2020 IEEE Signal Processing in **Medicine and Biology Symposium** (SPMB 2020)

Philadelphia, Pennsylvania, USA **5 December 2020**



IEEE Catalog Number: CFP2091R-POD ISBN:

978-1-7281-8821-8

Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP2091R-POD

 ISBN (Print-On-Demand):
 978-1-7281-8821-8

 ISBN (Online):
 978-1-7281-8820-1

ISSN: 2372-7241

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



TABLE OF CONTENTS

Plenary Talk No. 1: Ivan Selesnick, New York University – Tandon (Chair)
SPMB-I1.01: How Has Deep Learning Revolutionized Human Language Technology?1 <i>T. Ma, ASAPP Inc.</i>
Lecture Session No. 1: Hansen Mansy, University of Central Florida (Chair)
SPMB-L1.01: Resting State EEG Classification of Children With ADHD3 G. Ciodaro, A. Jahanian Najafabadi and B. Godde, Jacob University Bremen
 SPMB-L1.02: A Deep Learning-Based Method for Automatic Detection of Epileptic Seizure in a Dataset With Both Generalized and Focal Seizure Types9 A. Einizade, M. Mozafari, S. Hajipour Sardouie, Sharif University of Technology S. Nasiri, Harvard Medical School G. Clifford, Emory School of Medicine
SPMB-L1.03: Machine Learning Approach to Diagnose Schizophrenia Based on Effective Connectivity of Resting EEG Data15 K. Masychev, C. Ciprian and M. Ravan, New York Institute of Technology
SPMB-L1.04: A Comparative Study Between Classical Feature Engineering and RNNs for Seizure Detection in Imbalanced Data21 M. Alzaid, Princess Nourah bint Abdulrahman University
SPMB-L1.05: Seizure Type Classification Using EEG Signals and Machine Learning: Setting a Benchmark26S. Roy, Google Health U. Asif, J. Tang and S. Harrer, IBM Research
SPMB-L1.06: Automated Pacing Artifact Removal in Electrocardiograms32 C. Harvey, A. Noheria and D. Tahmoush, The University of Kansas
Poster Session No. 1: Vira Oleksyuk, Temple University (Chair)
SPMB-P1.01: Detecting Abnormal PCG Signals and Extracting Cardiac Information Employing Deep Learning and the Shannon Energy Envelope38 M. Chowdhury and Y. Hu, Middle Tennessee State University K. Poudel, East Central University
SPMB-P1.02: Compression, Denoising and Classification of ECG Signals using the Discrete Wavelet Transform and Deep Convolutional Neural Networks42 M. Chowdhury and Y. Hu, Middle Tennessee State University K. Poudel, East Central University
SPMB-P1.03: Crossterm-Free Time-Frequency Analyses Exploiting Deep Neural Networks46 S. Zhang, S. Pavel and Y. Zhang, Temple University

SPMB-P1.04: Radar-Based Dataset Development for Human Activity Recognition51 A. Ahmed and Y. Zhang, Temple University
SPMB-P1.05: Detecting Hip Dysplasia Using Acoustic Excitation in a Pig Model55 T. Hassan, R. Sandler, C. Price, A. Kassab and H. Mansy, University of Central Florida
SPMB-P1.06: Ultrasound-Mediated Chemical Sensing Using Titanium Dioxide (TiO ₂) Nanoparticles-Embedded Hydrogel with Possibilities of Performance Enhancement Using Machine Learning58 S. Islam, M. Park, R. Campbell and A. Kim, Temple University
SPMB-P1.07: Spectral Analysis of Tympanic Membrane Pulse Signal: An Approach for Noninvasive Detection of Elevated Intracranial Pressure62 R. Dhar, R. Sandler, K. Manwaring and H. Mansy, University of Central Florida
SPMB-P1.08: A Deep Learning-Based Real-Time Seizure Detection System65 N. Shawki, T. Elseify, T. Cap, V. Shah, I. Obeid and J. Picone, Temple University
SPMB-P1.09: The Temple University Artifact Corpus: An Annotated Corpus of EEG Artifacts71 A. Hamid, K. Gagliano, S. Rahman, N. Tulin, V. Tchiong, I. Obeid and J. Picone, Temple University
SPMB-P1.10: Improving the Quality of the TUSZ Corpus75 S. Rahman, A. Hamid, D. Ochal, I. Obeid and J. Picone, Temple University
SPMB-P1.11: Analysis of Electromyography Burst Signals using Topological Feature Extraction for Diagnosis of Preterm Birth80 V. Selvaraju, P. Namadurai and R. Swaminathan, Indian Institute of Technology Madras
SPMB-P1.12: Analysis of Surface Electromyography Signals in Fatigue Conditions Under Dynamic Contractions Using Time Difference of Muscle Activations84 J. Shiva, C. Sanjay and P. Karthick, National Institute of Technology (NIT) Tiruchirappalli N. Makaram, and R. Swaminathan, Indian Institute of Technology Madras
SPMB-P1.13: Automation of Emotion Quadrant Identification by Using Second Order Difference Plots and Support Vector Machines88 P. Mishra and N. Salankar, University of Petroleum and Energy Studies
SPMB-P1.14: XGboost-based Method for Seizure Detection in Mouse Models of Epilepsy92 L. Wei, C. Mooney and M. Lowery, University College Dublin R. Gerbatin, O. Mamad, H. Boutouil, C. Reschke, D. Henshall and G. Morris, Royal College of Surgeons – Ireland
SPMB-P1.15: Investigation of EEG Signal Response Using Event-Related Potential (ERP) Towards Ishihara Pseudo-Isochromatic Visual Stimulus95 A. Wicaksono, Bandung Institute of Technology T. Mengko and K. Iramina, Kyushu University
SPMB-P1.16: Machine Learning Supervised Classification Methodology for Autism Spectrum Disorder Based on Resting-State Electroencephalography (EEG) Signals100 C. Bhaskarachary, A. Jahanian Najafabadi and B. Godde, Jacobs University Bremen
SPMB-P1.17: Identification of Abnormalities in Head Computerized Tomography Scans104 M. DelRocini, C. Angelini and G. Rasool, Rowan University

Plenary Talk No. 2: Joseph Picone, Temple University (Chair)
SPMB-I1.02: Artificial Intelligence for Clinical Trial Design108 S. Harrer, IBM Research
Lecture Session No. 2: Yannick Roy, University of Montreal (Chair)
SPMB-L2.01: TABS: Transformer Based Seizure Detection109 J. Pedoeem, S. Abittan, G. Bar Yosef and S. Keene, The Cooper Union
 SPMB-L2.02: Epileptic Seizure Detection in EEG via Fusion of Multi-View Attention-Gated U-Net Deep Neural Networks115 C. Chatzichristos, J. Dan, A. Narayanan, N. Seeuws, K. Vandecasteele, M. De Vos, A. Bertrand and S. Van Huffel, Katholieke Universiteit (KU) Leuven
SPMB-L2.03: Epileptic Seizure Detection in Clinical EEGs Using an XGboost-based Method122 L. Wei and C. Mooney, University College Dublin
SPMB-L2.04: Seizure Detection Using Time Delay Neural Networks and LSTM128 A. Thygachandran, M. Kumar and H. Murthy, Indian Institute of Technology M. Sur, Massachusetts Institute of Technology R. Aghoram, Jawaharlal Institute of Postgraduate Medical Education and Research
SPMB-L2.05: Validation of Temporal Scoring Metrics for Automatic Seizure Detection133 V. Shah, I. Obeid, J. Picone, Temple University G. Ekladious and R. Iskander, Novela Neurotech Y. Roy, University of Montreal
SPMB-L2.06: Confidence in the Qualified Crowd: A Platform for Sourcing EEG Annotations138 J. Freitas, Loyola Marymount University A. Nguyen and W. Bosl, University of San Francisco
Lecture Session No. 3: Nashwa Elaraby, Penn State (Chair)
SPMB-L3.01: Robust Speech and Natural Language Processing Models for Depression Screening144Y. Lu, A. Harati, T. Rutowski, R. Oliveira, P. Chlebek and E. Shriberg, Ellipsis Health
SPMB-L3.02: Non-Linear Discharge of Human Motor Units During Linear Time-Varying Contractions Across Motor Pools149 D. McAuliffe, T. Kimec, C. Taylor and C. Thompson, Temple University
SPMB-L3.03: Detection of Traumatic Brain Injury Using Single Channel Electroencephalogram in Mice156 A. Sutandi, N. Dhillon and D. Si, University of Washington M. Lim, VA Portland Health Care System H. Cao, University of California Irvine
SPMB-L3.04: Biometric Authentication and Stationary Detection of Human Subjects by Deep Learning of Passive Infrared (PIR) Sensor Data164 J. Andrews, A. Vakil and J. Li, Oakland University

SPMB-L3.05: Machine Learning Applications to DNA Subsequence and Restriction Site Analysis.......170
E. Moyer and A. Das, Drexel University
SPMB-L3.06: Book Publishing @ Springer......176
M. McCabe, Springer Nature