

Automatic Atlas-based Cartilage Segmentation from Knee MR Images

Liang Shan, Marc Niethammer

Department of Computer Science, University of North Carolina at Chapel Hill

1 Introduction

Osteoarthritis (OA) is the most common form of joint disease and is characterized by cartilage loss. An accurate cartilage segmentation from magnetic resonance (MR) knee images is crucial to study OA. Due to the size of image databases acquired for OA studies, a fully automatic segmentation is needed.

In this paper, we therefore discuss a new automatic cartilage segmentation method from knee magnetic resonance (MR) images. The method is a step towards automatic analysis of large OA image databases.

2 Method

We use the atlas-based cartilage segmentation with anisotropic regularization proposed in [1]. See [1] for the overall pipeline and the details. The only two difference from [1] are discussed as below.

To simplify the atlas building and registration, we apply the affine transforms of femur and tibia to femoral and tibial cartilage respectively. It is a close approximation of the knee registration discussed in [1].

Since the dataset contains T1 weighted MR images only whereas multiple modalities were (T1 weighted and T2* MR) used to obtain bone segmentation in [1]. We compute the bone likelihood image using the method proposed in [2] which is based on the fact that the bone is dark in the T1 weighed MR images.

3 Conclusion

We presented an automatic atlas-based cartilage segmentation method.

References

1. Shan, L., Charles, C., Niethammer, M.: Automatic atlas-based three-label cartilage segmentation from MR knee images. *IEEE Workshop on Mathematical Methods in Biomedical Image Analysis* (2011) 241–246
2. Shan, L., Charles, C., Niethammer, M.: Automatic multi-atlas-based cartilage segmentation from knee MR images. *IEEE International Symposium on Biomedical Imaging: From Nano to Macro* (2012)