Automated Building Permit Assessments Using Artificial Intelligence: a Technological Leap in Integrating Ai and Bim

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SUMMARY

Building permit assessments are critical to ensuring compliance with construction regulations, promoting safety, sustainability, and accessibility. However, traditional manual workflows are inefficient, prone to errors, and unable to scale effectively. Compounded by fragmented Building Information Modelling (BIM) data and ambiguities in natural-language regulations—such as undefined terms like "minimum clearance"—these challenges impede urban development processes.□This paper presents an innovative framework integrating Artificial Intelligence (AI) and BIM to automate building permit assessments. The proposed framework addresses regulatory complexity and operational inefficiencies through three key components:□- Regulatory Intelligence with NLP: Advanced Natural Language Processing (NLP) algorithms extract and translate compliance rules from unstructured legal texts into precise, machine-readable formats. This minimizes interpretation biases and resolves ambiguities in regulatory language.□- Dynamic BIM Data Integration: A Dynamo-powered engine seamlessly links geometric and semantic BIM data with compliance rules for real-time validation of design elements, including spatial configurations and material properties.□- Predictive Compliance Validation: Machine Learning (ML) models analyze historical permit data to identify patterns in compliance violations, providing real-time visual feedback through intuitive 3D BIM interfaces. This approach facilitates iterative design improvements and fosters collaboration among stakeholders.□Preliminary results highlight the framework's ability to significantly reduce permit processing times and improve regulatory accuracy across diverse environments. By dynamically linking machine-readable regulatory texts with BIM data and leveraging predictive analytics, this framework addresses long-standing barriers to automation. It empowers architects to pre-evaluate designs for compliance, enabling faster submission and review processes. Furthermore, it equips city councils and surveyors with tools to expedite evaluations, fostering transparency, collaboration, and efficiency in urban governance.□This study represents a technological leap in integrating AI and BIM, setting a new

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standard for regulatory intelligence and real-time decision-making in construction compliance. Its implications extend to creating smarter, more sustainable urban environments by overcoming inefficiencies in the current permitting processes.