COMPUTATIONAL ANATOMY: DIFFERENTIAL GEOMETRIC APPROACH FOR THE COMPARISON OF MEDICAL IMAGES

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Abstract

The development of numerical and statistical methods for interpreting/classifying medical images is a challenging problem. The use of differential geometric methods (to be combined with techniques from machine learning) were proposed by Miller and Grenander in 1998 in a seminal paper called 'Computational anatomy:an emerging discipline". The area has now matured, both mathematically and technologically. In this talk I will report on some mathematical developments I saw in the workshop "Riemannian geometry in shape analysis and computational anatomy" (`http://www.mat.univie.ac.at/~shape2015/`). As the organizers summarized: "the diffeomorphism group plays a central role. The space of medical images is acted upon by the diffeomorphism group and differences between images are encoded by diffeomorphisms" . This wording is not strange to sophisticated medical groups such as the Id'Or Reseach Center in Brazil we have made contact with. Time permitting I will present some ideas we have been discussing with the Imperial College group leaded by Darryl Holm in the Science without Frontiers joint project.