

USE OF HYPERSPECTRAL IMAGING FOR ARTWORK AUTHENTICATION

A. Polak^{1,2}, **T. Kelman**¹, **P. Murray**¹, **S. Marshall**¹, **D. J. M. Stothard**²,
N. Eastaugh³, **F. Eastaugh**³.

¹ Centre for Signal & Image Processing, University of Strathclyde,
204 George Street, Glasgow, G1 1XW, United Kingdom

² Fraunhofer Centre for Applied Photonics, Fraunhofer UK Research Ltd,
99 George Street, Glasgow, G1 1RD, United Kingdom

³ Art Analysis and Research Ltd, 162-164 Abbey Street, London, SE1 2AN, United Kingdom
adam.polak@strath.ac.uk

Keywords: hyperspectral imaging (HSI), infrared, artwork authentication, support vector machine (SVM)

In recent years various scientific practices have been adapted to the artwork analysis process and a set of techniques was found advantageous for conservation and restoration works [1]. Apart of these applications, art market also benefits from scientific testing of artwork. Although these services are available to determine authenticity of traded pieces, they are very expensive and time consuming and therefore serve only very limited range of transactions. As a response for requirements of growing market there is a need for rapid and non-destructive methods empowering art authentication [2].

Hyperspectral imaging combined with signal processing and classification techniques are proposed as a tool to enhance the identification of art forgeries. Using bespoke paintings designed for this work, a spectral library of selected pigments was established and the viability of training and the application of classification techniques based on this data was demonstrated.

Developed techniques were used for the analysis of actual forged paintings held by the Berlin police, which comprised known and suspected forgeries from the infamous Beltracchi case [2, 3]. The analysis resulted in the identification of anachronistic paint, confirming the falsity of the artwork. Figure 1 illustrates one of analysed paintings and result of the classification, indicating *Titanium White* – a pigment known as anachronistic for this case.

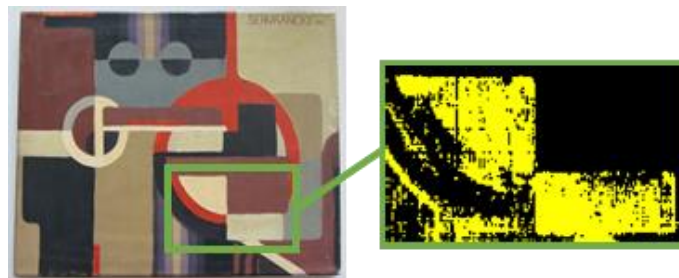


Figure 1 Illustration of a forged painting described as Sevrancx, with indication of analysis region and classification result of selected white/cream colour as an anachronistic paint *Titanium White*.

This work demonstrates the ability of hyperspectral imaging to identify various pigments and its applicability for artwork authentication.

Acknowledgement: This study was financed by Innovate UK, Technology Strategy Board. Special thanks to Berlin Police for supporting this study. This project was also supported by an Industrial Fellowship from the Royal Commission for the Exhibition of 1851.

References:

- [1] A. Adriaens, “*COST Action G8: Non-destructive analysis and testing of museum objects*”, in *Benefits of non-destructive analytical techniques for conservation*, Kalkara, (2004).
- [2] S. Hardach, “*BBC - Culture - The surprising secrets of busting art forgeries*”, 19 October 2015. [Online]. Available: <http://www.bbc.com/culture/story/20151015-the-surprising-secrets-of-busting-art-forgeries>. [Accessed 08 January 2016].
- [3] C. Finn, “*The Devil in the Detail*”, *Apollo: The international art magazine*, Vol. CLXXIX, no. 616, p. 50, (2014)