



The Future of Bridge Maintenance with the Usage of Automated Crack Detection Technology

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ABSTRACT

The overarching goal is to obtain long-term performance on highway structures, and more specifically on bridges. How to obtain this goal is through using high-performance concrete and other materials together to be able to create these long-lasting structures that do not require a significant amount of maintenance. Much of the research obtained is from the National Bridge Inventory (NBI) and InfoBridge, also known as LTBP Program, where students and professionals test how structurally sound bridges currently are and actions that can be taken to continuously improve them. Through the usage of data, trends can be found amongst bridges which are high performance, thus allowing for findings to be used as future reference. Furthermore, the data collected from the national bridge inventory and the LTBP program give insight for ways to go about bridge maintenance, preservation, and rehabilitation of these structures.

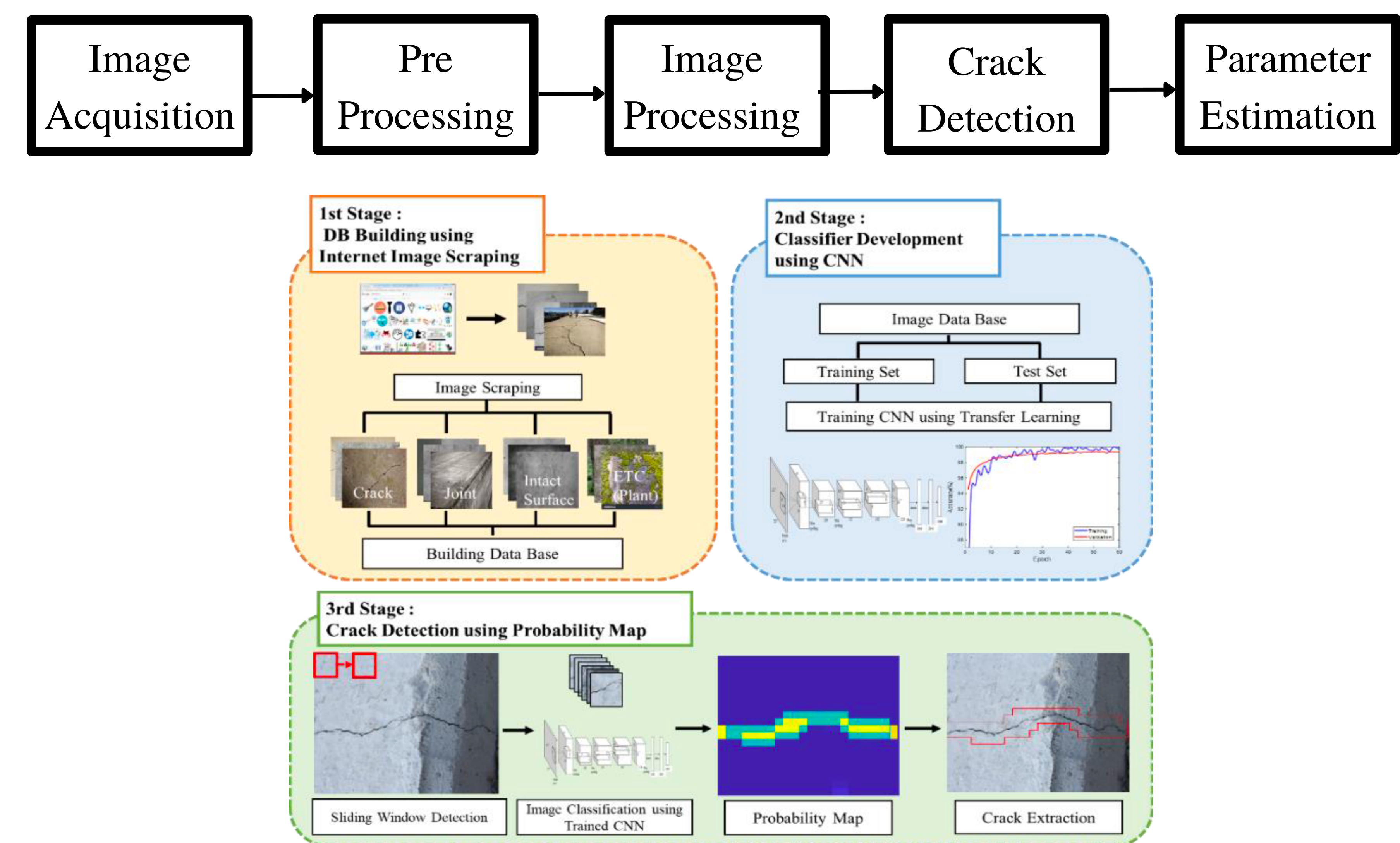


BACKGROUND

Bridges commonly fail due to cracks in the deck immediately after construction. However, it becomes extremely difficult to detect where there are any substantial issues during the maintenance checks. Traditional methods consisted of using visual, acoustic, and thermal inspections but there are challenges when it comes to outside factors that can affect maintenance checks. Thus in order to be able to detect where there could be any imperfections with grand ease, a STRUM (spatially tuned robust multi-feature) could be the solution to noninvasive structural checks. Through the usage of this technology, there could be less subjectivity in determining the structural soundness of a bridge and more direction when it comes to actions that need to be taken.

METHODOLOGY

- Collect images of structures that will be used for the crack detection assessment using an imaging device.
- Images are then preprocessed using methods such as segmentation or using filters to remove noise and shadows from the image.
- Image can then be converted to either grayscale or binary depending on the crack detection method used.
- Any cracks within the image can be detected due to the image being processed. The cracks are then separated based on their depth, width, and direction.
- Crack detection can help make decisions in regards to what can be done to better the structure



DISCUSSION AND RESULTS

Therefore, the usage of automated crack detection technology can give reliable insight into the severity of these cracks. Being able to detect the point source problem can help combat potential bridge failure and help the structure last longer. Shifting from traditional methods of inspection to more advanced methods is critical when it comes to analyzing the structure. Traditional methods can allow for subjectivity when it comes to results because there can be random errors stemming from the inspectors not being able to see internal failure or underestimating how severe the crack maybe. Whereas, the automated crack detection system can help reduce the potential danger of that structure.