Image processing for art investigation
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Advances in digital image acquisition methods and the wide range of imaging modalities currently available have lowered the threshold for museums to digitize their painting collections. This is not only crucial for archival or dissemination purposes but it also enables the digital analysis of the painting through its digital image counterpart. It also set in motion a cross-disciplinary collaboration between image analysis specialists, mathematicians, statisticians and art historians that have the common goal to develop algorithms and build a digital toolbox in support of art scholarship. Computer processing of digital images of paintings has become a fast growing and challenging field of research during the last few years.

This talk will highlight some of the contributions of the international joint initiative on big data, encompassing researchers from the Vrije Universiteit Brussel, Duke University, Ghent University and University College London, to this research domain. Since paintings are complex structures the analysis of all pictorial layers and the support requires a multimodal set of high-resolution image acquisitions. The developed tools that are used to process these vast amounts of multimodal data are based on dimensionality reduction methods, sparse representations and dictionary learning techniques. These tools are designed to be used in art related matters such as restoration, conservation, art history, material and structure characterization, authentication, dating and even style analysis.

The presented research can broadly be subdivided into three main fields. The first one is the digital enhancement of painting acquisitions in order to assist art experts in their professional assessment of the painting. The second main field of research is the automated detection of cracks within the Ghent Altarpiece, which is meant to help in the delicate matter of the conservation of this exceptional masterpiece but also as guidance during its current campaign of restoration. The last field consists of a set of methods that can be deployed in art forensics. These methods consist of the characterization of canvas, the analysis of multispectral imagery of a painting and even the objective quantification of the style of a particular artist.