

# Automatic segmentation of teeth from panoramic radiographs

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**Abstract:** Segmentation of teeth from panoramic radiographs can play an important role in early diagnosis and treatment that helps the dentist to make better decision. Our proposed algorithm consists of extraction of jaw and segmentation of teeth. We do the segmentation of the jaw using gradient vector flow (GVF) snake aided by the detection of the nearest black point around the jaw to exclude unnecessary regions around the jaw. Our proposal to segment the teeth by creating a model for each tooth using active shape model (ASM).

**Keywords:** ASM, k-means, GVF snake.

## 1. Introduction

In recent years, a fair amount of research is ongoing on dental X-rays. Among various kinds of radiograph, only panoramic radiograph contains all the teeth in single frame. Our proposal is to segment all the teeth from panoramic radiographs. Our method consist of two steps: extraction of the jaw and segmentation of the teeth. Jaw is extracted prior to the teeth segmentation to make it simple and accurate. The organization of this paper is as follows: section 2 briefly describes the proposed method; section 3 shows experimental results; finally, we draw conclusion in section 4.

## 2. Proposed method

Proposed method consists of 2 major steps: Segmentation of the jaw and extraction of the teeth.

### 2.1 Extraction of the jaw

Extraction of the jaw has several steps which are as below:

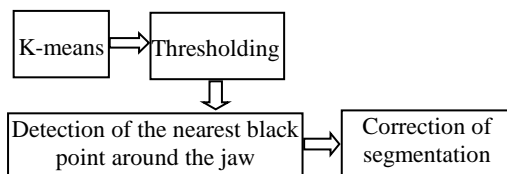


Figure 1. Algorithm for Extraction of jaw

### 2.2 Segmentation of the teeth

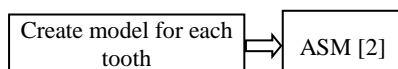


Figure 2. Algorithm for teeth segmentation

## 3. Experimental Result

We have implemented the extraction using C++, openCV and matlab. We have tested our proposed algorithm for jaw extraction on windows 7 and the CPU was Intel core i7 (3.40 GHz). Number of test image was 284. The percentage of successful extraction of jaw is 92%. The average execution time of jaw extraction was about 6.7 seconds. Example of jaw extraction is shown in Fig. 3. Implementation of teeth segmentation is not completed yet.

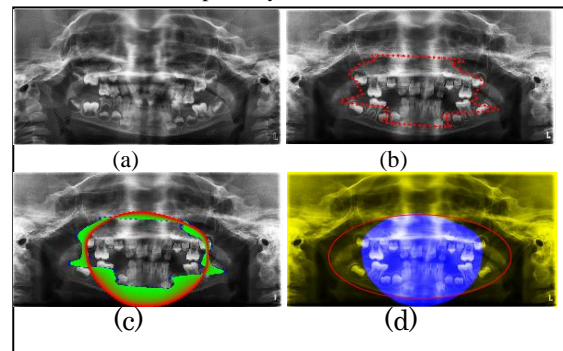


Figure 3. Extraction of jaw. (a) input panoramic radiographs; (b) Red dots represent nearest black points around the jaw estimated by k-means and thresholding followed by detection of nearest black points around the jaw. The points are sorted clockwise and prepared for the GVF snake; (c) green area shows changes in the snake, red line shows final snake; (d) blue region shows the segmented area; correction of the segmentation by oval shape shown in red color.

## 4. Conclusion

We propose segmentation of teeth from panoramic radiographs. Extraction of jaw prior to the segmentation is also proposed. Extraction of jaw is implemented and we get satisfactory result. In near future we will implement the segmentation of teeth and will show the importance of jaw extraction.

## References

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