

Automated Cephalometric Analysis using Active Shape Models.

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The manual identification of cephalometric landmarks on radiographs is a time-consuming process. The aim of this study was to evaluate whether image processing could be used to automate the procedure to within acceptable accuracy. Sixty-three randomly selected cephalograms were manually annotated by an orthodontist with 142 points (including 16 cephalometric landmarks), forming a template for each image. The templates were aligned with each other using the Procrustes algorithm and then Principal Components Analysis was applied, yielding a mean shape and a set of deformation modes. A local intensity model was also computed around each point. Together, these form an active shape model which was then used to fit the mean template to unseen images automatically, yielding a location on the image for each cephalometric landmark. The sixty-three examples were tested using a drop-one-out scheme to avoid testing in the training set. The accuracy of the landmark placement as compared to that of the expert was measured for each landmark. On average 13% of the landmarks were within 1mm, 35% within 2mm and 74% within 5mm. It was concluded that the current implementation of the method does not give sufficient accuracy for cephalometric analysis but is of interest because of the nature of the model used and improvements are possible.