Localization aware Deep Learning framework for Statistical Shape Modelling

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Abstract

Statistical Shape Modelling (SSM) is an effective tool for quantitatively analyzing anatomical populations. SSM has benefitted largely from advances in Deep Learning where Point Distribution Models (PDMs) are inferred direct form images, alleviating the need for a time-consuming and expensive workflow of anatomy segmentation, shape registration, and optimization. Nonetheless, most works do not consider the rigid pose transformation of shapes or anatomy of interest and require a tight bounding box over the anatomy. In this paper, we propose a deep learning framework that extracts the tight bounding box over the shape of interest from a complete image, does rigid registration using a spatial transformer, and then provides statistical shape representation. Additionally, we apply a gaussian filter on segmentation output, combining it with the original image to emphasize the anatomy shape, giving more accurate correspondences for shape analysis.

Keywords: Statistical Shape Modeling, Deep learning, Anatomy Segmentation

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