Geometry-Based Machine Learning in Biomedical Image Analysis

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5/24/2018 at 05:00 pm
CBIM 22

Abstract

Medical image analysis is of great importance for understanding human body anatomy, disease diagnosis, and patient treatment. Compared to the general computer vision tasks, most anatomical structures (e.g. heart, bones) are embedded with very unique shape information. The information presents not only the geometric correlation between structures, but also various pathologies. In the presentation, we address the task of medical image analysis using various machine learning methods together with the geometrical shape priors. The geometrical priors have different expressions (global and local priors), according to the specific scenarios. Several practical applications, such as motion reconstruction of left ventricle wall, bone/organ parsing et al., are discussed to demonstrate the usage of geometric shape priors together with machine learning techniques. The geometric priors validated by the experimental results help achieve the significantly better analytical results.