

Development of Automated Crack Detection System for Concrete-based Railway Concrete Using Deep-Learning R-CNN

Yong Hyoun Na¹, Mi Yun Park¹, Seong Back Park², Jeon Kyu Nam²

¹R&D, SHTPI, Republic of Korea, ¹R&D, KORAIL, Republic of Korea

The concrete track on a railroad (track) is a structure that supports trains between railway infrastructure components and its continuous quality control and maintenance are important for the safety of trains and passengers. However, due to the aging of the facility, thermal expansion and contraction, damage caused by manpower, and changes in topography, it causes damage to the surface and inside of the concrete track. Split and Defect of the concrete track is usually called crack and it directly reflects the health condition of the concrete track structure. Timely and accurate monitoring information and techniques are needed to repair and prevent concrete structures. Concrete track that effects on railway safety can detect cracks using image processing technique. However, since a condition of concrete track and surface noisy are obstructed to detect cracks, there is a need for a way to remove them effectively. An automatic crack detection system was developed using a high-resolution line scan camera that can capture cracks of more than 0.3mm at 80km speed from the existing visual inspection. The acquired image can detect cracks using conventional pattern recognition techniques, but the non-crack interfere with crack detection and are not efficient. In this study, a process using Faster R-CNN deep learning analysis technique was developed to detect cracks in concrete. Deep learning-based automated crack detection solution was developed, analyzed by learning 400,000 concrete images, and compared with field crack information, it was reviewed with about 79% accuracy.