Rock painting elements reassembled by using spatial metrics

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Abstract

Rock paintings exposed to bad weather conditions, especially when they are on bare rock faces, deteriorate progressively and it is often necessary to gather the elements that belong to a same figure to study it. It is the case of the Mezquital cave paintings in Hidalgo state (Mexico). The software COATL recently developed by two of the authors can be used to reconstitute the rock drawings, to estimate the degree of degradation, and then, differentiate the different families of paintings. The software selects automatically the pixel components that belong to a given shape, labels them and extracts each component perimeters to unite these elements according to the distance that separates them. The reconstituted figures can be then submitted to a series of test and measurements such as surface and/or perimeter length calculations, convex surface inclusions, fractal dimension, etc., without the purpose to realize a classification based on characteristic features. A set of different style paintings has been studied to estimate the confidence rate of the proposed treatments; these treatments concern mainly the enhancement of the drawn features by means of a new kind of thresholding, a gray tone exploration providing a controlled extraction of the item to be studied, a sorting of eventual superposed structures that can be then independently studied, the calculation of indices based on objective relationships between shape perimeters as well as between shape surfaces, the integration of the results in a data base allowing to compare the characteristics of the painting families. Our aim is to develop and propose a general technical approach that can be applied in different archeological contexts.

Keywords: Rock paintings, digital image processing, spatial metrics, shape indices

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