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AI-driven valuation: a new era for real estate appraisal

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Abstract

Purpose – This paper explores the emergence of artificial intelligence (AI) in real estate valuation, analysing its potential to enhance accuracy, efficiency and transparency in the appraisal process and examines the implications of this technological shift for various stakeholders.

Design/methodology/approach – This research adopts a comprehensive literature review approach, drawing upon existing research in real estate, computer science and related fields. A systematic analysis of scholarly publications and industry trends was conducted to examine the underlying technologies, diverse applications, potential benefits, inherent limitations and future trends associated with AI-driven valuation models, including machine learning and deep learning methods.

Findings – The study reveals that AI-powered valuation models offer significant advantages over traditional appraisal methods, including enhanced accuracy, increased efficiency, reduced costs and improved risk management. However, critical challenges related to data bias, algorithmic transparency (the "black box" problem), and the need for human oversight must be addressed to ensure responsible and effective AI implementation.

Originality/value – This paper provides insights into the transformative potential of AI in real estate valuation for a wide range of stakeholders. Real estate professionals can gain a better understanding of how AI can enhance their decision-making processes, improve efficiency and mitigate risk. Appraisers will benefit from the paper's analysis of evolving skillsets required in the AI era, while lenders and investors will gain a clearer understanding of how AI-driven valuation can strengthen risk assessment and portfolio management. Policymakers can utilize this research to inform the development of ethical guidelines and regulations for AI adoption in real estate appraisal.

Keywords Artificial intelligence, Real estate appraisal, Valuation, Machine learning, Explainable AI, Automated valuation models

Paper type Research paper

1. Introduction

The global real estate market, a cornerstone of economic stability and growth, hinges on the accurate and timely valuation of property. However, traditional appraisal methods, often relying on expert judgement and limited datasets, face increasing challenges in keeping pace with a rapidly evolving, data-driven landscape. This challenge is amplified by the rise of sophisticated investors demanding more insightful and transparent valuations (Barkham and Geltner, 1995; DeLisle *et al.*, 2020). Moreover, the increasing complexity of real estate assets, the emergence of novel property types, and the dynamic nature of global markets further strain the capabilities of traditional appraisal practices (Szumilo and Wiegelmann, 2024).

While traditional methods, like the Sales Comparison, Income, and Cost approaches, remain effective for individual property assessments, their limitations become pronounced when applied on a larger scale or in volatile markets. The inherent subjectivity of expert opinions can introduce inconsistencies and potentially undermine the reliability of valuations, particularly in high-stakes scenarios such as mass appraisal for taxation (Lee *et al.*, 2022; Renigier-Biłozor *et al.*, 2022). Furthermore, these methods often rely on restricted datasets that may be outdated, incomplete, or fail to capture the nuanced dynamics of rapidly changing real estate markets (D'Amato and Kauko, 2017; Pagourtzi *et al.*, 2003).

The emergence of Artificial Intelligence (AI) presents a transformative solution, offering the potential to revolutionize how we value real estate. AI, encompassing fields like machine learning (ML) and deep learning (DL), has demonstrated remarkable capabilities in data analysis, pattern recognition, and predictive modelling (Mullainathan and Spiess, 2017).

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opportunities, and the impact on housing affordability and access to ensure an equitable and sustainable transition.

(3) *Human-AI collaboration:* The optimal interplay between human expertise and AI capabilities in real estate valuation remains an open question. Research is needed to explore effective strategies for integrating AI tools into the appraiser's workflow, leveraging human judgement to validate and refine AI outputs, and fostering trust and collaboration between humans and AI.

(4) *Data bias and fairness:* AI models can inherit and perpetuate biases present in historical data, potentially leading to discriminatory valuations (Hunkenschroer and Luetge, 2022; Iban, 2022; Ozmen Garibay *et al.*, 2023; Renigier-Biłozor *et al.*, 2022; Seagraves, 2024). Developing robust techniques for bias identification, mitigation, and prevention in both data collection and model development is critical for ensuring fairness and equitable outcomes in AI-driven valuation.

(5) *Regulation and ethical frameworks:* The rapid evolution of AI necessitates the development of comprehensive regulatory frameworks and ethical guidelines specific to the real estate sector. Research is needed to inform the creation of standards addressing data privacy, algorithmic accountability, legal admissibility of AI-generated valuations, and the ethical implications of AI deployment, ensuring responsible and trustworthy AI adoption.

Prioritizing research in these crucial areas and fostering collaboration among academics, industry professionals, policymakers, and ethicists will enable the real estate industry to harness the transformative potential of AI while addressing its inherent complexities. This collaborative effort will pave the way for an AI-driven future for real estate valuation that is not only innovative but also responsible, equitable, and beneficial for all stakeholders.

7. Conclusion

This paper set out to explore the transformative potential of artificial intelligence (AI) in real estate valuation. Through a comprehensive review of existing research, we have analysed the diverse applications of AI, ranging from automated valuation models (AVMs) for residential properties to sophisticated tools for mass appraisal. Our analysis reveals a compelling case for AI's potential to revolutionize the valuation process, bringing significant enhancements to accuracy, efficiency, and transparency.

However, the journey toward widespread AI adoption in valuation is not without its challenges. Our findings highlight critical considerations that must be addressed to ensure responsible and ethical implementation. The potential for data bias, leading to discriminatory valuations, and the opacity of some AI algorithms ("black box" problem), raise significant concerns regarding fairness, transparency, and accountability. These concerns underscore the need for a robust AI framework for real estate valuation – one that prioritizes data quality, bias mitigation strategies, and the development of interpretable AI models that can clearly explain their reasoning to human stakeholders.

Moreover, ethical considerations surrounding the potential impact on the appraisal workforce must be carefully addressed. While AI might automate some tasks, it also presents opportunities for appraisers to evolve their skillsets, moving towards roles focused on data interpretation, model validation, and strategic advisory services.

Ultimately, the successful integration of AI in real estate valuation hinges on a balanced approach, embracing the power of innovation while upholding principles of responsibility, fairness, and transparency. By proactively addressing the ethical and practical challenges, the real estate industry can leverage AI's transformative potential to create a more sustainable and trustworthy future for the appraisal profession and the entire real estate market.

Future research should delve deeper into empirical validation of AI models, develop standardized methodologies for data collection and model development, and further explore the long-term socioeconomic impact of AI adoption on the workforce and housing markets. By focusing on these key areas, we can ensure a transition to AI-driven valuation that is both innovative and equitable.

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