MSc thesis proposal:
Deep Learning for Pituitary Gland Tumor Analysis from MR Images

**Background:** The aim of this project is to investigate machine learning methods for analyzing pituitary gland tumors in the brain, using MR images. The pituitary is a small gland found inside the skull just below the brain and above the nasal passages (see picture below).


Pituitary tumors are usually benign, however, the growth of its size could press the visual nerve causing problems e.g. vision loss.

**Problem description:** This MSc thesis is aimed at analyzing pituitary tumors from MR images by exploiting image analysis and machine learning methods. The work is a close collaboration with medical doctors in Sahlgrensha university hospital. Some methods to be studied in this thesis, among others, include: tumor volume estimation by using 3D segmentation methods; Image analysis methods for analyzing and characterizing tumor tissues, for example, whether the tumor tissue is soft, hard, uniform density and many more.

**Tasks in the thesis works:** can be split into several steps

1. Read relevant literatures, background materials on deep learning and brain images;
2. Get familiar with the software libraries for deep learning and MR image formats, and software;
3. Programs and tests on 3D image segmentation and conduct preliminary analysis of tumors (e.g., consistency, soft, hard tissues);

**Background knowledge for the thesis work:** Bio-medical image analysis and processing, Matlab, Python program experience will be of advantages.

**The project:** 1 or 2 students in the project.

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