
THE UNIVERSITY OF MANCHESTER

ABSTRACT OF THESIS submitted by Roy Samuel Schestowitz
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Statistical models of shape and appearance are widely used for analysis of biomedical images. Two deficiencies of these models are that they require consistent annotation of a large number of images in order to be built, and having built such models, it is then difficult to reason about their validity, let alone assess their quality. Herein, a method is described which addresses both problems and establishes a unified solution. In order to construct models reliably and rapidly, corresponding structures must be brought into a state where dense overlap across images is obtained. Image registration is the mechanism whereby a set of images can be analysed in a common frame of reference and models then derived from it. The thesis provides a solution to the problem where there is a recurring need to compare such models. It extends the method so as to provide an image registration assessment method which does not require ground-truth data. The thesis also deals with a complementary case where images are registered by minimising the complexity of models. Overall, the proposed framework can be perceived as one which combines registration and modelling, taking advantage of the fact that the ideas behind them are inherently the same. Registration provides correspondence across images; given that correspondence, models of appearance can be built and registration then assessed, without the need for ground-truth data.