

CLINICAL SECTION

Manipulation of digital photographs

J. Sandler

Chesterfield Royal Hospital, Chesterfield, UK

A. Murray

Derbyshire Royal Infirmary, Derby, UK

Abstract

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This article provides simple details of what to do with digital images once they have been captured. Inspection of the images as ‘thumbnails’ using Exif viewer® is described, as well as zooming in to check detail contained on the images. Storage of every orthodontic patient using the popular programme, Dentofacial Showcase™ is described in some detail.

For more formal verbal presentations or written material intended for display Microsoft Powerpoint® is the programme of choice. Transfer of the images between the three programmes is described in detail, as well as recommended layouts for written and verbal presentations.

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Introduction

The requirements for successful use of digital images are a high quality digital camera, and a sufficiently powerful computer to allow easy viewing and subsequent manipulation of the images (Figure 1). Most digital images are stored within the camera on either a Compact Flash card (43 × 38 × 3.5 mm in hard case) or a Smart Media card (thinner, lighter, and more flimsy). The former storage medium is probably more appropriate for a busy clinical environment, as the latter requires delicate handling.

Once the images have been captured they need to be ‘read’ by the computer. At present, the most convenient method is use of an adapter to allow the card to be inserted directly into an empty PCMCIA port. On a modern laptop this is the one occupied by the computers removable fax/modem or alternatively by the network card (Figure 2). If a desktop computer is used, a variety of multi-card readers are available that allow connection through the serial ports (COM1 or COM2), although transfer of images may be slower than using the PCMCIA port.

Exif viewer

Modern digital cameras are often sold with ‘bundled’ software to allow viewing of images. Exif viewer is provided with many cameras, and if loaded correctly, the ‘thumbnails’ (small representations of each picture on

the computer screen) are automatically loaded on the computer screen when the memory card is accessed (Figure 3).

Exif viewer also allows inspection of individual images, to check the entire area of interest is included, as well as confirming sufficient depth of field was available to ensure the whole picture is in focus (Figure 4). The instant preview facility, on all but the cheapest digital cameras’ LCD screen, certainly gives an overall impression of the image. It is only the top of the range cameras, however, such as the Fuji S1 Pro, that have a sufficiently high quality LCD screen combined with the facility to scan the entire image easily with a powerful optical zoom. This will allow quality verification by viewing on the camera alone. Images taken with mid-range cameras may need quality confirming, using Exif viewer, before the patients are sent home. Once all the images are all satisfactory Dentofacial Showcase is opened alongside Exif viewer. The ‘Restore Down’ button is now used (top right of the screen, button next to Close Programme button) for both programmes, to allow them to be visible on the screen at the same time.

All of an individual patient’s images are now selected in Exif viewer (left mouse button, whilst holding down the Ctrl key) and these are dragged and dropped into a previously opened new file in Showcase (Figure 5).

In a busy clinic, particularly where images are not necessarily downloaded from the card after every patient, it is important to write down the patient’s name on



Fig. 1 High quality camera ensures satisfactory digital images.

paper. This name should be then photographed to allow subsequent identification of patients. This is essential if many clinicians use the camera, particularly if the cards are filled to capacity before a backup is made. A 64Mb Compact Flash card will hold up to 330 images of more than sufficient quality for orthodontic purposes. If the rigorous system is not adhered to, the potential for losing a large number of high quality images is therefore high.

With Windows 2000® it is possible to view files as ‘thumbnails’, as well as the previous options of large icons, small icons, list, and details, available with older versions of windows. This is useful when a JPEG is to be imported into another programme and the quality is not an issue. One does not have the opportunity to directly fill the screen with the image and check the quality or manipulate the image in any way. To do this it is neces-



Fig. 2 PCMCIA card slots into the laptop.



Fig. 4 Each image can be checked for quality.

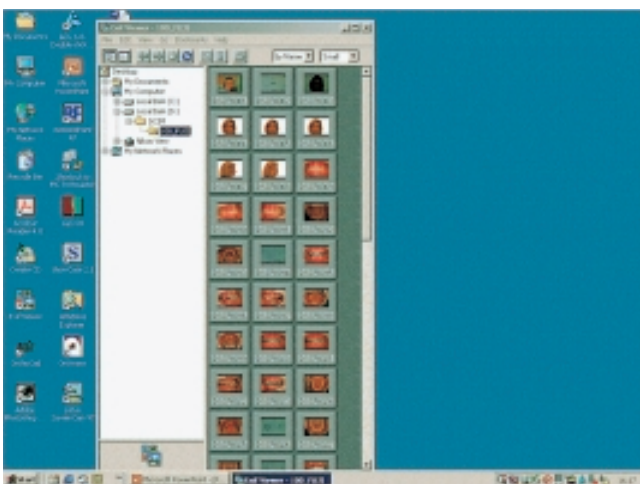


Fig. 3 Thumbnails automatically appear in Exif Viewer.



Fig. 5 Drag and drop from Exif to Showcase.

sary to double click the thumbnail and take the JPEG into Microsoft Photo Editor®, Adobe Photoshop®, or other image manipulation programme. The thumbnail facility is only of real value once the images have been manipulated, cropped, and checked as necessary.

Dentofacial showcase (www.dentofacial.com)

Showcase is a popular programme for storing, manipulating, and showing orthodontic records of patients, in an informal setting. Thumbnails are stored under each patient's name, and attributes such as type of photograph and stage of treatment can be easily attached to individual images, or groups of images using the 'Speedway' facility (Figure 6). The image may be rotated to compensate for poor camera positioning because, as a rule, the occlusal plane should be horizontal on the image (Figure 7). Using 'Speedway', images are now cropped to ensure little or no retractor appears in the frame, and that the 'background' areas of black, produced as a result of rotation of the image, are removed. Another disadvantage of rotating images is, the slight distortion this introduces, which is particularly noticeable with horizontal lines, as seen on archwires (Figure 8). There is no substitute for setting up the picture

correctly from the outset, paying sufficient attention to selection and use of retractors and camera positioning in all three planes of space.

Slides of particular interest can be selected within Showcase to run a slideshow to illustrate the features of the patient's malocclusion. Individual slides can be presented in order to show maximum detail of each view taken. Alternatively a selection of views can be incorporated within a single 'slide' for a less detailed, but more comprehensive overview of the case (Figure 9).

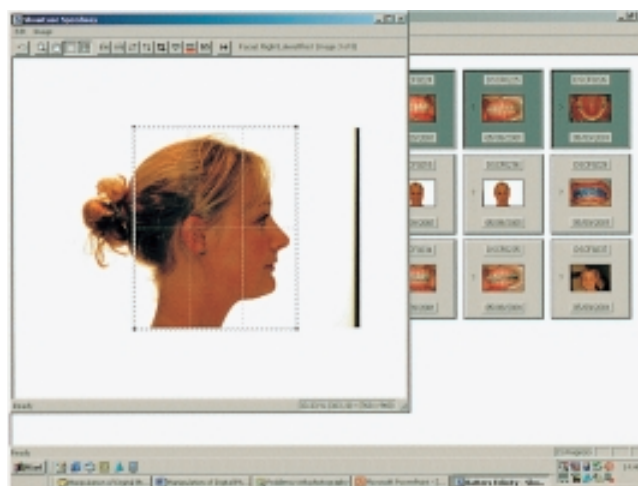


Fig. 6 Cropping of images in Showcase.

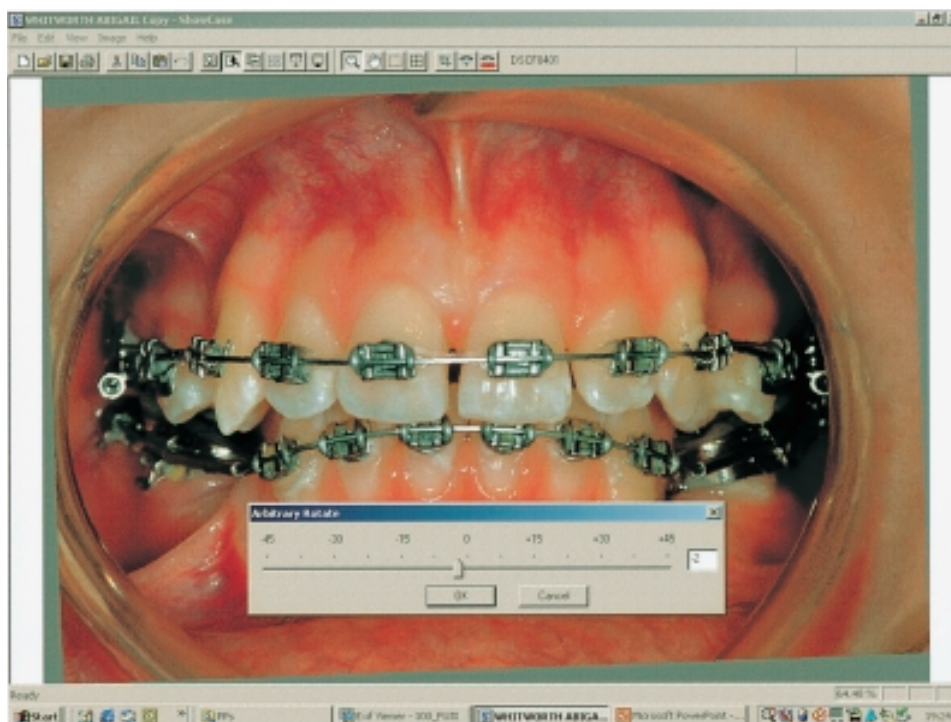


Fig. 7 Rotation of images possible.

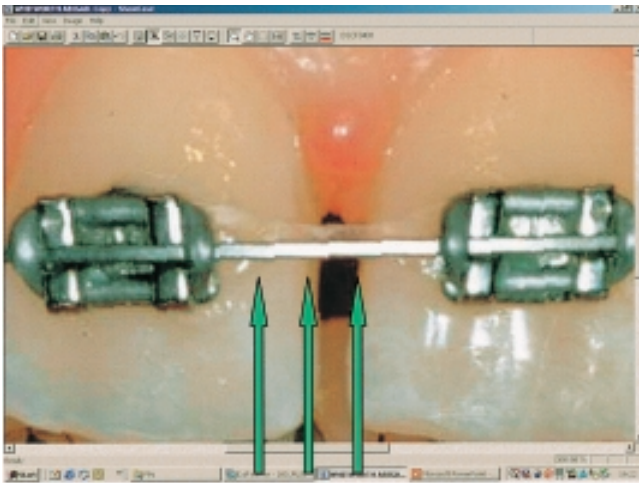


Fig. 8 Downside to correcting for faulty photographic technique.



Fig. 9 Overview of all photographs within Showcase.



Fig. 10 Copy and paste from Showcase to Powerpoint.

Patients images can be stored within folders in Showcase categorized in many ways e.g. by the type of treatment, the centre at which they are treated, the type of malocclusion or any other category the clinician feels is appropriate. There is a limit of 64 to the number of images that can be stored in each patients file within Showcase, which is a distinct advantage over other database programmes.

Powerpoint

For more formal verbal presentations and for written case reports for submissions to journals for publications or for transferring patients to colleagues Powerpoint is an excellent programme. Images can be taken from Showcase directly into Powerpoint. To do this, both programmes are opened simultaneously on the screen and the images are selected in Showcase, copied and the cursor is moved to a Powerpoint slide into which the image is pasted (Figure 10). The image will probably need to be resized within Powerpoint and then the process is repeated for further images. The advantage of the Powerpoint slides is that the relative size and position of the individual images is infinitely variable and maximum space can be occupied by material of interest. In Showcase the programme controls the layout and often the screen images are smaller than one would ideally like (Figure 11).

Intra-oral slides are scanned into Powerpoint and all five views can be incorporated into one slide to give the 'full picture' of the malocclusion and treatment at that point in time. The size of each image within the slide is controllable therefore areas of particular interest can be enlarged to allow detail to be seen (Figure 12).

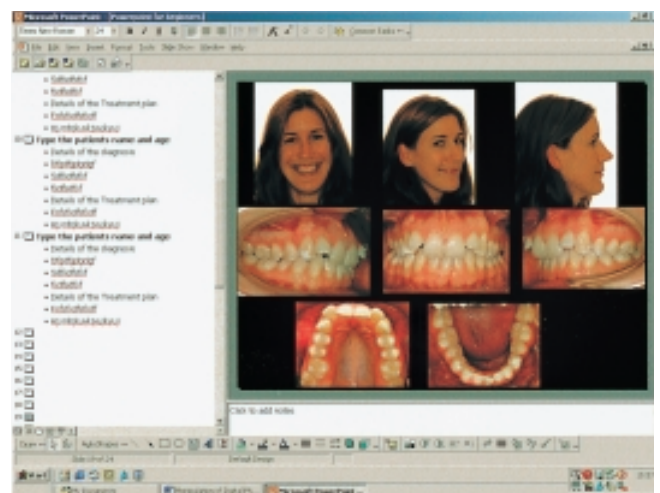


Fig. 11 Powerpoint slides ensure less background on view.

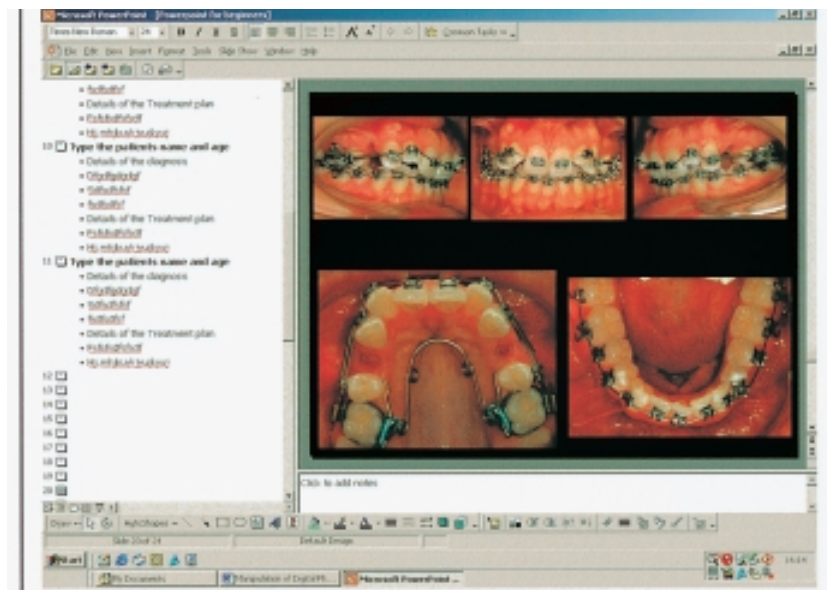


Fig. 12 Particular views of interest may be enlarged.

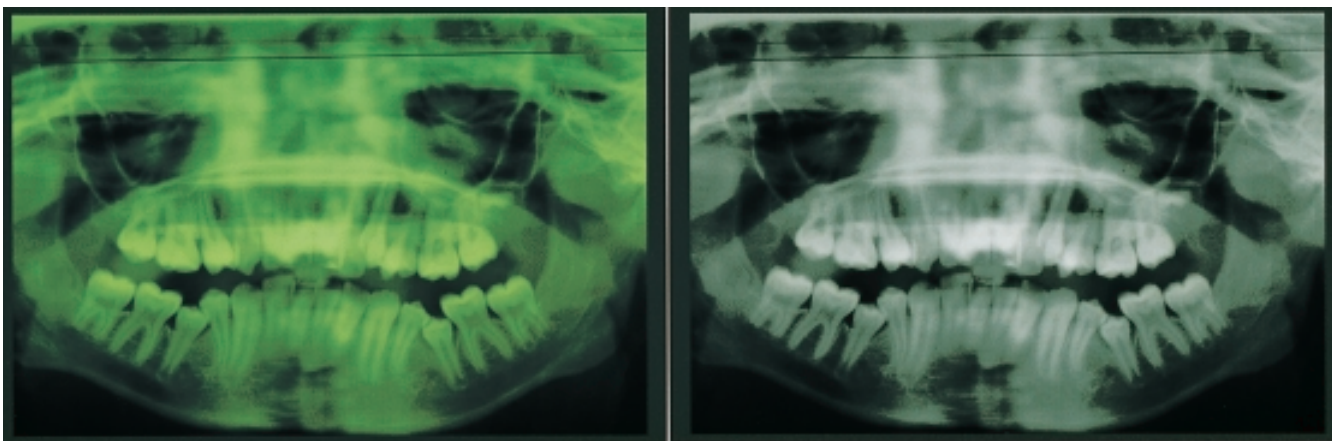


Fig. 13 Radiographs captured digitally and converted to grayscale.

Radiographic information should also be imported in to the computer. The lateral cephalometric radiograph and OPT can either be scanned, if the scanner has a transparency adaptor, or alternatively photographed with the digital camera. The flash is turned off and the camera aperture opened sufficiently wide to reduce the shutter speed to 125 or faster, to eliminate camera shake. The ideal background is an outside window, using daylight to trans-illuminate the film avoiding the greenish hue inevitable when an X-ray viewer is used for illumination. Alternatively once the image is within Showcase it can be converted from colour to Greyscale (black and white), which improves its quality markedly improved, before copying into PowerPoint (Figure 13).

A cephalometric analysis should be carried out for all case presentations and this information can easily be

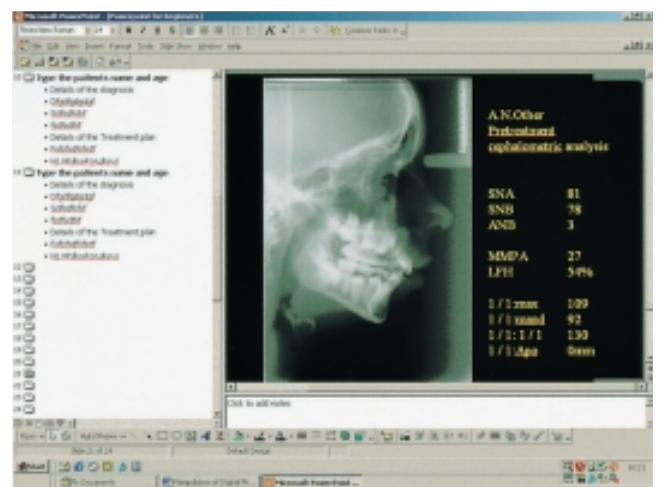


Fig. 14 Within Powerpoint legends can be added to enhance presentation.

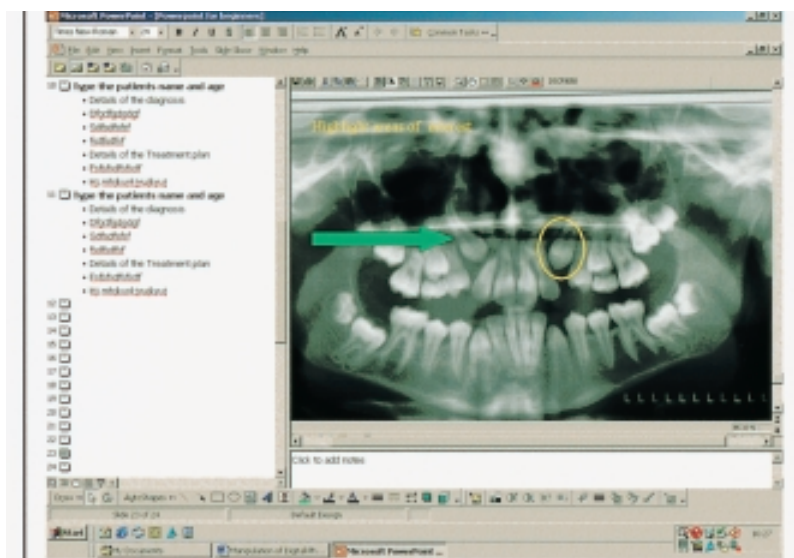


Fig. 15 Areas of interest easily highlighted, text also easily added.

added to a PowerPoint slide (Figure 14). Written information is also added to the slide of the OPT to further enhance the presentation and areas of particular interest can be easily highlighted (Figure 15).

Summary

Digital patient records are revolutionizing record collection, manipulation, and storage. Using the three pro-

grammes described, it is easy to view and store the images collected, as well as prepare high quality slide-shows for written and verbal presentation. All the information on particular patients can be presented to patients, individual colleagues or a large audience in a clear and concise manner, which can only serve as an aid to future diagnosis and treatment planning.