



IFC-based Semantic Segmentation and Semantic Enrichment of BIM for Bridges

IFC-based Semantic Segmentation and Semantic Enrichment of BIM for Bridges

Researchers at Purdue have developed an advanced framework for creating 3D geometric Building Information Models (BIMs) of bridges from 2D PDF plans into semantically segmented and enriched Industry Foundation Classes (IFC) models. While existing PDF2BIM algorithms enable the semi-automatic generation of IFC models, they often lack essential semantic information and treat the entire bridge as a single entity. This new framework addresses these limitations by segmenting bridges into distinct components, such as piers and decks, and associating each with relevant semantic data. Tested on four bridges in Indiana, the framework demonstrates significant potential for enhancing data integrity, facilitating better asset management, and improving collaboration among stakeholders. By leveraging the abundant information within bridge plans, this approach streamlines the incorporation of rich data into IFC-based BIM models, ultimately leading to more cost efficient, sustainable, and productive bridge project management.

Technology Validation:

Multiple tests were conducted for the proposed framework. It was primarily tested on four different bridges in the state of Indiana, US. The 3D model that was generated by the PDF2BIM was first segmented into multiple different components, namely, a deck and 3 piers. Results demonstrated that the bridge models can enable more accurate analysis and evaluation of bridge performance, facilitate better asset management and maintenance strategies, and enhance communication among stakeholders, including designers, engineers, contractors, and asset managers.

Advantages:

- Enhanced accuracy and data management
- Sustainable

Technology ID

2024-ZHAN-70693

Category

Buildings, Infrastructure, &
Construction/ Infrastructure
Modeling & Digital Twins

Authors

Hang Li
Fan Yang
Jiansong Zhang

View online page



-Cost-effective

Applications:

-Bridge Design

-Performance Analysis

-Construction

-State DOTs

TRL: 4

Intellectual Property:

Provisional-Patent, 2024-08-30, United States

Keywords: Building Information Modeling (BIM),3D bridge modeling,Semantic segmentation,Industry Foundation Classes (IFC),PDF-to-BIM conversion,Infrastructure asset management,Construction project optimization,Bridge design automation,Digital twin for infrastructure,Structural component segmentation,Data-driven construction management,Sustainable infrastructure modeling,Civil engineering software,Collaborative construction workflows