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| **Format 3** : Thesis with research project within a research institute proposed by:  Research Group Digital Mathematicus (DIMA), Vrije Universiteit Brussel (VUB) | |
| Medical Image Analysis based on Fusion and Deep Learning | |
| GUIDANCE | |
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| (name) | Prof. Dr. Tan Lu  [Tan.Lu@vub.be](mailto:Tan.Lu@vub.be)  Mr. Dejan Ilic (PhD candidate in DIMA) |
| * Number of students | 1 |
| CONTEXT | |
| In vitro fertilization (IVF) is an important technique to help people in a fertility process. In IVF, the analysis of the oocytes/embryos can help embryologists in their decision-making, and possibly helps to improve the success rates of IVF processes. The Universitair Ziekenhuis Brussel (UZ Brussel), which is known for its expertise in IVF, is collaborating with the research group DIMA in analyzing images of oocytes/embryos using advanced image processing techniques.  In particular, images of oocytes/embryos are collected using different focal length and the important structures of the underlining oocytes/embryos are to be analyzed for quality prediction. In this regard, image modeling using both classical methods (e.g. fusion) and deep learning (e.g. deep convolutional neural networks) are to be developed and combined. | |
| GOAL | |
| The goal of this master thesis is to analyze images of oocytes/embryos:   1. developing fusion models to integrate images of oocytes/embryos that are taken using different focal length; 2. recognize important oocyte/embryo structures by segmenting the integrated images. | |
| METHODOLOGY | |
| The main methodology that will be applied in this thesis is image fusion and deep learning (e.g. deep convolutional neural networks). | |
| PROFILE/REQUIRED SKILLS (e.g. rather theoretical / rather practical implementation, required knowledge (courses, methods, computer language(s), etc.) | |
| 1. good understanding in machine learning and neural networks 2. good skills in coding deep learning models using Python (e.g. using pytorch) 3. good skills in using MATLAB | |
| COVID-19: In case additional restrictions are put into place by the government because of COVID-19, can the student continue the internship online? If adjustments to the project are needed in such a case, please specify these adjustments. | |
| The student can continue the thesis online if additional COVID-19 restrictions are implemented to prevent face-to-face discussions. | |
| REFERENCES | |
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