Automatic analysis of artistic paintings using information-based measures

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Artistic paintings are concrete visual expressions of human evolution and creativity to share emotions, values, visions, beliefs, and trends of history and culture. Likewise, creating, interpreting, and analyzing artistic paintings is complex and hard to compute because it is a social, contextual and subjective process.

One nontrivial aspect of artistic paintings analysis is measuring the information contained in those paintings. In particular, artistic paintings contain information correlated to schools, periods, and artists.

The artistic community widely uses automatic computational analysis of artistic paintings for authentication of artistic paintings. Currently, this process does not substitute human experts completely; however, it is an essential additional control for fraud. Furthermore, new techniques can be helpful in authorship attribution, fraud detection, art style categorization and art content explanation.

We introduce novel solutions for automatic computational analysis of artistic paintings to address the problems of artist authentication. Specifically, we analyze how different authors expose information in their works of art. Furthermore, we infer what information quantification can tell us about the author's style, way of painting, and relationships with other authors.

To perform this analysis, we use Normalized Compression (NC) to calculate a local complexity matrix that characterizes each artist and use these matrices to construct a phylogenetic tree that portrays the relationships between artists in terms of how they compose their paintings. Finally, we use the regional complexity fingerprints and other auxiliary features to improve the state-of-the-art style and artist classification results. The complete study is supported by an extensive website (http://panther.web.ua.pt) for fast author characterization and authentication.

FIGURE 1
Examples of artistic paintings with different levels of complexity. The Normalized Compression (NC) value of each painting is displayed in the lower right corner.

FIGURE 2
Heat maps of the local complexity matrix (fingerprint) of some authors, computed with the NC. This fingerprint shows the author's range of complexity and the locations in the canvas painted with more detail (or complexity). To see all matrices, please visit the website.