

Monitor

The computer says no

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Computing: Image-processing software could help to identify artists by their characteristic brushstrokes—and spot forgeries

THE ability of computers to analyse complex digital images is growing rapidly. Robots are being fitted with powerful vision systems that enable them to recognise and hold things. Computers can scan satellite images of the Earth for tiny features, or search pictures from deep space for strange objects. They can analyse medical images to find out what might be going on inside a human body. Now digital imaging is starting to figure out how to spot art forgeries, too.

Science has long been used to help authenticate works of art. Technicians can date paint from its chemical composition, for example, or x-ray a canvas to reveal what lies below the surface. In recent years, however, the art itself has come under more scientific scrutiny, especially through the analysis of brushstrokes. The idea is to establish an artist's "handwriting" to help experts attribute paintings.

One of the most comprehensive studies using such methods was published recently in *Signal Processing Magazine*, published by the Institute of Electrical and Electronics Engineers. James Wang of Penn State University and his colleagues from other universities analysed the paintings of Vincent van Gogh, with the assistance of the Van Gogh and Kröller-Müller museums in the Netherlands.

The researchers used high-resolution images, made in shades of grey, of 101 paintings which were either by Van Gogh or in his style. Of these, 82 have consistently been attributed to the Dutch painter, and a further six are known to have been painted by others. (Experts cannot agree who painted the remaining 13 pictures.)

From these paintings, 23 were selected because they were known unquestionably to be by Van Gogh and because they represented different periods of his life, during which his style changed. These paintings were used to "train" computers running image-analysis software about how the artist painted. Scans of small areas of the paintings were taken for individual analysis, so the software could identify the recurrent use of certain brushstroke patterns and other features. The resulting data were used to build a mathematical model of Van Gogh's style against which the other paintings could be tested.

The model had some success. For instance, when two known Van Goghs, "The Plough and the Harrow" and "Wheatfield with Crows", were used for training, the system indicated that among the paintings that closely resembled them was "The Sea at Saintes-Maries", a fake commissioned or sold by Otto Wacker, a German art

Vincent Van Gogh Foundation



Whodunnit?

dealer. But when the image analysis was repeated at a greater level of detail, the Wacker forgery was shown to be different. Ultimately the software correctly identified four of the six paintings known not to be by Van Gogh, though it also classified two of his works as having been painted by someone else.

The researchers describe their results so far as “encouraging, but not perfect”. Computerised image-processing systems should get better at detecting forgeries as they are trained to recognise further aspects of artists’ styles, says Dr Wang. He and his colleagues are now using images taken at other wavelengths, including ultraviolet, to analyse different aspects of Van Gogh’s brushwork.

Interest has been shown in using image analysis to help find forgeries of other artists. The bigger the body of an artist’s known work, the more accurate the system should be, because it will have more examples to learn from. But however good computers get at classifying paintings, they are likely to remain only one of the tools used to detect forgeries. Although the researchers are certain that technology can provide some answers to riddles about whose hand was responsible for a particular work, they also concede that human experts will have the final say.