MARA CORPORATION GROUP OF COMPANIES

KEMENTERIAN KEMAJUAN DESA DAN WILAYAH

KPTM KOLEJ POLY-TECH MARA

ICAR '23
INTERNATIONAL CONFERENCE ON CROSS-DISCIPLINARY ACADEMIC RESEARCH 2023

THE 2ND INTERNATIONAL CONFERENCE ON CROSS-DISCIPLINARY ACADEMIC RESEARCH 2023 (ICAR 2023)

Sustainable Business, Environment & Society

40181 700982

icar2023@kuptm.edu.my

Organizer:

UNIVERSITI POLY-TECH MALAYSIA UPTM

Co - organizer:

KPTM KOLEJ POLY-TECH MARA

ARSHAD AYUB GRADUATE BUSINESS SCHOOL

UNIVERSITI TEKNOLOGI MARA

Universiti Malaysia KELANTAN

UNIVERSITI TEKNOLOGI MARA INSTITUTE OF BUSINESS EXCELLENCE

UNIVERSITAS JAMBI

ICAR 2023: 103-107

THE APPLICATION OF MACHINE LEARNING IN DETECTING DAMAGE STRUCTURES

*[1]*F. F. Abdul Aziz,[2]Z.Yahya,.[3]D. I. Abdul Manan, & [4]M.A. Yunus, [5]R. Omar,*
[1]farah@uptm.edu.my, Universiti Poly-Tech Malaysia, Malaysia
[2-3] Universiti Poly-Tech Malaysia, Malaysia
[4] Structural Dynamics Analysis and Validation (SDAV), Faculty of Mechanical Engineering, Universiti Teknologi MARA (UiTM)
[5]Machinery Technology Centre, SIRIM Industrial Research,

ABSTRACT

The occurrence and development of damage to engineering structures is still not fully understood and is very difficult to be detected, located and quantified. Structural health monitoring (SHM) techniques using vibration-based damage detection (VBDD) are defined as a process to detect, locate and quantify structural damage. However, for a large, complex structure with joints, the VBDD method requires some knowledge of the damage location, which is itself a costly and time-consuming procedure due to the complex behaviour of the structural joints. This research aims to propose an advanced AI-based solution by using Machine Learning techniques to detect the presence of damage in the jointed structure. The newly developed algorithm of Machine Learning, which uses Artificial Neural Networks (ANNs) and modal testing techniques, is used to effectively and accurately predict the presence of damage in the structure. The Machine Learning algorithm is used to build the new prediction model and establish maximum correlation with the target response of the frequency response function (FRF) associated with the ensemble parameters. algorithm can learn from the data itself and find the optimal set for the given target. This leads to significant savings in terms of experimental effort, computational efficiency and faster decision making in detecting damage in the jointed structure. The result of the research, the development of the algorithm algorithms, will be able to learn from the data of the damaged structure itself and make predictions based on the learned data of the generated model.

Keywords: Machine Learning, Structural health monitoring, vibration-based damage detection, Artificial Neural Networks

ICAR '23

INTERNATIONAL CONFERENCE ON CROSS-DISCIPLINARY ACADEMIC RESEARCH 2023

Organizer:

UNIVERSITI POLY-TECH MALAYSIA
UPTM

Co - organizer:

KOLEJ POLY-TECH MARA
ARSHAD AYUB GRADUATE BUSINESS SCHOOL
Universiti Malaysia KELANTAN
UNIVERSITI TEKNOLOGI MARA
INSTITUTE OF BUSINESS EXCELLENCE
UNIVERSITAS JAMBI

icar2023@kuptm.edu.my

40181 700982