STSM Report

Characterisation and visualization of cultural heritage materials through colour naming

REFERENCE: Short Term Scientific Mission, COST TD1201
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Summary

Documentation of cultural heritage materials often involves the development of innovative visualisation techniques tailored to different applications for professional research and conservation and or simple presentations to the general public in various media. This requires the identification of specific characteristics of image data and the employment of appropriate visualisation processes to support object description and enhance dissemination of information as detailed in the objectives of COSCH Working Group 5 (WG5).

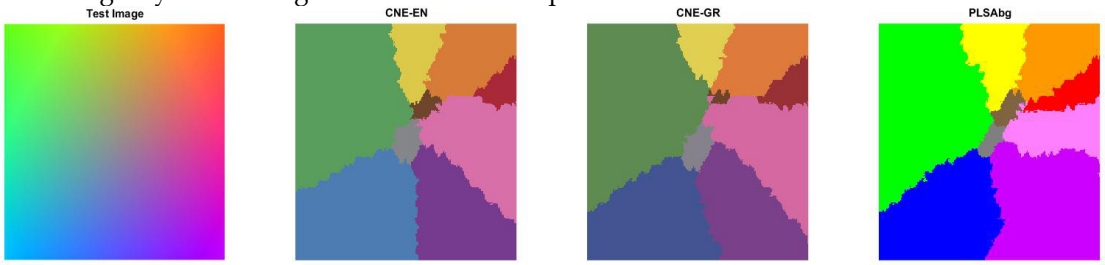
Colour names are widely used in everyday life to describe the colour appearance of materials and have been found to play an important role in long-term memory and to enhance recognition. This STSM aimed to make an advance towards the establishment of a procedure to assign automatically colour names to pixels in images and colour measurements of cultural heritage materials in order to enhance the identification of specific characteristics of data and data visualisation processes and in long term to improve the accessibility of the resulting e-documentation to end-users. This project contributes to the objectives of WG5:

a) Comparison of two different procedures to identify salient colour characteristics (colour names) in cultural heritage related test images.
b) Colour quantization using a representative colour for each identified colour category/name in each cultural heritage related test image.
c) Documentation of identified colour names in each cultural heritage related test image as metadata to facilitate accessibility to specialists in different disciplines and the general public.

Pixels of test images and colour measurements of cultural heritage materials were assigned to eleven colour names using a procedure of the research host (PLSAbg) trained by real world images and a procedure of research visitor trained by English and Greek responses in an online colour naming experiment (CNE-EN & CNE-GR). The test images were rendered using the outputs of both procedures to a limited colour palette consisting of eleven representative colours for each of the eleven basic colour terms/categories (see Figures). Overall the models produced consistent colour identifications and promote colour naming as a valuable resource in documenting cultural heritage materials with practical applications in information retrieval tasks, semantic image processing and colour communication across languages. The use of natural language in cultural heritage domain brings advantages as more people have access to global communication systems. This trend implies that colour specification is not only the domain of trained colour technologists but is also needed by large multilingual audiences. Future research involves the extension of the colour vocabulary to support subtler colour identifications in images of cultural heritage materials.

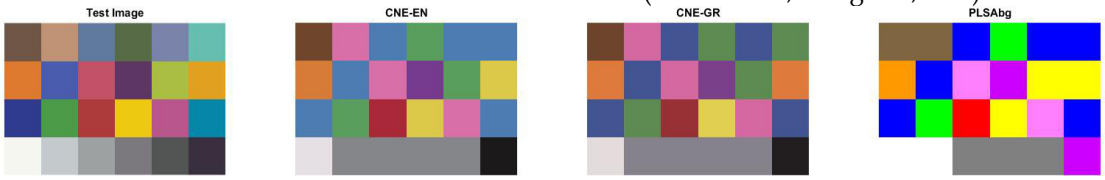
Original test images and colour measurements (X-rite i1Pro, 2 degrees – D65) of cultural heritage materials were provided by Dr Lindsay MacDonald of COSCH Working Group 1. The synthetic test image was provided by the host Joost van de Weijer, Universitat Autonoma de Barcelona, Spain. Colour names were assigned to colour coordinates assuming sRGB viewing conditions and using LUTs constructed by the two procedures.

Test Image: Synthetic diagonal slice of colour space

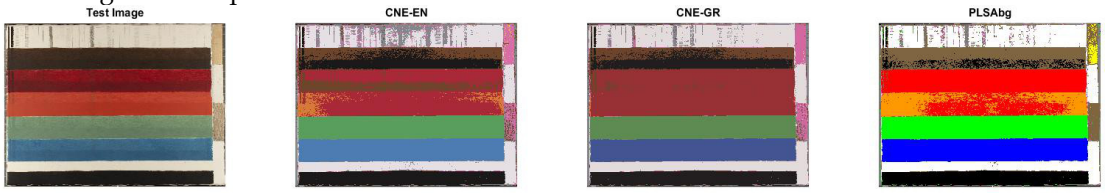


Test Image: X-Rite Colour Checker Chart

Colour measurements of X-Rite Colour Checker Chart (X-rite i1Pro, 2 degrees, D65)



Test Image: Colour palette



Test Image: Russian Icon

Colour measurements of Russian Icon Colour Checker Chart (X-rite i1Pro, 2 degrees, D65)