

Alexandre Lobo

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Short Bio

Associate Professor, Head of Department, Research Coordinator at the University of Saint Joseph, Macau, SAR China. Founder of the Laboratory of Applied Neurosciences (LAN/USJ). PostDoctorate and Honorary Research Fellow at the University of Leicester - UK. Visiting Associate Professor at the University of the Chinese Academy of Sciences (UCAS) - Shenzhen Institutes of Advanced Technologies (SIAT). PhD in Engineering Federal University of Ceará (2010). Associate Professor and Software Department Chief at University Gregorio Semedo (UGS), Angola (2016). Associate Professor at University Lusitana of Angola (2009-2015). Master in Artificial Intelligence UFC (2007). Has large experience in Artificial Intelligence, Bioengineering, and Applied Computer Science, focusing on signal and image processing. RESEARCH AREAS - Neuroscience applied to management (marketing, leadership, performance) - Business Analytics - Big Data Applications - Theory of Constraints - Project management - Digital Signal Processing - Bioengineering / Computer-Aided Diagnostic Systems - Artificial Intelligence - Deep Learning - Nonlinear analysis and dynamics of time series.

TITLE

Intelligent Data Fusion System for Assessing and Classifying the Long-Term Effects of Exposure to COVID-19 in Pregnancy (Long Covid): Associated Neurophysiological and Epigenetic Mechanisms and Consequences for Infant Development

ABSTRACT

The Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2) is responsible for the most significant global public health crisis of the last 50 years, having brought severe damage to mental health, with about 36% of patients presenting neuropsychiatric symptoms during or in cases of "Post-Acute Sequelae of COVID-19" (PASC). Among these, we can mention cognitive impairment, fatigue, sleep disturbances, depression, post-traumatic stress, and

substance use disorders observed for more than 6 months after infection in patients who required hospitalization and non-hospitalized in percentages ranging from 3-47%. The main objective of this work is to develop and validate an intelligent system based on data fusion and multiple Artificial Intelligence approaches to assess PASC neuropsychiatric symptoms in women exposed to the SARS-CoV-2 virus during pregnancy with PASC neuropsychiatric symptoms, comparing the exposed non-pregnant women and the involvement of neurophysiological and epigenetic mechanisms, as well as determining the consequences of PASC for the development of babies. The project provides the follow-up for 12 months of women with long-term COVID treated at the HUWC (University Hospital), performing Neuropsychological and Sleep Assessments carried out through directed anamnesis, and polysomnography, in addition to various tests. Additionally, non-invasive ambulatory monitoring of heart rate is carried out, and computerized analysis of its variability is carried out. Metrics will be extracted in the time domains (SDNN, SDANN, RMSSD, pNN50, among others), frequency (HF, LF, LF /HF, among others), geometric and non-linear (entropy, chaotic, among others). The data collected in the research are from multiple sources and of different types, including laboratory analysis, DNA methylation and RNA sequencing, questionnaires, and monitoring tests such as polysomnography, EEG, EOG, and ECG. The data is consolidated, integrated, and validated in a structured and unstructured data lake, which allows classifying the project as a Big Data solution. The system also provides a layer for viewing and interpreting the information obtained, either through diagnostic support dashboards or through the use of eXplainable Artificial Intelligence (XAI) techniques to indicate the most relevant attributes for certain types of analysis.