

Human-Machine Synergy in Real Estate Similarity Concept

In the evolving field of real estate analysis and valuation, the synergy between human expertise and machine intelligence is reshaping how we define, analyze, and apply similarity in property valuation. Our presentation, Human-Machine Synergy in Real Estate Similarity Concept, delves into the potential of advanced AI models—specifically leveraging the HELIOS system (Homogeneity Estate Linguistic Intelligence Omniscient Support)—to transform real estate market analysis. By bridging linguistic intelligence with machine learning, we explore the creation of “real estate fingerprints,” unique identifiers derived from the synergistic analysis of property features. This method goes beyond traditional metrics to unlock deeper insights into property similarity, offering more accurate, context-aware market assessments. Our study emphasizes AI’s role in enhancing mass appraisals, ensuring more reliable, homogenous grouping of properties in dynamic market environments. This is particularly crucial in the context of property taxation, where accurate and fair assessments directly impact taxpayers. The application of AI in mass appraisal processes ensures that valuations are not only equitable but also transparent, reducing the potential for disputes and enhancing taxpayer trust in the system.

In doing so, we highlight the critical interplay between human judgment and machine precision, fostering innovation in property valuation through a blend of automated and expert-driven decision-making. This presentation aligns with the symposium's focus on AI’s transformative potential, showcasing how human-machine collaboration can lead to anti-fragile valuation systems that not only adapt but improve in the face of uncertainty.

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Dr. hab. inż. Małgorzata Renigier-Biłozor, prof. UWM, has been a faculty member at the University of Warmia and Mazury (UWM) since 2005. She holds extensive expertise in real estate valuation, including mass appraisal, decision support systems for real estate management, and the application of cutting-edge solutions in spatial management. She is also recognized as an expert in integrating AI technologies into decision-making systems in the real estate market. Prof. Renigier-Biłozor leads interdisciplinary research focused on developing methodologies for decision-making systems in real estate markets, with particular emphasis on behavioral aspects and advanced AI technologies in property value modeling. Her research also plays a critical role in identifying developmental risks affecting the functioning and transformation of spatial units.

Dr. Renigier-Bitozor has held significant administrative roles at UWM, including Director of the Institute of Spatial Economy and Geography, and she brings a wealth of international experience from research stays and study visits across countries such as the UK, Ireland, Turkey, the Netherlands, Spain, Italy, Lithuania, and the USA. She has also been an active participant in international research teams and conference organizations.

With over 100 peer-reviewed publications and numerous awards for her scientific and organizational achievements, she has led nine research and development projects funded by organizations such as the NCN, ESA, and IAAO. Her work has focused on decision support subsystems, real estate market evaluation, and hybrid systems powered by artificial intelligence to automate property valuation.

Currently, she leads a research project (2024–2027) funded by the National Science Centre (NCN) to develop socially acceptable procedures for transforming property taxation systems. Her collaboration with the business sector involves the implementation of advanced decision support systems for real estate management, with a focus on innovative, AI-driven solutions for property valuation. This project is especially relevant in the context of mass appraisal, ensuring fair, transparent, and equitable property taxation, which is crucial for fostering trust among taxpayers.

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Artur Janowski is a Professor in the Institute of Geodesy and Construction. He has published a number of textbooks and original papers on computer vision, artificial intelligence systems, application of human emotion recognition solutions in both Polish and international scientific journals. He is/used to be, amongst others, a member of the Institute of Research Engineers and Doctors (USA), Institute of Electrical and Electronics Engineers (IEEE) Geoscience and Remote Sensing Society, Institute of Electrical and Electronics Engineers (IEEE). Currently, his scientific interests are focused on: hybrid artificial intelligence system for AVM application. He is/was undertaking a number of projects financed by the Polish National Science Centre (NCN), European Space Agency (ESA) or International Association of Assessing Officers (IAAO)