Towards large-scale MR thigh image analysis via an integrated quantification framework

Chaowei Tan
Dept. of Computer Science
10/10/2017 at 02:30 pm
CBIM 17

Abstract

In this paper, we focus on large scale magnetic resonance (MR) thigh image analysis via accurately quantifying major tissue composition in the thigh by a novel integrated framework. Specifically, the framework is able to distinguish muscular tissue and different types of adipose tissues, i.e. subcutaneous adipose tissue (SAT), inter- and intra-muscular adipose tissue (IMAT and IAMAT), efficiently. Deformable models and learning based techniques are integrated in the novel framework to enable robust quantification. Importantly, extensive evaluations are conducted on a large set of 3D MR thigh volumes from longitudinal studies of hundreds of subjects to investigate radiographic osteoarthritis (OA) related changes of muscular and adipose tissue volumes. The analysis is constructed by two subcohorts (G1 and G2). G2 has 61 patients which keep healthy at baseline (BL) and 48 months (M48), while G1’s 85 patients are healthy at BL but have knee OA at M48. Paired t-tests are used to investigate the changes of these tissue size over time passing with/without pathological progression. The experimental results show that, in G1, patients’ IMAT and IAMAT are statistically significant respectively, yet G2 has no such variation in the same tissue type. Thus we conclude from the statistical analysis that age may not directly affect thigh tissues, but IMAT and IAMAT may have obvious changes in patients with knee OA.