**How to write a popularized one-page summary of your degree project**

(Note: instructions here are in English, but if you are native in Swedish, write in Swedish)

• Write in Swedish if you are native in Swedish, otherwise write in English (see templates below). Make sure that the contents and language of the summary are suited to a wider circle of readers. Think of the reader as a person with a good all-round education, who is not an expert in your field.

• Make the title of the summary attractive and short (one line). Avoid expressions like ‘summary’ and ‘study’ in the title.

• Begin with a general introduction where you give some background information about your project. This will help the reader understand the idea of your work.

• Describe the methods and techniques only briefly − unless the objective of the study is to test or develop a method. In that case, also make clear to the reader for what purpose the method can be used.

• Go into greater detail when describing your results, and how they can be applied.

• Write a summary that is easy to understand and enjoyable to read; remember that it is an advertisement for your degree project. Minimize use of technical terms. Avoid all too long sentences with many subordinate clauses.

• Ask a friend (who is studying a different subject) to read and give honest comments on the first draft. Also ask your friend to correct the language. Rewrite and ask for new comments!

You can read more and find more advise at: <http://awelu.srv.lu.se/?id=5796>

When you are satisfied with your summary give it to your supervisor for input and approval. After making the final changes send it to: Johanna Jonsdottir: johanna\_bjarney.jonsdottir@biol.lu.se

**Layout model**

Type-face: Garamond (except for title)

Your name in the upper left corner, in bold type, 12 p

Centred title in bold type, **Arial** 14 p

Main text, 12 p

Blank line marks new paragraph

Subtitles, if you use them, in bold type

Latin names, and technical terms that are defined or explained, in italics

Information about advisor, department etc., 11 p

Advisor’s name in bold type

Illustration(s) if relevant, place them where it is appropriate

**The next two pages are templates to use (one for Swedish, one for English)**

**Theodor Rumetshofer**

**The active brain at rest**

**What are you doing when you are at rest? When you take a short break from your daily life without looking on your phone or thinking about something special. And what is your brain doing? The neurons in your brain are constantly communicating, even when you are doing nothing. It is possible to measure the neuronal activity indirectly over the higher energy consumption and blood flow using functional magnetic resonance imaging (fMRI). A MRI scanner uses a combination of a strong magnetic field (140.000 times stronger than the earth’s magnetic field) and radio frequency pulses to investigate the human brain at rest, a method which is called resting-state fMRI (rsfMRI).**

During a rsfMRI examination the whole brain is parcellated into small voxels, which are 3-dimensional cubes of 1-3 mm3. During 5-7 minutes of rest, a time signal can be measured for each voxel. Voxels which are “functional connected” have a similar time signal are likely to be connected and processing the same information. Those voxels can be summarized together into a network, so called resting-state networks (RSN). Examples of such networks can be seen in the image below. The most important and robust network is the default mode network (DMN). It is only active when the brain is at rest and it is hypnotized to represent an introspective phase of sorting and processing past experience.

A picture containing text, different, many, group

Description automatically generated

The measured time signal consists of the neuronal signal but also of physiological and artificial noise. This noise can come from the heartbeat, respiration, small head movements or even from the MRI scanner. To remove those unwanted noise from the signal, it is necessary to carefully preprocess the data. In this work two slightly different preprocessing programs, fMRIprep and CPAC, were compared to investigate the robustness and differences in the functional connectivity of six different brain networks.

The voxels with are involved in the different networks were the same for subjects preprocessed with fMRIprep and CPAC. However, the functional connectivity between and within the networks was higher in subjects preprocessed with fMRIprep. Those differences could be attributed to the fact that the programs used slightly different ways to estimate the head motion as well as the physiological noise e.g., by using a different mask of vessels in the brain. This comparison may help to better understand the influence and interaction of different preprocessing steps to the functional connectivity inside the human brain at rest.

Master’s Degree Project in Bioinformatics 60 credits 2021

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