



Graduate School of Information Science, University of Hyogo
23rd International Research Seminar

**BREAKING THE VALIDATION PARADOX IN PATTERN
DISCOVERY FOR DYNAMIC TIME SERIES**

Mon. 2 June 2026 (17:00 ~ 18:00) JST

ONLINE SEMINAR

Clustering and other unsupervised methods aim to discover latent mathematical organisation in data, yet they lack principled criteria for determining whether discovered structures are genuine or artefactual. This creates a fundamental epistemic circularity: to know whether discovered patterns are genuine, we must validate the methods; but to validate the methods, we must already know whether the patterns are genuine. Because unsupervised learning is applied precisely when structure is unknown, its results are often difficult to falsify.

In this talk, I examine how this problem emerged through the analysis of continuous glucose and insulin delivery data from people with Type 1 Diabetes, where multiple clustering and probabilistic modelling approaches produced strikingly different yet individually plausible results. Although standard validation metrics suggested strong performance, disagreement between methods exposed the fragility of prevailing evaluation practices and the risk of mistaking artefacts for genuine discovery.

To address this challenge, I present a framework for objective, structure-specific validation in unsupervised learning. As one example, I show how canonical correlation patterns—derived from the geometry of correlation space—provide grounded benchmarks for evaluating unsupervised methods in correlated time series. More broadly, this highlights how principled validation can transform unsupervised learning from speculative exploration into scientifically grounded discovery in dynamic settings.

Register here (free)

<https://shorturl.at/7DQit>

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Guest Speaker



Zahraa Abdallah

Senior Lecturer,
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Zahraa S. Abdallah is a Senior Lecturer (Associate Professor) in Machine Learning at the University of Bristol, UK, where she leads the Data Science Research Lab. Her research focuses on time series analysis, adaptive learning, explainable AI, and multimodal learning, with particular emphasis on healthcare applications. She received her PhD from Monash University, Australia, where her dissertation was awarded the prestigious Mollie Holman Medal for the best thesis in the School of Information Technology. Her recent projects focus on learning from and evaluating time series in dynamic settings, with applications spanning type 1 diabetes, cancer research, Alzheimer's biomarkers, Parkinson's disease EEG analysis, finance, and insurance.

For more details:

<https://www.bristol.ac.uk/people/person/Zahraa-Abdallah-06844ace-4e4b-4cf5-8212-7266bec7ede8/>