

ARCHITECTURAL HERITAGE

MUR DM 117/Less - Artificial Intelligence as a tool for monitoring and regenerating the architectural heritage

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584] Politecnico di TORINO [Piva/CF:00518460019]- Less S.r.l. [p.IVA IT12599730012]
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Context of the research activity	<p>Artificial Intelligence (AI) plays a key role in preserving architectural heritage and improving building efficiency. It assesses cultural resources accurately, informs conservation decisions, and optimizes costs and energy savings. AI aids urban regeneration, enhancing quality of life and sustainability. Integrating AI offers opportunities for cultural resource evaluation, sustainable city regeneration, and enhanced energy efficiency. AI is a significant step towards preserving heritage and advancing a sustainable future.</p> <p>Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23002770003</p>
Objectives	<p>This research will be developed in the context of an industrial collaboration with the company Less S.r.l. and will be centered on the enhancement and regeneration of architectural heritage supported by the use of Artificial Intelligence.</p> <p>Artificial Intelligence (AI) is playing an increasingly significant role in preserving and enhancing architectural heritage and improving building energy efficiency. This innovative technology offers a great opportunity to improve heritage conservation, economically assess heritage resources, enhance decision-making processes, regenerate urban areas, and propose optimal building aggregations and stakeholder strategies for redevelopment. It aims to research the potential of AI in the architectural and urban context to support sustainable urban regeneration services for public administrations, real estate developers, and public/private investors facing complex urban regeneration projects with historical assets.</p> <p>The application of AI in architectural heritage allows for an accurate assessment of cultural resources. Through advanced image recognition, real-time data analysis, and key indicators, it efficiently identifies, catalogues, and evaluates valuable architectural elements. This enables informed decisions on conservation and restoration strategies, optimizing costs, maximizing energy savings, and adopting circular economy principles in</p>

material selection and resource use. Smart monitoring and control systems with AI can optimize energy resource use, reducing consumption and operational costs, thereby reducing environmental impact and providing long-term benefits such as comfortable and healthy buildings.

Furthermore, AI is a powerful tool for urban regeneration. Using machine learning algorithms and data analysis, it analyzes urban dynamics and suggests targeted redevelopment interventions at both architectural and district levels, improving citizens' quality of life, fostering sustainable city development, and monitoring gentrification phenomena and urban attractiveness fluctuations.

In summary, integrating AI into the architectural heritage sector offers multiple opportunities. It facilitates the evaluation of cultural resources, supports sustainable city regeneration through Renewable Energy Communities (CER) and/or Positive Energy Districts (PED), and enhances the energy efficiency of existing buildings using predictive and dynamic modeling (Digital Twin). Utilizing AI is a significant step towards preserving and valorizing heritage, contributing to resilient communities and advancing towards a sustainable future.

Skills and competencies for the development of the activity

- attainment of a Master's Degree or Specialist Degree or Degree issued according to the regulations preceding Ministerial Decree of November 3, 1999, No. 509, as amended by Ministerial Decree of October 22, 2004, No. 270, with a minimum score of 95/110;
- good knowledge of the English language;
- good knowledge of the economic and estimation discipline;
- experience in the estimation field of economic evaluation of projects;
- good knowledge in the construction and management of databases;
- good knowledge of geospatial data management and GIS programmes.