

Quantitative Medical Image Analysis

Brandon Whitcher^{1,2,*}

1. Mango Solutions, Chippenham, UK

2. Statistics Group, Department of Mathematics, Imperial College London, UK

*Contact author: bwhitcher@mango-solutions.com

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All pharmaceutical companies apply medical imaging to their drug development process. One key difference between the application of medical imaging for drug development versus clinical diagnosis is quantification. The biomarkers obtained from a medical imaging experiment must be quantifiable in order to apply classical methods of statistical inference; for example, group comparisons based on treatment or disease. Imaging biomarkers are obtained in clinical trials, usually on a subset of subjects, at every stage in drug development. The process of obtaining a summary statistic or hypothesis test from *in vivo* medical imaging requires several steps, such as reconstruction, registration, segmentation and mathematical modelling before inference may be performed. The number and sequence of steps will vary depending upon the disease, drug therapy and biological system under investigation. I believe that open-source programming environments like *R* and public-domain medical imaging data sets (e.g., ADNI, OAI, RIDER) are key to incrementally improving the quality of the methodology and implementation of algorithms for medical imaging applied to drug development. I will provide an overview of quantitative methods for medical image analysis using specific packages developed in the *R* community and relevant clinical data.

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