Institut "Jožef Stefan" Ljubljana, Slovenija

TECHNOLOGY OFFER

STRESS-DETECTION ALGORITHM FOR WEARABLE DEVICES IS OFFERED FOR LICENSING

Fields of use
Artificial Intelligence (AI), Computer Software, Applications for Health, Medical/health software, Cognitive aid, Other leisure and recreational products and services, Health and beauty aids

Current state of technology
Prototype available for demonstration

Type of cooperation
Licensing agreement

Intellectual property
Copyright, Exclusive Rights, Secret Know-how

Developed by
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Summary

Our researchers developed a computer-implemented algorithm for stress detection. The algorithm was evaluated in a real-life setting and is integrated into a prototype application for managing mental health and well-being.

We are looking for a company able to implement the algorithm in commercial wearable applications in the framework of a license agreement.

Description of the invention

Continuous exposure to stress is harmful to mental and physical health. Solutions for efficient, accurate and user-accepted automated stress detection are still missing on the market. Our artificial intelligence researchers have developed and tested an algorithm for continuous detection of stressful events. The algorithm is using data from a wrist device which is capable of measuring users' heart rate (HR), blood volume pulse (BVP), galvanic skin response (GSR), skin temperature (ST), the time between heartbeats (IBI) and accelerometer data. The offered technology is a computer-implemented algorithm, however, the proposed algorithm in a combination with appropriate wrist device (which must be provided by the partner sought) can constitute a competitive product for the health and well-being market.

Stage of development

The algorithm was evaluated in laboratory and real-life setting. The accuracy on 55 days of real-life data from 5 subjects, for distinguishing stress vs. no-stress events was 92%. These promising results are currently being re-evaluated on a larger group of participants (more than 50) from Slovenia and Belgium.

The algorithm is integrated into a smartphone prototype application for managing mental health and well-being. The complete solution is available for demonstration. The algorithm is being constantly improved and tested. The authors of the algorithm have the necessary knowledge to offer all the engineering expertise and support (research team of 30 people) to the potential licensee to implement the algorithm in a commercial product.

The Authors

Authors of the algorithm are computer science experts specializing in the development of proprietary methods and algorithms for analyzing wearable sensor data used mainly in the health domain but applicable to other domains as well. The team has been among finalists of the global competition for medical diagnostic devices. They have won the

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international competition for activity recognition. They are active in several projects for the development of smartwatch monitors for independent living of seniors with dementia; detection of falls and abnormal behaviors for elderly; support older workers in reducing physical and mental stress using wristband and personalized advice and decision support to help patients with heart problems.

Main Advantages

Most of the related artificial intelligence algorithms for monitoring stress are tested in laboratory scenarios for which they are specialized. However, when tested in the real-life scenarios their performance drops significantly. The offered algorithm in addition to the high performance in laboratory scenarios achieves high performance also in uncontrolled, real-life scenarios.

This is thanks to the novel context-based machine-learning approach. The algorithm combines several machine-learning components to find out the context under which certain event happens before it detects whether it is stressful or not. One of the components is a laboratory stress-detection classifier trained on laboratory data to distinguish between stress and no-stress physiological signals. Another component is a proprietary activity-recognition classifier which continuously recognizes user's activity and thus provides context information about real-life circumstances. The third machine learning component is a classifier trained on real-life data which combines the outputs of the other two components (laboratory stress classifier and activity-recognition classifier) and provides the final decision whether a certain situation is stressful or not. The recognized user's activity and computation of features for stress detection from the above-mentioned physiological signals (Blood Volume Pulse, Heart rate, Skin temperature and Galvanic skin response) improves the ability to distinguish between genuine stress in real life and the many situations which induce a similar physiological arousal (e.g., exercise, eating, hot weather, etc.). This is the main advantage as opposed to other known approaches in the research community and on the market.

Partner Sought

The researchers are looking for companies who are interested in obtaining a licensing agreement for the stress-detection algorithm. In particular, the following companies from wellness and health sectors are sought:

- Companies which develop and produce wearable wireless wellbeing, sport and fitness devices.

- Companies which offer solutions for remote patient monitoring, on-site professional healthcare monitoring and home/office/work environment monitoring.

Researchers are also offering an option for partners to use the algorithm via SaaS service.

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