

# Robust Region Landmark Detection for Mouse Brainstem Section Images

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**Abstract. Keywords:** landmark detection, atlas generation, mouse brain, gabor filter

## 1 Introduction

Registering brainstem is hard due to the lack of sharp edges, compared to Cerebral Cortex and Cerebellum.

Allen Reference Atlas does not have enough details in brainstem.

**Fig. 1.**

## 2 Related Work

Point Landmark Detection  
SIFT  
Saliency and Objectness Detection  
global rarity scheme  
center-surround scheme  
Texture Representation  
gabor filter  
textons

## 3 Represent Texture using Histograms of Gabor Textons

Represent texture at each pixel using Gabor filters.  
rotation-invariant k-means clustering to form textons.  
Over-segment into superpixels.  
Describe texture using histogram of textons

## **4 Detect Significant Region Using Center-Surround Contrast**

Region Growing

## **5 Robust Boundary Detection by Region Concensus**

## **6 Matching Boundaries from Different Sections**

## **7 Experiments**

### **7.1 comparison with human labelings**

Shows the results of our algorithm is comparable to human labeling.

**Fig. 2.**

### **7.2 robustness of matching**

Shows that matchings are robust to distortion and shape change. Also shows that our distance measure is a sensible one: each of the four terms is important. We show this by changing the term weightings, and then compare matching results.

## **References**

1. Clarke, F., Ekeland, I.: Nonlinear oscillations and boundary-value problems for Hamiltonian systems. Arch. Rat. Mech. Anal. 78, 315–333 (1982)