Early explorations of EEG as a method for interactive evolutionary design of 3-dimensional objects

Abstract

Automatic generation of art has aided artists in creating novel 2-dimensional artforms in a field known as evolutionary art. The development of technology on 3D printing has attracted people of different fields to designing 3D shapes for art display, an architecture design, a prototype or even an aiding tool. However, current automatic generation algorithms have focused primarily on 2D art only and have not successfully crossed the realm into 3D. This paper introduces an automatic method for generation of 3D artforms using electroencephalogram (EEG). Interactive evolutionary computing (IEC) is the typical method used to evolve art, however, IEC is often reported to cause significant fatigue among its users due to its repetitive and time-consuming characteristics. With the combination of brain-computer interface (BCI) and IEC, the hope is to speed up the interactive process, hence reducing user fatigue and at the same time be able to produce promising solutions. The proposed approach focuses on understanding human emotions in order to identify user preferences of the 3D shapes automatically and further evolve the selected artform. The use of a natureinspired shape generation formula, called the Gielis supershape, is used as the encoding for generation of 3D art and is shown to be able to bring forth large varieties of shapes during the automatic evolutionary optimization process.