A Comparative Study of Data Mining-Based Bridge Monitoring Using Vibration Data

Meisam Gordan[1, 3*], **Daniel McCrum**[1], **Ong Zhi Chao**[2], **Zubaidah Ismail**[3], **and Abdollah Malekjafarian**[1]

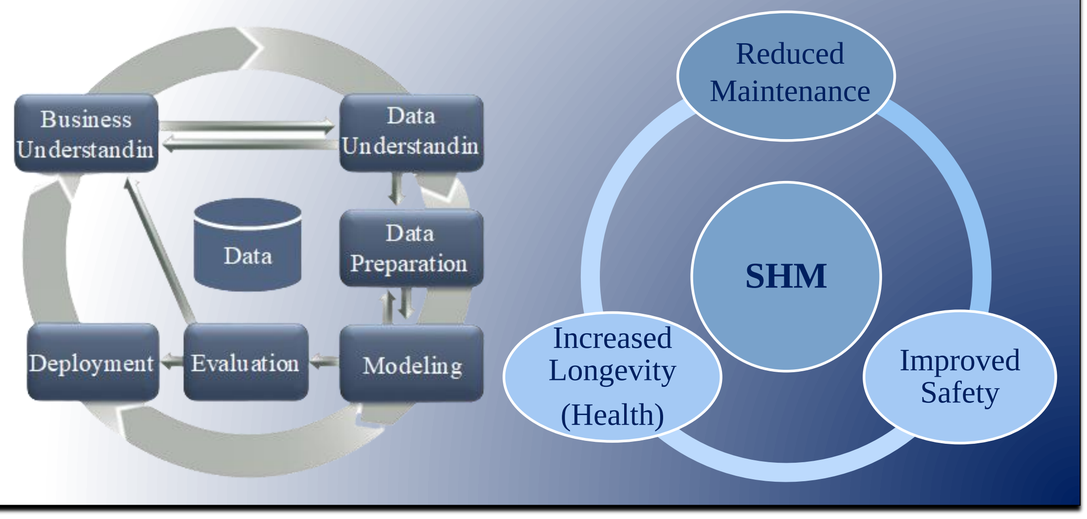
[1]School of Civil Engineering, University College Dublin (UCD), Belfield, D04 V1W8 Dublin, Ireland
[2]Department of Mechanical Engineering, University of Malaya (UM), 50603 Kuala Lumpur, Malaysia
[3]Department of Civil Engineering, University of Malaya (UM), 50603 Kuala Lumpur, Malaysia

Corresponding author E-mail address: meisam.gordan@ucd.ie

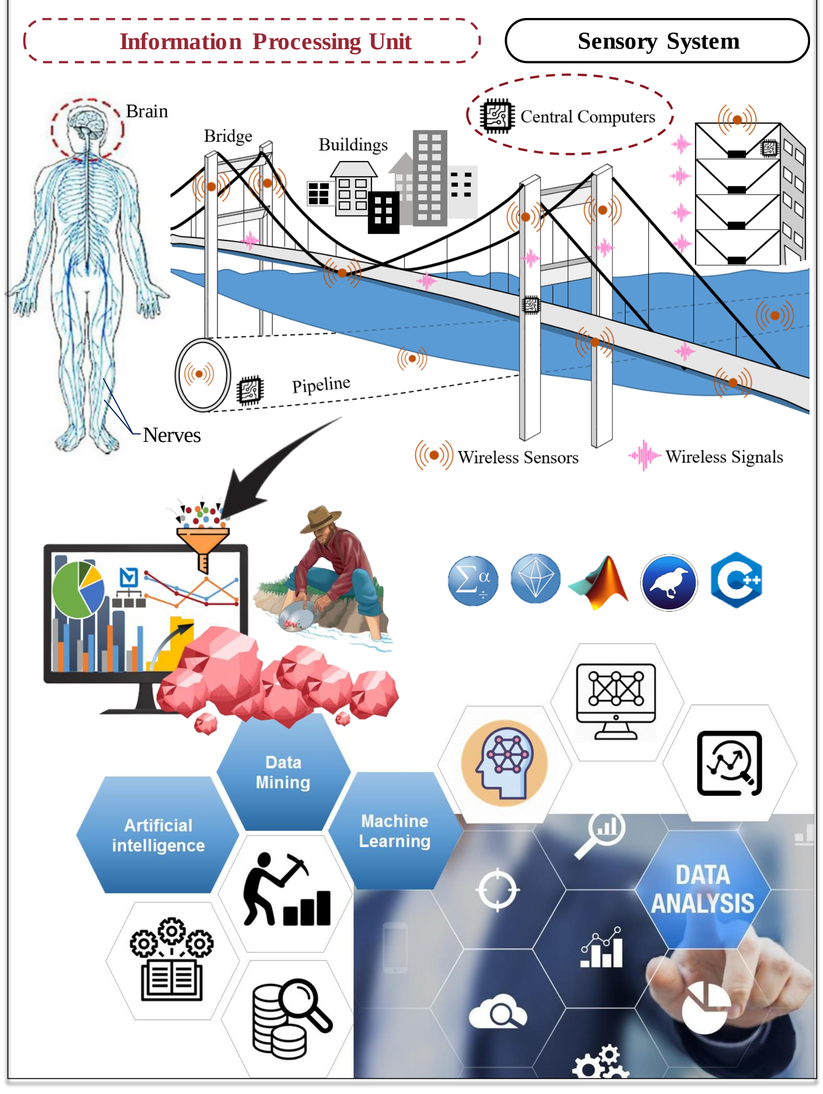
UCD STEM SYMPOSIUM
June 13th, 2023

Abstract

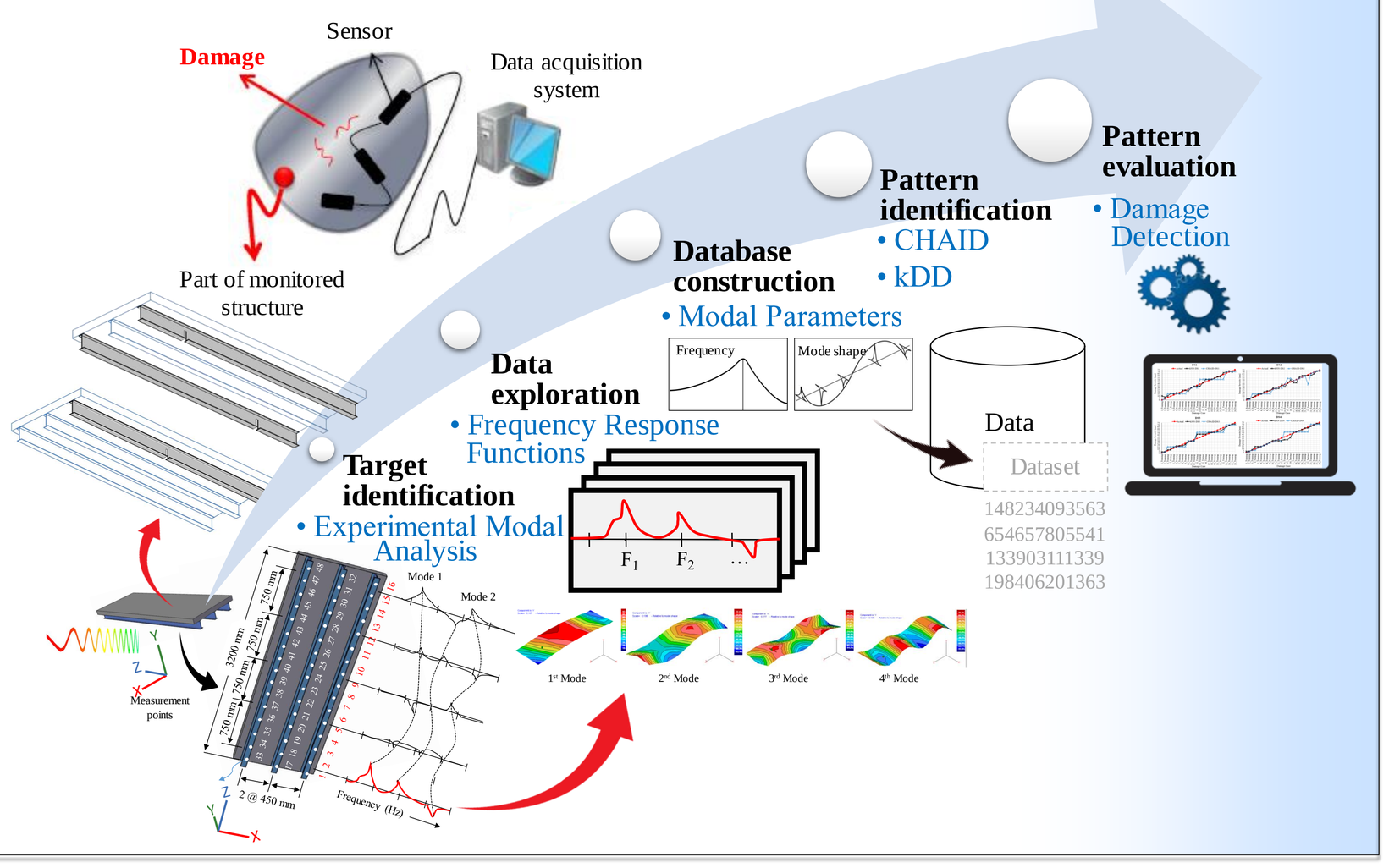
Bridge monitoring is one of the most significant areas of Structural Health Monitoring (SHM) due to the aging infrastructure that is nearing or has already exceeded its design life. Computing technologies, such as data mining, play a vital role in extracting valuable insights from real-world datasets. This study aims to demonstrate the potential of data mining in SHM for detecting damage in a lab-scale composite bridge using vibration data. To achieve this goal, a data-driven algorithm, k-Nearest Neighbors (kNN), is compared to Chi-squared Automatic Interaction Detector (CHAID) for predicting the severity of damage. The results indicate that kNN outperforms CHAID in terms of prediction accuracy for both training and testing segments.



Introduction



Methodology



Experimental Modal Analysis

Outcomes

Acknowledgement

UMEngSHM
University of Malaya • Faculty of Engineering • Structural Health Monitoring Group
umengshm.com

Collaborators

- Centre of Research Industry 4.0 (**CRI 4.0**), UM, Malaysia
- Advance Shock and Vibration Research (**ASVR**) Group, UM, Malaysia
- Preparedness and Resilience Enforcement for Critical INfrastructure Cascading Cyberphysical Threats and effects with focus on district or regional protection (**PRECINCT**), UCD, Ireland