

Developing statistical methodologies for Anthropometry

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Abstract

Fitting Ready To Wear clothes is a basic problem for customer and apparel companies. One of the most important problems to develop new patterns and grade to all sizes is the lack of updated anthropometric data. For this reason, national administrations and industrial groups from the clothing sector in different countries have been fostering several national anthropometric surveys in recent years. In 2006 the Spanish Ministry of Health promoted a 3D anthropometric study of the Spanish female population. This survey aimed to generate anthropometric data from Spanish women for the clothing industry [1]. A sample of 10.415 Spanish females from 12 to 70 years old randomly selected from the official Postcode Address File was measured. The obtained anthropometric data constitute valuable information to understand the body shape of the population. A very important challenge is to define an optimal sizing system. A sizing system classifies a specific population into homogeneous subgroups based on some key body dimensions. Our research group has developed some clustering methodologies using some of the ideas of [4, 5], among others. On the other hand, the shape of the 10.415 women is described by using a set of correspondence points. In this case, we have used the statistical shape analysis [3] to divide the population into efficient sizes according to their shape. In the multivariate accommodation problem, a small group of representative cases (human models) which represents the anthropometric variability of the target population is commonly used. The appropriate selection of this small group is critical in order to accommodate a certain percentage of the population. We use the archetypal analysis [2] to that end. The archetypes returned by the archetypal analysis are a convex combination of the sampled individuals, but they are not necessarily observed individuals. However, in human modeling is crucial that the archetypes are real people. An algorithm inspired by the Partitioning Around Medoids (PAM) clustering algorithm to obtain necessarily observed individuals, which we call archetypoids, has been proposed. All the just mentioned statistical methodologies use the anthropometric data of the Spanish survey. They are gathered together in an R package called *Anthropometry*, that will be available soon.

Keywords: Anthropometric data, Clustering, Statistical shape analysis, Archetypal analysis

AMS subject classifications: 62P30.

Acknowledgements: This research has been partially supported by grants TIN2009-14392-C02-01 and TIN2009-14392-C02-02.

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