

Active Shape Models for the Interpretation of Oro-Facial Images.

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The analysis of oro-facial photographs and radiographs has become possible due to advancements in digital imaging techniques. Novel morphometric methods permit the analysis to proceed despite complex changes in shape. This study evaluates the application of active shape models (ASMs) to a variety of dental images. The potential of the ASM technique for the automatic landmarking of cephalograms was evaluated on a set of sixty-three randomly selected examples. Occlusal photographs of dental casts (54 upper, 61 lower) were similarly used to build and evaluate an ASM for the automatic outlining of teeth for improving existing removable partial denture (RPD) design software. Thirdly, ASMs were used to analyse vertical facial shape change across a set of 131 selected cephalograms. Finally, the shape variation over 45 landmarked front-face photographs was analysed using the same technique. In the first project the automated landmarking provided an excellent first guess at the location of landmarks but sometimes required minor correction by a clinician. In the second project a clear visual benefit of designing RPDs with a cast image in the background was found due to the constant in-place reference to anatomical features. In the study of vertical facial deformity, the shape analysis provided a dramatic and highly effective visualisation of antero-posterior and short-long variation. The final study showed how the subtle variations in face shape can be quantitatively analysed. We conclude that the ASM technique is extremely powerful for analysing landmarkable images and can be successfully applied to a range of dental images and for a variety of different studies.