Digital Analysis of Paintings

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***Abstract*—**

I. Introduction

Digital image processing is a field which encourages the crossover of different scientific disciplines, often biological research and computer vision align to automate the collection and analysis of plant growth. However, art and computing are fields which, at first glance, have very little in common.

But a deeper look unveils a plethora of different avenues from detecting forgeries to being able to date an artists work within a catalogue of their known pieces.

This survey paper will unearth some techniques which can be applied to the digital analysis of paintings, as well as existing research which has already applied computer vision to the field of art.

II. Colour Analysis

Digital images are typically considered to be a matrix of pixels, where each pixel contains information about the colour of that place in the image.

Colours can be represented in numerous different ways, but are typically three to four bytes; for example the Red, Green, Blue (RGB) colour space uses one byte for the levels of red, one for green and one for blue. The fourth byte is unlikely to be considered in artwork as it usually represents the transparency, known as the alpha channel, of the pixel.

A single byte colour space purely focuses on the intensity of a pixel, in actuality this represents a grayscale image.

Analysing colour is the base of all analysis techniques in image processing, the value(s) of a pixel with regards to its location and neighbours can be used to build up some very complex knowledge about the image. This section will deal specifically with the colours which an artist uses within their work, such as looking at the distribution of colours across a work, rather than using colour information to determine textures.

A. Colour Distribution

B. Pigment Mapping

C. Difference Visualisation

III. Texture Analysis

Paintings are somewhat unlike the normal subject for image processing, whilst most images are either simple two dimensional images, or two dimensional slices of a three dimensional object. Paintings often thought of as two dimensional, but with many paint types these paintings become three dimensional.

This aspect is lost in the digitisation of the painting; but there are still ways of analysing the texture of the image.

A. Steerable Filters

B. Gabor Filters

C. Histograms of Edge Orientated Gradients

D. Multifractal Classification

E. Texton-Based Analysis

IV. Statistical Analysis

A. Stylistic Analysis

B. Authentication of Artwork

C. Dating an Artist's Work

V. Brushstroke Analysis

A. Artistic Identification

B. Rhythmic Brushstrokes

References