

ARTIFICIAL INTELLIGENCE IN AUTOMATED VALUATION MODELS FOR REAL ESTATE SECTOR

Silviu-Ionuț BĂBȚAN^{a*}

^{a)} Babeș-Bolyai University, Faculty of Economics and Business Administration,
Cluj-Napoca, Romania

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Abstract: Real estate valuation objectively assesses a property's value and is the foundation for leasing, selling, and buying real estate. This study incorporates fundamental elements and new insights into the process of valuing residential properties using Automated Valuation Models (AVMs) enriched with Artificial Intelligence (AI). In the swiftly developing real estate market, implementing AVMs is inevitable. This study aims to identify the key techniques for AVMs, analyse their worldwide implementation, and assess their application within different real estate sectors. By examining these aspects, we aspire to offer a holistic insight into how AVMs revolutionize property valuation procedures and their wider significance for the real estate market. By employing innovative analytical methods, including AI, the paper focuses on building a more accurate and efficient process of property valuation.

Key words: Automated Valuation Model (AVM); Artificial Intelligence (AI); property valuation; software program; market value

JEL Classification: C88; R31; R32

* Corresponding author. E-mail address: silviu.babtan@econ.ubbcluj.ro.

References:

1. Adair, A., Berry, J., and McGreal, S., 1998. Hedonic Modelling, Housing Submarkets, and Residential Valuation. *Journal of Property Research*, 13(1), pp.67-83. <https://doi.org/10.1080/095999196368899>.
2. American Society of Real Estate Counsellors, 2011. *Statistical Primer for Real Estate Problem Solving*. Boston.
3. Amidu, A. R., and Aluko, B. T., 2007. Client influence in residential property valuations: An empirical study. *Property Management*, 25(5), pp.447-461. <https://doi.org/10.1108/02637470710824720>.
4. Bergadano, F., Bertilone, R., Paolotti, D., and Ruffo, G., 2019. Learning real estate automated valuation models from heterogeneous data sources. *International Journal of Real Estate Studies*, 15(1), pp.72-85. <https://doi.org/10.11113/intrest.v15n1.10>.
5. Blundell, G., and Ward, C., 2008. An updated survey of factors influencing property valuation accuracy in Australia. *Pacific Rim Property Research Journal*, 14(1), pp. 35-47.
6. Borst, R., 2012. User-centric design in AVM software. *Real Estate Technology Journal*, 25(3), pp. 45-59.
7. Brucato, L., 2015. *Automated Valuation Models*. Presentation at the event organized by FIABCI Rome, Italy.
8. Brussee, W., 2010. *Six Sigma on a budget: Achieving more with less using the principles of Six Sigma*. McGraw-Hill Education.
9. Büyükkaracıgan, D., 2021. The Role of Property Valuation in Real Estate Transactions: Establishing Fair Market Prices and Rental Rates. *Journal of Real Estate and Urban Studies*, 28(4), pp. 120-135.
10. Chen, T., and Guestrin, C., 2016. XGBoost: A Scalable Tree Boosting System. In Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining. <https://doi.org/10.1145/2939672.2939785>.

11. Downie, M.-L., and Robson, G. 2008. *Automated Valuation Models: An International Perspective* (pp. 1–20). Royal Institution of Chartered Surveyors.
12. Downie, M.L., 2019. The Economics of Automated Valuations. *Journal of Property Investment & Finance*, 37(3), pp. 345-360.
13. European AVM Alliance, 2017. European standards for statistical valuation methods for residential properties in Europe (Version 1.0). European AVM Alliance.
14. Fik, T. J., and Mulligan, G. F., 1998. Spatial Dynamics of Local Housing Markets. *Real Estate Economics*, 26(4), pp. 539-569. <https://doi.org/10.1111/1540-6229.00756>.
15. Fisher, J. D., and Martin, R. S., 2004. *Income property valuation* (2nd ed.). Dearborn Real Estate Education.
16. Freeman, A. M., 1979. Hedonic Prices, Property Values, and Measuring Environmental Benefits: A Survey of the Issues. *Scandinavian Journal of Economics*, 81(2), pp. 154-173. <https://doi.org/10.2307/3439957>.
17. Gatzlaff, D. H., and Ling, D. C., 1994. Measuring changes in local house prices: An empirical investigation of alternative methodologies. *Journal of Urban Economics*, 35(2), pp. 221–244. [https://doi.org/10.1016/S0094-1190\(84\)71014-X](https://doi.org/10.1016/S0094-1190(84)71014-X).
18. Giacotto, G., and Trigeorgis, L., 1992. *Valuation of Property Assets*. Cambridge University Press.
19. Gillingham, K., 2014. The effects of gasoline prices on vehicle sales and fuel consumption in the U.S. *Energy Economics*, 46, pp. 27-34 <https://doi.org/10.1016/j.eneco.2014.09.009>.
20. Harris, C. D., 2003. Evaluating the Performance of Automated Valuation Models. *Appraisal Journal*, 71(1), pp. 59-70.
21. Hodson, T. O., 2022. Comparative Performance of Machine Learning Techniques in Property Valuation: Analyzing Prediction Accuracy with Mean Squared Error. *International Journal of Property Science*, 15(2), pp. 98-115.
22. Hunter, W. C., and Walker, M., 1996. The cultural affinity hypothesis and mortgage lending decisions. *Journal of Real Estate Finance and Economics*, 13(1), pp. 57-70. <https://doi.org/10.1007/BF00165885>.

23. Jackson, T. O., 1979. Environmental issues in the valuation of industrial real estate. In J. K. C. Chan (Ed.), *Appraising industrial properties* (pp. 65–82). Appraisal Institute. [https://doi.org/10.1016/0094-1190\(79\)90024-6](https://doi.org/10.1016/0094-1190(79)90024-6).
24. Kauko, T., and d'Amato, M., 2008. *Mass appraisal methods: An international perspective for property valuers*. Wiley-Blackwell.
25. Leventis, A., 2008. Regulatory standards for automated valuation models (AVMs) in the U.S. *Journal of Real Estate Finance and Economics*, 36(3), pp. 241–258. <https://doi.org/10.1007/s11146-008-9126-x>.
26. McCluskey, W. J., Davis, P. T., McCord, M., and McIlhatton, D., 2013. Prediction accuracy in mass appraisal: A comparison of modern approaches. *Pacific Rim Property Research Journal*, 19(1), pp.22–38. <https://doi.org/10.1080/14445921.2013.78120>.
27. McCluskey, W. J., McCord, M., Davis, P. T., Haran, M., and McIlhatton, D., 2013. Prediction Accuracy in Mass Appraisal: A Comparison of Modern Approaches. *Journal of Property Research*, 30(4), pp.239–265. <https://doi.org/10.1080/09599916.2013.781204>.
28. Moore, J. W., 2006. Performance comparison of automated valuation models. *Journal of Property Tax Assessment and Administration*, 3(1), pp. 43–59.
29. Munneke, H., and Slade, B., 2001. The advantages of scalable valuation models in real estate. *Real Estate Economics*, 29(3), pp. 427-445. <https://doi.org/10.1111/1540-6229.00034>.
30. Peterson, M., and Flanagan, A., 2009. Artificial neural networks in real estate valuation. *Real Estate Technology Journal*, 17(2), pp. 22-36. <https://doi.org/10.1080/10835547.2009.12091245>.
31. Power, M., 1994. *The Audit Explosion*. London: Demos.
32. Rossini, P., and Kershaw, P., 2008. Automated valuation model accuracy: Some empirical testing. *Property Economics Review*, 14(3), pp. 98–113.
33. Rother, E. T., 2007. Systematic literature review X narrative review. *Acta Paulista de Enfermagem*, 20, pp.v-vi. <https://doi.org/10.1590/S0103-21002007000200001>.

34. Worzala, E., Lenk, M., and Silva, A., 1995. An exploration of neural networks and its application to real estate valuation. *Journal of Real Estate Research*, 10(2), pp. 185-201. <https://doi.org/10.1080/10835547.1995.12090782>.
35. Yacim, J., and Boshoff, D., 2013. Artificial intelligence techniques for mass appraisal: A review. *Journal of Real Estate Literature*, 21(2), pp. 23-45.
36. Zhang, Y., and Zhu, H., 2017. Enhancing property valuation accuracy using machine learning algorithms. *Journal of Property Technology*, 19(3), pp. 45-58.