Artificial Intelligence and 3D Modelling Exploration: An Integrated Digital Design Studio.
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This paper describes a CAAD teaching strategy in which some Artificial Intelligence techniques are integrated with 3D modelling exploration. The main objective is to lead the students towards "repertoire" acquisition and creative exploration of design alternatives. This strategy is based on dialogue emulation, graphic precedent libraries, and 3D modelling as a medium of design study.

The course syllabus is developed in two parts: a first stage in which the students interact with an intelligent interface that emulates a dialogue. This interface produces advice composed of either precedents or possible new solutions. Textual descriptions of precedents are coupled with graphical illustrations and textual descriptions of possible new solutions are coupled with sets of 3D components. The second and final stage of the course is based on 3D modelling, not simply as a means of presentation, but as a design study medium. The students are then encouraged to get the system’s output from the first stage of the course and explore it graphically. This is done through an environment in which modelling in 3D is straightforward allowing the focus to be placed on design exploration rather than simply on design presentation. The students go back to the first stage for further advice depending on the results achieved in the second stage. This cycle is repeated until the design solution receives a satisfactory assessment.

The strategy used is composed of the integration of three elements: an unconventional knowledge-based system, a neural network and a 3D modelling and rendering system.

Neural networks have a great potential as learning systems that are able to yield support for emergence and creativity. However, there are two main problems with using neural networks in design. One is how you interact with such system. The bare interfaces of neural networks are very poor and passive from the architectural point of view, rendering those systems virtually unusable in design. The second pertains to the integration between neural network techniques and other approaches.

3D modelling and rendering systems are now powerful presentation tools in the architectural field. However, the complexities of such systems and their logical
interfaces do not give much room for their use as a means of design study. Their learning curve is the reason of why CAAD courses often become software oriented rather than design oriented.

This paper will describe an innovative integrated model in which those problems are overcome. The resulting system provides an interface in which the neural network output is translated into meaningful human-like output. It also provides an easy transition from textual information to 3D modelling as a design medium, in which the first becomes more usable and the last is enhanced as an intelligent activity.

The result of this teaching strategy is that students are encouraged to use intelligent systems in a more enjoyable way and to study precedents and explore design alternatives towards creativity within a graphical environment.