

## Master Thesis project *In Biomedical Machine Learning*

### Prediction of Cervical Degeneration from Radiological Imaging and Clinical Data

*In collaboration with the Division of Image Processing, Department of Radiology (dr. M. Staring) and the Department of Neurosurgery (dr. Vleggeert-Lankamp, MD) from the Leiden University Medical Center.*

#### Who?

We are looking for two students:

- searching for a Master thesis project
- majoring in computer science, mathematics, biomedical engineering, artificial intelligence, physics, or a related area
- with affinity for (python) programming and machine learning

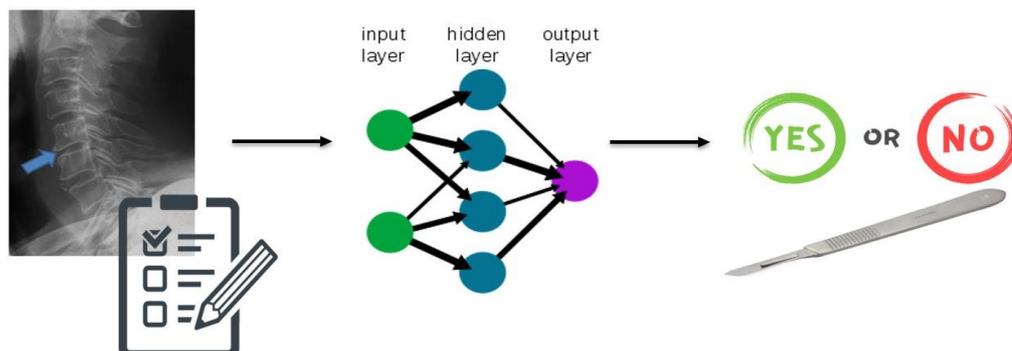
#### What?

Cervical degeneration is an essential component in the development of neck pain. The variation in rate of cervical spine degeneration that can radiologically be observed in patients, gives rise to the assumption that some patients are predisposed to develop an accelerated form of degeneration. Identifying these patients prior to surgery can improve clinical decision making, whether to operate or not, as it is hypothesized that patients with accelerated degeneration fare worse after surgery.

The research aim is therefore to find ways to identify these degenerative spinal changes in an early stage, using a combination of clinical and radiological parameters. The student will develop a machine learning model (deep learning) that combines radiological images (X-ray and MRI) with clinical data in order to optimally identify patients with accelerated degeneration and thus predict which patients should and which patients should not be operated upon. For the project, data from 109 NECK-trial patients will be used. All patients have one X-ray and one MRI pre-operatively and clinical scores pre-operatively and one and two years post-operatively. For verification of the model comparable data from 1000 patients will be available from the ROTTERDAM Study. Your result will contribute to the process of clinical decision making in spinal surgery.

#### Where?

You will be embedded in the LUMC and experts from both departments will be available for consultation. At the department of Neurosurgery there is years of experience with spinal research and a high publication rate. Students will be offered the opportunity to co-publish their results and present on a scientific conference. At the Division of Image Processing Machine Learning expertise and infrastructure is readily available.



#### Interested?

**Contact:** Caroline Goedmakers ([c.m.w.goedmakers@lumc.nl](mailto:c.m.w.goedmakers@lumc.nl))

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