Analysis of the Round Robin Test data acquired at IFAC-CNR

Due to the increasing number of spectral imaging devices that have been developed for the study and digital documentation of artworks, COSCH Working Group 1 is performing a Round Robin Test (RRT) to explore the characteristics of different spectral imaging systems, understand how they influence data and information reliability with respect to the various types of artworks, and ensure the usefulness, accuracy and comparability of results. Four objects of different typologies (SphereOptics Zenith Polymer® Wavelength Standard, X-Rite® ColorChecker Classic, painted panel reconstructed with medieval Tuscan technique, and Russian icon on a tinned steel plate) are being analysed with distinct spectral imaging systems at sixteen institutions.

The present work, developed at IFAC-CNR (Italy) under the supervision of Marcello Picollo, focused on the analysis and organisation of the data obtained from the acquisition performed on the four RRT objects with its push-broom hyper-spectral imaging system in the visible and near-infrared ranges. Developed and optimised for applications on coloured surfaces, IFAC-CNR's push-broom system showed very high spatial and spectral resolutions, whether the purpose of the analysis was the spectral identification of materials from areas as small as 1 mm x 1 mm, the acquisition of RGB images with high resolution, or the detection of underdrawings in the near-infrared region. Moreover, for the X-Rite® ColorChecker Classic, besides IFAC-CNR's results, the data acquired with another push-broom hyper-spectral system from IP-UEF (Finland) were also used. Although both systems are based on the same working principle, they were designed in different ways, and the comparison between both sets of data, showing differences between results, constituted an example that proves the relevance of the RRT exercise.

The information gathered in this report will be a starting point for the handling, articulation and comparison between all the data from the institutions involved in the RRT, which will help to deepen knowledge on the potential, constraints and practical aspects of sixteen spectral imaging instruments, and obtain a common understanding regarding the characteristics and usefulness of such devices. Ultimately, it will help to define good and optimised practices and lead to the state-of-the-art study and digital documentation of cultural heritage.