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Automatic Visual Data Interpretation for Pipeline Infrastructure Assessment

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Abstract

Due to the rapid aging of pipeline systems, municipalities have become proactive in checking their conditions regularly to ensure continuity of services and to protect the investment made in these networks. It is critical to have effective methods for assessing the condition of pipelines, evaluating the level of deterioration, and determining the type and probability of defects to allow selection of the maintenance/repair/rehabilitation strategies that will be least disruptive, most cost-effective and safe. This leads to collecting up-to-date and accurate pipeline condition data and automating pipeline construction and rehabilitation processes.

Among various existing pipeline electronic inspection techniques, RedZone Robotics Inc. provides one of the most flexible and industry-leading robotic equipment with superior data acquisition capabilities. They are also developing a new generation of robotic crawler for acquiring data independent of human operators. This innovative development creates the need to automate pipeline condition assessment, especially to automatically highlight and classify pipe defects. Therefore, the primary objective of this project is to advance image-content based automatic pipeline inspection and condition assessment with the participation of RedZone Robotics Inc. located in the Commonwealth of Pennsylvania. The research will take an innovative approach to bring automated pipeline infrastructure visual data interpretation and assessment to a new level of unprecedented quality and performance, and to close the semantic gap between image features and semantic concepts.