Statistical Modeling of Reaching Motions using Functional Regression with Endpoint Constraints

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We describe how to build a statistical model for the prediction of reaching motions using motion capture data on a variety of individuals performing reaches to a range of targets. The model allows various inputs such as the stature, age and the location of the target to be specified and then computes the predicted trajectories of the body markers necessary to place an object exactly at the specified target. Functional regression methods for modeling angles and other quantities as well as trajectories are described. An algorithm for combining the predicted angles and other components to satisfy specific endpoints such as placing an object at a target is presented. The methodology is illustrated with an application to two-handed standing lifts.

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