

ملخص البحث رقم (٣)

السيد الأستاذ الدكتور/ مقرر اللجنة العلمية الدائمة لترقية الأساتذة والأساتذة المساعدين للحاسبات والمعلومات

تحية طيبة وبعد – احيط سيادتكم علما بان البحث رقم ٣ بياناته كالتالي:
عنوان البحث باللغة الانجليزية:

Using Hybrid Filter-Wrapper Feature Selection with Multi-Objective Improved-Salp Optimization for Crack Severity Recognition

مكان النشر وتاريخه:

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١. سهاء المشاركون في البحث:

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ملخص البحث باللغة الانجليزية :

The emerging technology of Structural Health Monitoring (SHM) paved the way for spotting and continuous tracking of structural damage. One of the major defects in historical structures is cracking, which represents an indicator of potential structural deterioration according to its severity. This paper presents a novel crack severity recognition system using a hybrid filter-wrapper with multi-objective optimization feature selection method. The proposed approach comprises two main components, namely, (1) feature extraction based on hand-crafted feature engineering and CNN-based deep feature learning and (2) feature selection using hybrid filter-wrapper with a multi-objective improved salp swarm optimization. The proposed approach is trained and validated by utilizing 10 representative UCI datasets and 4 datasets of crack images. The obtained experimental results show that the proposed system enhances the performance of crack severity recognition with $\approx 37\%$ and $\approx 31\%$ increase in recognition average accuracy and F-measure, respectively. Also, a reduction rate of $\approx 67\%$ is achieved in the extracted feature set with all the tested datasets compared to the conventional classification approaches using the whole set of features. Moreover,

the proposed approach outperforms other approaches with classical feature selection methods in terms of feature reduction rate and computational time. It is noticed that using VGG16 learned features outperforms using the fused hand-crafted features by 17.7 %, 15.9 %, and 23.5 % for fine, moderate, and severe crack recognition, respectively. The significance of this paper is to investigate and highlight the impact of applying multi-feature dimensionality reduction through adopting hybrid filter-wrapper with multi-objective optimization methods for feature selection considering the case study of crack severity recognition for SHM.