# Gao Jun jar Nishant Ravikumar

**School of Computing**

**MSc Project Final Assessment Report**

**To be completed jointly by the supervisor and assessor. The supervisor should upload it to the ‘FINAL ASSESSMENT REPORTS’ shared folder.**

**Student: Gao Jun**

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**Programme of Study: Advanced Computer Science**

**Supervisor: Nishant Ravikumar**

**Assessor: Marc de Kamps**

**Title of project: LiTS insight: Deep learning approaches to tumor segmentation**

**Type of project: Empirical investigation**

**Deliverables actually presented have been accurately recorded in the report: Yes**

**If not, briefly describe any inaccuracies:**

The report below gives the gradings and justifications for each category as well as the overall grade.

**Overall Comments**

At face value, this apppears to be an impressive project. The ultimate segmentation result appears very good, but many aspects are unclear. The write up is not very clear. The differences between the two data sets are insufficiently explained, and the rationale for a two stage algorithm is not clear in the report. A range of different networks were explored and the implementation complexity of the project was relatively high, well done!

*Note:* this report should in the main be evaluative there is only a need to describe the content of the report in the event of the student's abstract being inadequate.

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| Criterion | Score | Feedback to Student |
| **Problem Clarification [12 marks]**  - Project aim clearly defined.  - Project objectives determined and clearly stated.  - Project deliverables properly listed.  - Ethical, legal, and other issues identified and considered. | 8 | Project aim, objectives and deliverables are defined. But the goals are stated in terms of datasets that have not been introduced yet. That makes assessing the objectives hard. Brief context to the project was provided. No discussion of ethical, legal or social issues was included. |
| **Background Research [15 marks]**  - A comprehensive and balanced survey of relevant literature is provided.  - Relevant theories/methods/procedures/tools/ frameworks and/or technologies were explored and evaluated.  - Educated decisions were made to select solution methods/technologies/procedures. | 10 | Brief clinical background information included, but this could be improved. Relevant literature on medical image segmentation techniques based on deep learning were discussed, but this lacked sufficient depth and insights. For instance, the relative limitations/advantages of the different types of segmentation networks covered in the literature review were not discussed. Theoretical background on deep learning in general and segmentation networks (e.g. CNNs) in particular was missing. |
| **Design/Methodology [15 marks]**  **ES and SP projects:**  - System requirements elaborated and clearly stated. For SP projects the requirements should be more detailed and precise.  - An overall design of the software was developed and properly described.  **EI projects:**  - Relevant datasets/variables identified and explained.  - A valid design of the required experiments was developed.  **TS projects:**  - Research hypotheses were elaborated and clearly discussed.  - A theoretical framework/research methodology was developed and clearly described. | 10 | Appropriate data sets were identified and described. The data preparation steps employed were described very briefly with little justification. This would have benefitted from more detail in the report. Appropriate loss function and evaluation metrics were defined. The comparison of one- and two-step segmentation approaches for the task of interest was a nice inclusion in the project. The rationale for using a 2-stage approach is not clear. |
| **Implementation [30 marks]**  - Working software/Valid results that meet the primary aim of the project was/were achieved.  - The software/results is/are of good quality and can be adopted.  - The software/results meet(s) all the objectives and requirements of the project. | 24 | A range of different neural network architectures were implemented and compared for the segmentation task. The implementation complexity was relatively high and worthy of an MSc project. Well done! Implementation could have been described in greater detail in the report. |
| **Validation and Evaluation [10 marks]**  - A proper testing/validation and/or evaluation plan (i.e. methodology) was devised and clearly documented.  - The software/results was/were properly tested/validated and/or evaluated. | 7 | Appropriate evaluation metrics were implemented and used to compare the segmentation performance of the models investigated. Some effort made to discuss the results obtained and some useful insights were reported. |
| **Conclusions and Future Work [6 marks]**  - Results and conclusions were correctly and clearly stated.  - Discussion of future work is thorough and clear. | 3 | Sensible conclusions are drawn, supported by the obtained results. Some effort made to discuss future work, but requires deeper reflection. |
| **Report Quality [12 marks]**  - The report is properly structured.  - The student’s own work/contributions can be easily distinguished.  - Referencing is valid and the numbering of figures and tables is correct and consistent.  - The language is sound, and the sentences are clear and easy to understand.  - The report is free of grammatical and typographical errors. | 7 | Written quality of the report is ok, however, the structure and organisation can be significantly improved. Too many concepts are used before they have been properly explained which makes the report hard to read. Figures and tables are used effectively to communicate key concepts and summarise results. |
| **OVERALL GRADE (/100):** | 69 |  |

We confirm that the grading has been undertaken based upon our professional judgement of standards.

**Supervisor**: Nishant Ravikumar. **Assessor**: Marc de Kamps. **Date**: 30/09/2024