

Automated Translation of Rebar Information from GPR Data into As-Built BIM: A Deep Learning-based Approach

Zhongming Xiang,¹ Ge Ou, Ph.D.,² and Abbas Rashidi, Ph.D.³

¹Dept. of Civil and Environmental Engineering, Univ. of Utah, Salt Lake City, UT 84112; e-mail: zhongming.xiang@utah.edu

²Dept. of Civil and Environmental Engineering, Univ. of Utah, Salt Lake City, UT 84112; e-mail: ge.ou@utah.edu

³Dept. of Civil and Environmental Engineering, Univ. of Utah, Salt Lake City, UT 84112; e-mail: abbas.rashidi@utah.edu

ABSTRACT

Building Information Modeling (BIM) is increasingly used in the construction industry, but existing studies often ignore embedded rebars. Ground Penetrating Radar (GPR) provides a potential solution to develop as-built BIM with surface elements and rebars. However, automatically translating rebars from GPR into BIM is challenging since GPR cannot provide any information about the scanned element. Thus, we propose an approach to link GPR data and BIM according to Faster R-CNN. A label is attached to each element scanned by GPR for capturing the labeled images, which are used with other images to build a 3D model. Meanwhile, Faster R-CNN is introduced to identify the labels, and the projection relationship between images and the model is used to localize the scanned elements in the 3D model. Two concrete buildings is selected to evaluate the proposed approach, and the results reveal that our method could accurately translate the rebars from GPR data into corresponding elements in BIM with correct distributions.