# Computer-Assisted Facial Identification

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Crowds are coming to Magna Science Adventure Centre to take part in a statistical study aimed at assessing facial variability. This is the first step in providing methodology for quantifying in a statistical sense the quality of match of two images of a face, for example of an image captured on a surveillance monitor to an image held in a database. We have now taken a few hundred high quality 3D images of adults' faces and are well on our way towards our target of around three thousand images. The 3D scanner is an array of eight digital cameras that take synchronised 2D pictures and these are used to build a 3D model of the face. The picture on the left shows Lucy Morecroft, Research Associate on the project in Sheffield, in front of the Geometrix® equipment; those below show the array of eight pictures taken of me. The three-dimensional image can be viewed on my web page at http://www.shef.ac.uk/nickfieller/scan and volunteers for the study are given a diskette with their own 3D image to take away.

Geomterix also supply the software (pioneered in the Matrix films) for building the 3D model. Included is a facility for obtaining the three-dimensional coordinates of landmarks on the face (features such as corners of the eyes, tip of nose etc) which currently have to be identified manually by positioning cross-hairs in two or more different views. The starting point of the statistical analysis is the portfolio of landmark-based shape analysis techniques developed largely by Ian Dryden and Kanti Mardia. Initially we will be considering 2D to 2D matching in identical orientations, followed by 2D to 3D and then between different 2D views.

There are many available systems for automatic facial recognition — picking out faces in a crowd – so why is another one needed? This project is different in that the aim is to provide a measure of identification as distinct from recognition. It is intended to offer courts high quality statistical forensic evidence as to whether a suspect can be excluded or included as an offender via an associated facial match probability. It should be open to scientific scrutiny by both prosecution and defence, just as other forensic evidence based on fragments of glass, soil, fibres etc is used. It will never be a substitute for fingerprinting (neither digital nor DNA) but it can play a part.

The overall project is a joint venture between the Departments of Forensic Pathology (with Dr Martin Evison as Principal Investigator) and Probability & Statistics and is sponsored by the US Government on behalf of the FBI and follows the guidelines of the UK Police Information Technology Organisation. Since the research involves using human subjects full Research Ethics Committee approval has been obtained and participants must sign an informed consent form and they may ask to have their face deleted from the database at any time. Co-investigators other than myself are Dr Damian Schofield in Nottingham and Dr Chris Solomon in Kent who have expertise in computer visualisation and machine vision. Ian Dryden in Nottingham is a consultant to the project. If you want to volunteer your face for the study the scanner will be at the Magna Centre for the next few weeks, well signposted and only five minutes from Junction 33 of the M1.