

Satellite Remote Sensing for Pavement Health Monitoring at the Network Level

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Traditional pavement inspection techniques, such as manual-base and vehicle-based survey, causes the pavement survey work to be costly and inefficient. In fact, some of these periodic inspection efforts are redundant and some of them cause late-detection of the problems. In the last two decades, the remarkable advance of Interferometric Synthetic Aperture Radar (InSAR) techniques has been witnessed. High-resolution satellite images have been freely accessible at several space agencies (such as ESA, JAXA, and CSA) and advanced InSAR image analysis techniques (such as DInSAR, PSInSAR, and SqueeSAR) have been developed, which enable millimeter-accuracy pavement surface deformation measurements at a large area (e.g. all the roads of Iowa). This project aims to develop an InSAR system for network-scale pavement health monitoring that will facilitate the early detection of pavement distresses, reduce/prioritize trips of inspection vehicles to lower the inspection cost, and help Iowa DOT to prioritize road maintenance strategies and maintain safety and quality of roads. The anticipated benefits include (1) a large monitoring area covering all of the roads in Iowa, which will help Iowa DOT to build more robust pavement and infrastructure management system; (2) high monitoring frequency (e.g. monthly) and continuous monitoring facilitate early detection of pavement distresses and early treatment with preventive measures, which can increase the service life of the pavement and reduce the total maintenance cost while maintaining the safety and quality of roads.

Keywords: Satellite Remote Sensing; Pavement Health Monitoring; Network Level; InSAR technique