


Chapter 6

Prediction and Enhancing Construction Processes Through Machine Learning and Recent Optimization Techniques

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ABSTRACT

This chapter explores artificial intelligence (AI) and machine learning (ML)-driven processes in transactions that detect optimization, emphasizing forecast analysis, auto tomatoes, and data-based decisions. It investigates how AI/ML models increase the accuracy of planning, resource allocation, reducing risk and real-time monitoring of construction activities. By integrating history with intelligent algorithms, construction workflow can be trimmed for more efficiency, cost-effectiveness and durability. Case studies and emerging technologies highlight AI's transformative prospects in eliminating industry challenges such as delays, budget overruns, and safety risks. The chapter outlines practical structures and future directions for the implementation of AI and ML to optimize the construction project exhibition from the end to end.

INTRODUCTION

In the construction industry, which has long been considered by the adoption of new technologies, has been taking deeply with the integration of artificial intelligence (AI) and machine learning (ML). These technologies are re-defining how construction projects are conceived, planned, implemented and managed. Among the increasing pressure for timely delivery, cost control, durability and safety, presents a powerful set of tools for processes throughout the life cycle of AI and ML construction projects. Their forecasts to adopt and mark the main shift from the reactive in prescription management approaches, enabling stakeholders to make informed decisions on the basis of data-based insights rather than inward or stable planning models (Kazeem et al., 2023).

At its root, AI refers to the simulation of human intelligence processes by machines, especially computer systems. These processes include learning, logic and self-improvement. ML, a subset of AI, focuses on the development of algorithms that allow the computer to learn from predictions or decisions based on data based on data. When applicable to construction management, these technologies provide unprecedented capabilities in the process of large and complex datasets to expose patterns, prediction results, and automatic routine and complex tasks equally (Baduge et al., 2022a).

The most attractive advantage of AI and ML in construction is predictive analysis. Construction Projects Produces a large amount of data through building information modeling (BIM), sensors, drones, project management. Software and Historical Tiachaic Records. M.L. Algorithms can analyze these data sources such as potential project risks such as cost overrun, scheduled delays, labor shortages

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