Impact localization of aluminum plate by using CNN deep learning algorithm

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In recent, structural health monitoring (SHM) research is an important field that has been actively conducted by several researchers. Of the various research areas involved, the problem of location detection of impacts is very important for the assessment of the integrity of impacted structures. Therefore, various related studies have been conducted, and among these, impact position detection studies using time of arrival (TOA) of impact wave have been actively studied. However, as the recent researches on the application of artificial intelligence (AI) for image recognition become more active, this paper intends to apply AI to the impact location detection. In particular, four PZT sensors were used to acquire impact signals generated from an aluminum plate, and the acquired signal images were trained using the CNN deep learning algorithm to identify the characteristics of the signals. And based on this, the study of predicting impact location using random impact signal images was performed. In addition, we verified through experiments how the performance of the CNN deep learning algorithm changes according to various configuration values of the CNN deep learning algorithm. Finally, the possibility of detecting the impact location of the aluminum plate using the CNN deep learning algorithm was successfully confirmed.