8th World Conference on Structural Control and Monitoring (8WCSCM)
Orlando, FL, USA 5-8 June 2022

Pedestrian Suspension Bridge Monitoring Using Computer Vision

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Recently, numerous pedestrian suspension bridges have been constructed worldwide. While recent tragedies regarding pedestrian suspension bridges have shown how these bridges can wreak havoc on the society, there weren't any specific guidelines for construction standards nor safety inspections. Structural health monitoring is one of the methods to ensure the safety of pedestrian suspension bridges. System identification, one of the popular applications for structural health monitoring method, is a method to estimate the dynamic system from the measured response. Most of the system identification methods for bridges are currently adapting output-only system identification method, which assumes the dynamic load to be a white noise due to the difficulty of measuring the dynamic load. In the case of pedestrian suspension bridges, the pedestrian load is within specific frequency range, resulting in large errors when using the output-only system identification method. Therefore, this study aims to develop a system identification method for pedestrian suspension bridges considering both input and output of the dynamic system. This study estimates the location and the magnitude of the pedestrian load, as well as the dynamic response of the pedestrian bridges by utilizing artificial intelligence and computer vision techniques. Simulation based validation test and on-site validation tests were conducted to verify the performance of the proposed system. The proposed method is expected to improve the accuracy and the efficiency of the current inspection and monitoring systems for pedestrian suspension bridges.