



Thesis Project Form

Title (tentative): Signal Processing and Bio-Fingerprinting applied to Polysomnographic data

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Description

Motivation and application domain

The Polysomnography (PSG) is a technique used to diagnose, or rule out, many types of sleep disorders, including narcolepsy, idiopathic hypersomnia, periodic limb movement disorder (PLMD), REM behavior disorder, parasomnias, and sleep apnea.

Many sleep-wake signal patterns (alpha waves, vertex sharp waves, sleep spindles, K-complexes, saw-tooth waves, arousals, slow eye movements -SEMs, rapid eye movements - REMs) are well defined for healthy subjects, but not for un-healthy one.

General objectives and main activities

The Polysomnography (PSG) monitors brain activity (EEG), eye movements (EOG), muscle activity or skeletal muscle activation (EMG derivations for chin and legs), body position (video camera) and heart rhythm (ECG). Breathing functions (respiratory airflow, oxygen saturation, respiratory effort indicators) are also measured.

The candidate should aim at developing an automated patient-personalized pattern recognition system (e.g. alpha waves, vertex sharp waves, sleep spindles, K-complexes, saw-tooth waves, arousals, slow eye movements -SEMs, rapid eye movements - REMs). Extensive literature and shared codes on this subject are available.

Training Objectives (technical/analytical tools, experimental methodologies)

- _ Study and comprehension of state-of-the-art results and algorithms.
- _ Definition of sleep-wake signal patterns for un-healthy subjects.
- _ Development of an automated patient-personalized pattern recognition system.

Place(s) where the thesis work will be carried out: DITEN (UNIGE); Università di Lugano

Additional information

Pre-requisite abilities/skills: Experience in computational science (or willing to learn) with Python programming environment is preferable.

Maximum number of students: 2

Financial support/scholarship: Available