Using Machine Learning to Diagnose Fatigue

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Fatigue is one of the most common complaints and there is no effective way to diagnose it. If a program is created to find the heart rate measurement and blink rate then, through machine learning, fatigue can be diagnosed. The fatigue level was based off the fatigue subgroup in the Profile of Mood States (POMS). First finding the regions desired for both blink and heart rate detection, by using Haar-like Classifiers, both quantities can be obtained. For blink detection the area primarily focused on was the eye region. For heart rate detection the forehead was focused on and then the optical intensity was measured in the green channel. Then after buffering this data and Fast Fourier transforming it, the peaks provide a heart rate. Although there is a correlation between blink rate and fatigue, heart rate has no correlation with fatigue. However there is a correlation between stroke volume index (SI) and cardiac index (CI), which heart rate is able to assist in finding. Additionally in the original equation, cardiac output (CO)/ body surface area (BSA), to find CI the end-diastolic volume and end-systolic volume is needed but to compensate for using no external equipment, another equation by Mr. Chandrasekaren was used. The program based off the blink and heart rate detection provides accurate results in determining high levels of fatigue but had difficulty in establishing the difference between moderate and low levels. The application, for example, can help companies maintain productivity and assess employee safety in high risk jobs. Keywords: Haar-Like Classifiers; Machine Learning; Blink Detection; Remote Photoplethysmogram; Heart Rate Detection; Fatigue

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