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## Nota di contenuto

1. Introduction to non-invasive biomedical signals for healthcare -- 2. Signal Acquisition Preprocessing and Feature Extraction Techniques for Biomedical Signals -- 3. The Role of EEG as Neuro-Markers for Patients with Depression: A systematic Review -- 4. Brain-Computer Interface (BCI) Based on the EEG Signal Decomposition Butterfly Optimization and Machine Learning -- 5. Advances in the analysis of electrocardiogram in context of mass screening: technological trends and application of artificial intelligence anomaly detection -- 6. Application of Wavelet Decomposition and Machine Learning for the sEMG Signal based Gesture Recognition -- 7. Review of EEG Signals Classification using Machine Learning and Deep-learning Techniques -- 8. "Biomedical signal processing and artificial intelligence in EOG signals" -- 9. Peak Spectrogram and Convolutional Neural Network-based Segmentation and Classification for Phonocardiogram Signals -- 10. Eczema skin lesions segmentation using deep neural network (U-net) -- 11. Biomedical signal processing for automated detection of sleep arousals Based on Multi-Physiological Signals with Ensemble learning methods -- 12. Deep Learning Assisted Biofeedback -- 13. Estimations of Emotional Synchronization Indices for Brain regions using Electroencephalogram Signal Analysis -- 14. Recognition Enhancement of Dementia Patients' Working Memory using Entropy-based Features and Local Tangent Space Alignment Algorithm.

## Sommario/riassunto

This book presents the modern technological advancements and revolutions in the biomedical sector. Progress in the contemporary sensing, Internet of Things (IoT) and machine learning algorithms and architectures have introduced new approaches in the mobile healthcare. A continuous observation of patients with critical health situation is required. It allows monitoring of their health status during daily life activities such as during sports, walking and sleeping. It is realizable by intelligently hybridizing the modern IoT framework, wireless biomedical implants and cloud computing. Such solutions are currently under development and in testing phases by healthcare and governmental institutions, research laboratories and biomedical companies. The biomedical signals such as electrocardiogram (ECG), electroencephalogram (EEG), Electromyography (EMG), phonocardiogram (PCG), Chronic Obstructive Pulmonary (COP), Electrooculography (EoG), photoplethysmography (PPG), and image modalities such as positron emission tomography (PET), magnetic resonance imaging (MRI) and computerized tomography (CT) are non-invasively acquired, measured, and processed via the biomedical sensors and gadgets. These signals and images represent the activities and conditions of human cardiovascular, neural, vision and cerebral systems. Multi-channel sensing of these signals and images with an appropriate granularity is required for an effective monitoring and diagnosis. It renders a big volume of data and its analysis is not feasible manually. Therefore, automated healthcare systems are in the process of evolution. These systems are mainly based on biomedical signal and image acquisition and sensing, preconditioning, features extraction and classification stages. The contemporary biomedical signal sensing, preconditioning, features extraction and intelligent machine and deep learning-based classification algorithms are described. Each chapter starts with the importance, problem statement and motivation. A self-sufficient description is provided. Therefore, each chapter can be read independently. To the best of the editors' knowledge, this book is a comprehensive compilation on advances in non-invasive biomedical signal sensing and processing with machine and deep learning. We believe that theories, algorithms, realizations, applications, approaches, and challenges, which are presented in this

book will have their impact and contribution in the design and development of modern and effective healthcare systems.

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