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3D visualisation of skin lesions use in photogrammetry

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Dermatology is, in large part, an imaging speciality. Automated programmes based on analysis of two-dimensional images, such as those provided by dermoscopy, have achieved similar diagnostic accuracies to those of humans in some studies. One area in which the technology is inefficient compared to the human viewer, is that it has not been possible to easily represent the three-dimensional nature of skin lesions. This means that it has not been possible to assess lesion volume or surface texture efficiently, such that it could form the basis for diagnostic algorithms. In the present study, we report our progress using photogrammetry of skin lesions using technology developed by Dimensional Imaging. The advantage of this approach, over other alternatives such as laser scanning, is that capture is almost instantaneous with few artefacts due to subject movement; dense data calculation at each image pixel; one to one colour registration unaffected by structural lighting; and that it is non invasive and well tolerated. We have used two Canon EOS 350D cameras in a bespoke frame, under ring flash illumination. A Macbeth colour chart is included in every shot as a standard. An extremely detailed model of the lesion can be recovered from which the image colour and range data can be projected as a 3D model. The interpixel spacing is 0.040mm (and typical skin epidermal cell spacing is 0.100mm). We have now examined over 700 lesions. The vividness of the reconstructed image is striking and they lend themselves both to teaching and further analysis. Preliminary analysis using simple picture extraction measures suggests that such approaches may be useful diagnostically. The 3D images will be demonstrated on a laptop.