fulfilled

The presented thesis thoroughly and in accordance with the assignment delineates the goals, formulates them accurately, and fulfills them to a high standard. The objectives were clearly defined and all goals have been met. Notably, the student demonstrated exceptional diligence in studying the domain of lung cancer, acquiring comprehensive knowledge of the subject matter. This in-depth understanding is evident throughout the thesis, particularly in the analysis and proposal of models for determining cancer progression. The student's extensive study of lung cancer and its progression greatly contributes to the quality and depth of the thesis, highlighting a commendable level of dedication and expertise that extends beyond the standard expectations for this type of work.

### 2. Main written part

95 / 100 (A)

The thesis presents a comprehensive examination of lung cancer progression using statistical, machine learning, and AI methods. It is appropriately scoped, factually accurate, and logically structured, ensuring understanding for readers. The formal notations are correct, and the typographic and linguistic aspects adhere to guidelines. The thesis is citation-rich, with all sources correctly cited and distinguished from original work. I deduct 5 points for an overly detailed description of the models, while lacking a theoretical description of the parameters of the models that are subsequently tuned by setting hyperparameters.

### 3. Non-written part, attachments 100 /100 (A)

The student has effectively utilized a suitable programming language along with the appropriate libraries, which is commendable. The code is well-organized, readable, and versioned, demonstrating good software development practices. The non-written components of the thesis primarily involve exploratory data analysis (EDA), the training of models, as well as the testing and evaluation of proposed methods. All of these aspects are in strict accordance with the thesis objectives. Overall, I am pleased with the quality and appropriateness of the tools and methodologies employed and have no reservations regarding this part of the work.

### 4. Evaluation of results, publication outputs and awards 100 /100 (A)

The thesis opens up possibilities for practical application. The methods and models developed can be employed in clinical settings to aid in data collection by serving as a suggestion tool for oncology specialists. Additionally, the results can be utilized to supplement data in retrospective studies, thereby enhancing the accuracy of historical data analyses. This dual utility underscores the practical relevance and potential impact of the thesis findings in both clinical environments and research contexts.

## The overall evaluation 96 /100 (A)

The thesis is a structured and technical work that effectively meets its objectives. The student demonstrated exceptional diligence in studying lung cancer and collaborating with the private sector on a real project. The thesis includes a clear discussion of limitations and potential for future expansion. The practical application is commendable. Overall, the thesis exemplifies high standards with practical relevance and impact in clinical and research contexts.

## Questions for the defense

1. On a selected example of one patient, visually show and rigorously interpret the results of the AI model on a timeline and compare them with manually obtained progression values.
2. How would you change the methods and models from retrospective to prospective progression prediction, considering that data are only available up to the time of prediction and the time to pharmaceutical change will no longer be an option as it is a future event? How should the solution and data gathering be adjusted to accommodate this shift?

# Instructions

## Fulfillment of the assignment

Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.

## Main written part

Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies?

Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 52/2021, Art. 3.

Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.

## Non-written part, attachments

Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.

## Evaluation of results, publication outputs and awards

Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

## The overall evaluation

Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.