

3D computer model emerges from a pile of snaps

SCULPTOR Antony Gormley, famed for his gigantic steel "Angel of the North" in Gateshead, UK, now has a way to transform ordinary digital snaps of his works into 3D computer models.

The software, named Digital Pygmalion after the mythological sculptor whose statue was brought to life by the goddess Aphrodite, is the first capable of doing this. The models can be posted to a website, explored on a computer screen or converted into plastic replicas using a 3D printer.

Gormley is scaling a sculpture of a crouching human up to 25 metres high with the software, while a London auction house is considering using it to make models of its sculptures available to potential buyers.

The brainchild of Roberto Cipolla, Carlos Hernández Esteban and George Vogiatzis of the University of Cambridge, Digital Pygmalion could also be used to digitally archive museum exhibits and to compare them with those in other locations. And it could enable gamers to turn themselves into digital replicas to replace characters in the game.

In the past, video footage of crime scenes has been transformed into computer models, allowing juries to explore them in the courtroom. But sculptures are much harder to model because they tend to lack the angles, colour changes and textures that most software uses to relate images to each other.

Digital Pygmalion gets round this using an algorithm that can deal with complex shapes. First, 30 to 40 digital images of the sculpture are taken. These are then turned into black 2D silhouettes on white backgrounds. By comparing the shapes of the different silhouettes, the software can work out which points at their edges are simply the same parts of the sculpture seen from a different angle - known as the frontier points. Once it finds enough frontier points, the software will home in on the only set of camera positions that matches up to the silhouettes.

It uses this information to produce a rough model called a "visual hull" (see Graphic). At this stage, the hull still lacks details, such as eye sockets. So the software then compares the hull's surface with each original digital camera image, pixel by pixel, adjusting the model until it agrees with all the photos.

Phillip King, a London-based sculptor and former president of the UK's Royal College of Arts, says sculptors will find the software very useful. "With a virtual model, you can refine it, change things, try different colour combinations."

The Cambridge team has also modelled a sculpture by the late British artist Henry Moore, a 4th-century Japanese terracotta horse and a section of the marble west frieze of the Parthenon in Athens, Greece, now housed in the British Museum in London.

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