SleepMon: A Workshop on Non-Invasive Monitoring Technologies for Sleep Disorder Assessment

Abstract:
A sleep disorder is a medical disorder of the sleep patterns of a person. Sleep disorders can interfere with normal physical, mental, social and emotional functioning. Furthermore, sleep disorders are associated with comorbidities such as stroke, heart disease, osteoporosis or arthritis impact, which are directly related to an individual's quality of sleep.

The current mainstream sleep disorder detection and assessment methods (e.g. Polysomnography) are very inconvenient for patients due to the cumbersome wiring that is required for the biosignal acquisition. In addition, there is a high cost associated with a sleep test at a specialized lab, which includes the use of facilities and equipment, as well as technical staff and physicians involved in data collection and the interpretation process. As a result many patients with sleep-related problems go undiagnosed, and even the ones who are tested in a sleep lab cannot be monitored of over longer periods of time to assess longitudinal variations.

The points mentioned above, emphasize the need for automatic, non-intrusive methods for sleep disorder assessment, that patients can use in their homes. This would not only help decrease health care costs but also increase the number of diagnosed patients due to increased accessibility of sleep disorder testing. The potential of home sleep testing has lately attracted attention due to its many benefits:

1. The patient self-administers the home sleep test (HST), and is able to spend the night in the patient's own bed in familiar surroundings (reducing first night effect).
2. HST can be especially advantageous and accessible to the home-bound, elderly in assisted living care, or those with chronic illness, who require specialized care. It is also beneficial for those with difficulty arranging time out of their schedules to spend the night in-lab by removing this barrier to diagnosis.
3. HST diagnostics would reduce cost compared to the cost of an in-lab sleep study.

This workshop invites contributions that seek to advance the current standards in sleep monitoring by taking advantage of new sensing devices that can effectively and non-invasively collect biosignals and behavioral sleep data, as well as methods and tools for more efficient and automated data analysis.

List of Topics:
Topics of interest include, but are not limited to:

- Non-invasive sensing devices for biosignal data acquisition
- Method and tools for biosignal data analysis
- Audio and video-based methods for sleep pattern monitoring
- Methods and tools for sleep disorder detection
- Devices for in-home sleep monitoring

- Multi-source data fusion methods for sleep-related decision making
- Sensor data stream fusion, feature extraction and pattern analysis
- Usability issues of sleep monitoring devices
- Data privacy concerns in sleep monitoring
- Methods and tools for sleep disorder treatment
- Use of mobile devices for sleep monitoring
- Automatic detection of events of interest during sleep
- Machine learning and data mining tools for sleep disorder-related decision making
- Methods for evaluating the effect of sleep disorders on daily activities

Goals:
This workshop aims to attract an interdisciplinary group of researchers who are involved in research related to sleep disorder detection, assessment, monitoring and treatment, focusing on novel technologies that aim to make sleep pattern analysis tools more easily accessible, less invasive and less expensive. The researchers will present their work and receive feedback from their peers. As part of the larger theme of the PETRA conference, the participants will also have the opportunity to interact with top scientists working with pervasive assistive technologies to exchange valuable ideas that could advance the state-of-the-art in the field.

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