Cluster Analysis to Discover Similarity Among Bricks for Restoration and Original Roman Age Bricks

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Abstract

This study started from a request of a restoration équipe during works on the roman building “Minerva Medica” (Rome), treat of survey on the conservation bricks used in the integrations. We obtained some samples of the original roman bricks and of those used for the integration. We looked for the better chromatic relationship between the two series of bricks in order to confirm the respect of the Cesare Brandi’s restoration theory in the work of integration on the buildings.

Materials & Methods

Five integration bricks (CBA1, CB1, C1, C1, CBD2) and 3, unknown aged, roman bricks (RBA1, RB1, RBC1) comes from Minerva Medica while 2 others integration bricks (CBE1, CBE2) comes from the Carcere Mamertino (Roma Romano). Chromatic measures were performed, by adigital portable spectrophotometer Konica Minolta 2600d equipped with SpectraMagic software for data processing, in the following experimental conditions: CIELab colour space; illuminant D65; observer: 10°; 8 mm mask diameter (MAV); UV component excluded (SCE), average value of three consecutives measures at 0.5 sec distant.

Results

A comparison between each face average, associated to standard deviation, and each face median, associated to difference between the quartiles q3/4, q1/4, have been made. The cluster analysis has been made with the MYSF (Multi-Variable Statistical Package) software version 3.22 (Kovach Computing Services), with the following settings: nearest neighbour as clustering method, Euclidean distance, no data transformation.

Conclusions

This study has enabled the first use of the cluster analysis to make a selection, based on colour, of the integration brick more suitable to restore stability to the original roman masonry in bricks during a restoration work. It has been fundamental a testing of the colour both on wet and dry surface because, after laying, in our case of outdoor artifact, the brick is exposed to rain and to capillary rise of water that involves a chromatic change; in the last case, an inlet of soluble salts occurs which leads to the same effect, as we seen for the sample CBD2.

References