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Generative architectural and urban design technique based on artificial neural networks

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DESCRIPTION

Designers develop their works utilising models or drawings depending on their design needs and constraints during the design process. Its technique is comparable to that of algorithm programming, especially in the creation of shapes, such as generative design for pavilions or high-rise structures; it inputs various regulating elements and outputs the created geometric models or drawings. To produce design solutions, two algorithmic approaches are available. The Metropolis method, simulated annealing, and the genetic algorithm are examples of rule-based algorithms. These algorithms consider the design process to be an optimization problem, employing human-defined criteria to iteratively approach the solution that fits the requirements (Aletta, 2018).

For decades, academics in architectural design have used these algorithms to better their work. Simulated annealing has been used to address the facility layout problem in hospital interior design and develop optimal floor designs, as well as to analyse and optimise a lightweight construction with high performance and cheap cost. Furthermore, the evolutionary algorithm has been utilised to develop massing alternatives based on a site as a pixel image, as well as to search for design solutions that improve thermal and lighting performance in a structure. Users must precisely describe the objective function in order to "training" the algorithms to discover answers. This means that designers in the realm of design must give a clear assessment function to declare the instead of making a binary judgement on the design's quality Designers struggle to grasp and represent the exact goal function mathematically the data-driven process, which employs artificial intelligence technologies, is another method for generating design solutions. Artificial intelligence approaches, particularly machine learning techniques such as neural networks, have been widely applied in design and non-design fields. As a decision-making tool, machine learning differs from simulated annealing and the genetic algorithm. To be more specific, the process is depicted as a network of neurons and a neural network that explains the computational links between the inputs and outputs. When the neural network is given input feature data and output design data, the computer begins the training process. The neural network's parameters are optimised through back propagation (Adams, 2006).

The user may then use the finished network to enter a fresh set of feature data and receive feedback on the output design data. Using this strategy, the user must feed the neural network with only the design features and their related design outcomes, rather than the goal functions, in order to train a "data translator" which in the transformation of the input data into the output design works. In prior studies, researchers used machine learning to solve architectural, urban, and environmental concerns. Machine learning techniques have been used successfully to solve design problems such as learning design concepts from design examples, learning design shapes from point clouds, converting unstructured triangle meshes into ones with consistent topology, classifying design objects, and quantitatively describing and categorising the design process. Recently, researchers in architectural design have used various neural networks to learn and develop design works (Baumann, 1990).

Transforming visual design data into 2D graphics is a simple way to feed design data into neural networks. To produce design visuals, Generative Adversarial Networks (GANs) are utilised. GANs were previously used to create satellite views of cities, architectural floor plans and layouts, street view images, three-view images of residential dwellings, the geometry of curved surfaces as black-and-white images, structural solutions with

assessment criteria, and brick assembly plans (Postma, 2018). A side from 2D pixel-based tasks, 3D Convolutional Neural Networks (3DCNNs) and 3D Generative Adversarial Networks (3DGANs) [offer another technique to learning and inferring architectural data in a 3D voxel-based format]. These approaches may be used to categorise 3D architectural aspects, find difficult-to-manufacture elements in 3D models, and generate modelling for industry and furniture (Walden, 2014).

REFERENCES

Aletta F, Oberman T, Kang J (2018). Associations between positive health-related effects and soundscapes perceptual constructs: a systematic review. Int J Environ Res Public Health. 15(11): 2392.

Adams M, Cox T, Moore G (2006). Sustainable soundscapes: noise policy and the urban experience. Urban Stud. 43(13): 2385-2398.

Baumann D, Haggh B (1990). Musical acoustics in the middle ages. Early Music. 18(2): 199-210.

Postma BN, Jouan S, Katz BF (2018). Pre-Sabine room acoustic design guidelines based on human voice directivity. J Acoust Soc Am. 143(4): 2428-2437.

Walden DK (2014). Frozen music: music and architecture in Vitruvius De Architectura. Greek Rom Mus Stud. 2(1): 124-145.