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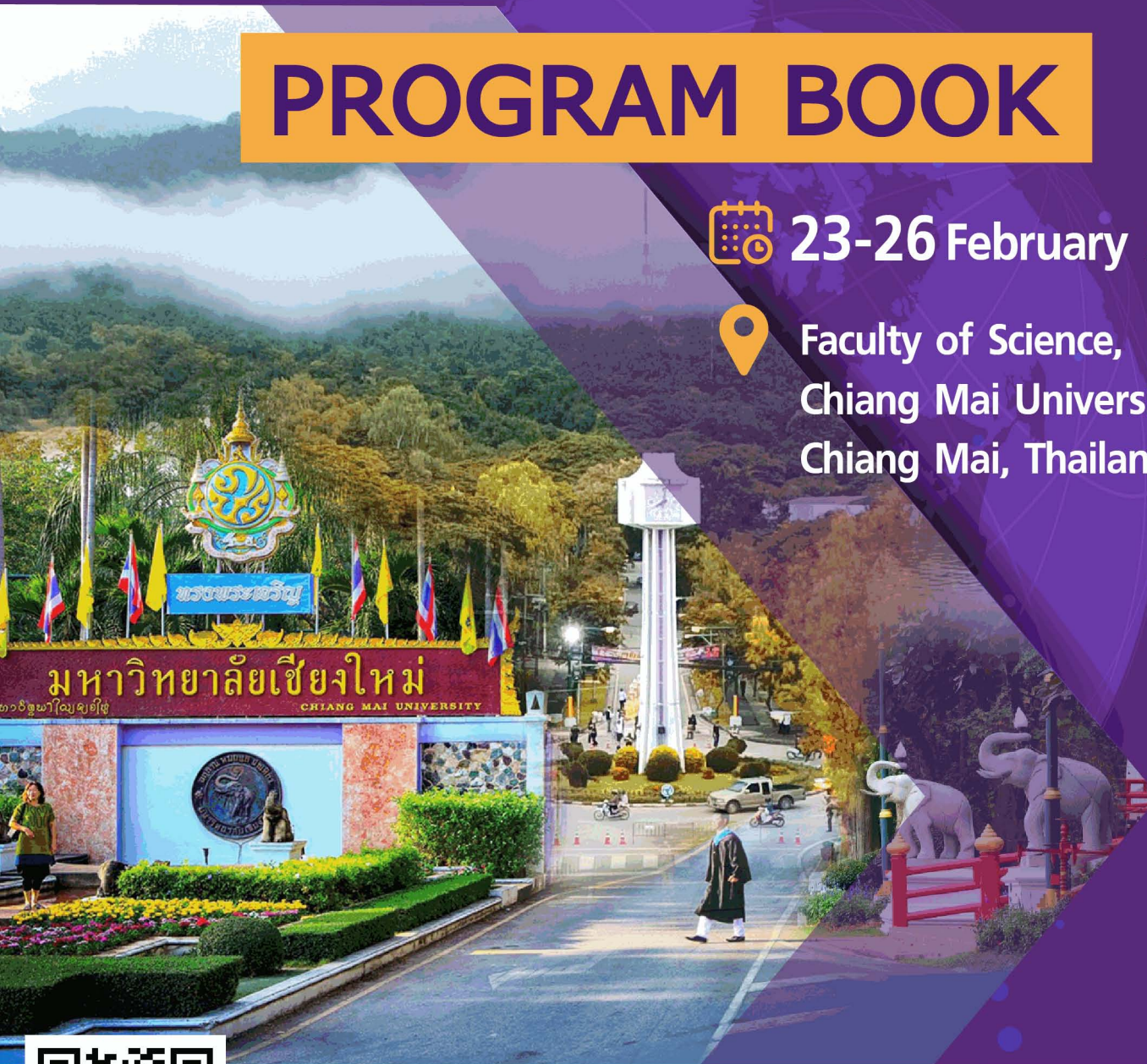
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Information Visualization and Machine Learning for Data Analysis of Sensors and Biosensors

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Abstract

Recent years have witnessed a remarkable increase in the use of nanomaterials for sensors and biosensors, with prospects of achieving ubiquitous monitoring of health and environmental conditions with deployment of wearable devices and sensor arrays. These developments yield large amounts of data, which require statistical and computational tools. In this lecture an overview will be presented of information visualization and machine learning techniques applied to the analysis of various types of sensing and biosensing data. Examples will be shown of electronic tongues, electrochemical sensors and biosensors employed to detect pollutants in waters, bacteria and biomarkers for different types of cancer and for SARS-CoV-2. The sensors and biosensors are normally built with a combination of nanomaterials and biomolecules using film-forming techniques that permit control of molecular architectures. With computational methods it has been possible to perform diagnosis with impedance spectroscopy and optical data, and also with direct image analysis of the biosensors units. These capabilities may allow for the development of computer-assisted diagnosis tools that integrate scientific data, images and text.

Keywords: layer-by-layer films, biosensors, clinical diagnosis, information visualization, machine learning