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Proof of Concept with Distributed Temperature Sensing for Crack Detection on Dikes

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Cracks occurring on dike surfaces due to droughts, are a big threat for the safety of flood defence infrastructure as they increase infiltration rates and reduce the resistance to mass rotational failure (slope stability). Hence, an effective and sustainable monitoring system for crack detection is of paramount importance given the increase in frequency of drought events. Conventional methods heavily rely on visual inspections by expert observers, drone technologies survey, or destructive techniques such as sampling and trenching. Most of them result sparse qualitative and labor-intensive assessments. In this project, we aim to develop a method which combines two different sensing techniques —distributed temperature sensing (DTS) and conventional video cameras— for detecting the cracks on the dike surface. In contrast to earlier studies using DTS to measure the temperature changes during high water levels in the riverside slope and to detect seepage changes, we will be measuring the superficial moisture content on the riverside and the landside slopes of the dike, and use it as a proxy for crack detection in combination with the camera images and deep learning techniques. It is expected that by including the DTS measurements, the detection of cracks may outperform the actual methods in an economically and more densely manner along several kilometers of dikes in real time.