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A Review on Possibilities of Artificial Intelligence in construction Industry

Arpit Singh Bhadoriya
Assistant Professor, Dept. of Civil Engineering, UCE, Govind Guru Tribal University, Banswara, Rajasthan, India

Abstract: ***At present if we see construction industries, they are facing lot of problems which finally create project delay. The progression of the construction industry is strictly limited by the countless complex challenges it faces such as cost and time overruns, health and safety, productivity and labour scarcities. Working on these complex problems of construction industries is not easy in many aspects but if these problems are countered with the help of AI results will be robust. Therefore, many research efforts in the Architecture, Engineering, and Construction community have recently tried introducing AI into building asset management processes. AI is also able to make the process of decision making faster, decrease error rates, and increase computational efficiency. Among the different AI techniques, machine learning, pattern recognition, and deep learning have recently acquired considerable attention and are establishing themselves as a new class of intelligent methods for use in structural engineering. A present review of existing literature on AI applications in the construction industry such as activity monitoring, risk management, resource and waste optimization was conducted. Additionally, the opportunities and challenges of AI applications in construction were identified and presented in this study. This study focuses on AI and its application in construction industry.***

Keywords: Artificial Intelligence, Machine learning, Asset Management, Deep Learning, Sustainability, Safety, Risk

I. INTRODUCTION

In recent years, technology is increasingly being used in a range of ways to make construction more efficient and innovative. It is no longer odd to fly a drone over a construction site, to optimize work schedules to improve workplace safety or choose the best setting based on predictions. All possible because of artificial intelligence (AI). Despite a retarded initial adoption pace, construction leaders are beginning to take a greater interest in the transformative prospects of AI tech. During the next upcoming years, expect an increasingly quick rate for tech acceptance as applications and products targeted for construction continue hitting the market[1]. As a matter of fact, the construction industry is one of the least digitized industries in the world and most stakeholders acknowledge the age-long culture of resistance to change. The lack of digitization and overly manual nature of the industry makes the management of projects more complex and unnecessarily tedious. The absence of adequate digital expertise and technology adoption within the construction industry has also been linked to cost inefficiencies, project delays, poor quality performance, uninformed decision-making and poor performance in terms of productivity, health and safety [2]. Construction has been regarded as one of the riskiest industries, where the number of fatal accidents exceeded in many developed countries without a significant downward trend. Numerous kinds of research have revealed that safety issues are tied up with hazardous working conditions and the lack of supervision, emphasizing the necessity of construction management for safety guarantee and accident prevention. By using data to help identify patterns and determine the root cause of an accident, incident or near miss, AI systems in construction are aiming to prevent accidents by giving workers the tools to predict and thus, prevent accidents, and most importantly, fatalities. Since manual checking may cause some errors, real-time detection of behaviours of the workers may help to reduce accidents in the construction sites. With the help of AI (Artificial intelligence) safety in construction sites can be monitored at ease [4].

II. ARTIFICIAL INTELLIGENCE AND CONSTRUCTION WORKS

Artificial intelligence can play a vital role to make construction work more efficient. Some fields where AI can do revolutionary work are

A. Resource and waste optimization

There is a growing amount of construction and demolition waste produced each year across the due to rapid continual development. These construction activities have adverse effects on the environmental, natural and human resources globally observed a paradigmatic change in the approaches to waste management from waste intelligence, which suggests measures to reduce waste only after it happens, to proactive data-driven approaches i.e. waste analytics, which minimizes waste through design[2].

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There has been an increasing use of BIM as a virtual, less-expensive and computational environment to enable construction design with a view to minimize waste generation[5].

B. Estimation and scheduling

AI-based estimation (or prediction) models have wide applicability in various domains of the construction industry. Particularly, these estimation models are instrumental in the early prediction of construction cost and duration, which are key project success factors. Unreliable project cost and time estimates could have huge economic and financial implications [2].

C. Supply chain management

To explore factors affecting supply chain excellence and outcomes, revealed issues such as SCM knowledge education and supply chain culture. The major barriers found are lack of top-level buy-in and general understanding of supply chain. The high cost of advanced IT for SCM, lack of unique and regional specific performance measurement frameworks, lack of organizational trust and effective communication channels between partners had been a major hindering factor. AI techniques can play a significant role in solving these issues that are hindering excellence in the supply chain[2].

D. Health and safety

As artificial intelligence evolves, so do its abilities to improve safety standards while predicting incidents before they happen. Using artificial intelligence, safety monitoring systems may sift through vast quantities of visual data to detect personnel and circumstances that do not comply with safety standards. .AI can be an invaluable tool in all sorts of business endeavors. When it comes to processes like data analysis and safety protocols, machine learning is the future. For instance, AI programs can assist with the visual analysis of a construction site, providing real-time data collated from cameras and other sensors throughout the location. This can provide vital information on potential hazards, accident likelihood, and similar key points to help plan for worker safety[4].

E. Risk Management

Risk management is a discipline that allows for “reducing financial losses, improving health and safety, goodwill and reputation, minimizing environmental and social impact, can result in reduced liabilities such as insurance premiums, fines and penalties”. Most of the evaluations in Risk Management are subjective and based on experience; therefore, much research focuses on establishing a methodology for making objective, data-driven decisions and adopting AI solutions[1].

Case-Based Reasoning is a general term in project risk management for solving new problems based on similar past experiences. It helps identify and mitigate project risks at early stages, such as design and construction planning. Some efforts have been noted in gathering risk cases and building a risk case database to facilitate CBR for practical use in the construction industry[7]. However, because risk case databases frequently contain large amounts of data and reports written in unstructured textual data, manually examining, analysing, and comprehending these reports is time-consuming, labour-intensive, and inefficient. When it comes to collecting 'right' situations and information in a short amount of time, the necessity of learning from previous experience is sometimes overlooked[6].

Every construction project has some risk that comes in many forms such as Quality, Safety, Time, and Cost Risk. There are AI and machine learning solutions today that general contractors use to monitor and prioritize risk on the job site, so the project team can focus their limited time and resources on the biggest risk factors[3].

III. CHALLENGES

Use of AI in construction engineering can make revolutionary changes in construction industry but it also has some challenges to face as construction work is not still have much use of machine learning and other such things. Still construction industries are mostly dependent on manpower hence to adopt Artificial Intelligence completely in construction will not be much easy.

IV. CONCLUSIONS

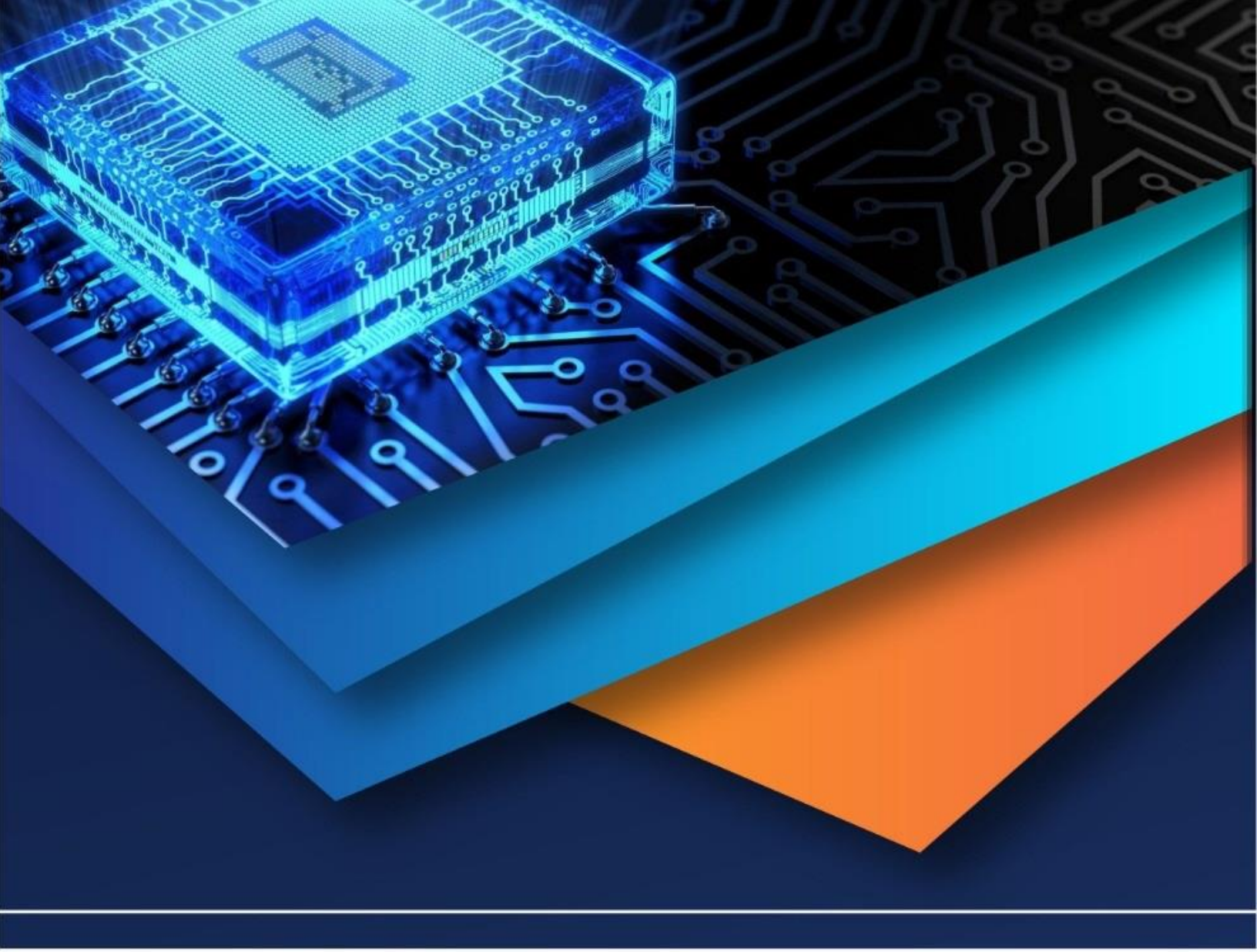
At present Artificial Intelligence technologies in civil engineering is at very early stage of development and evolving day by day hence application of AI at big scale can have technical defects. However use of AI under controlled manner can give efficient results. This study has provided some areas where AI can be a tool to produce better results.

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