Statistical Model for Human Body Measurements

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Abstract

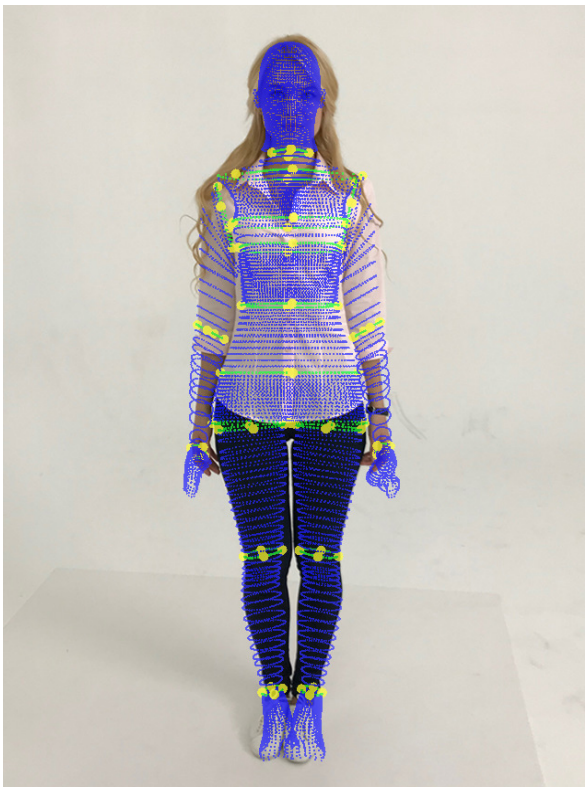
Recent interest in XR technologies and the corresponding applications (online sizing, virtual try-on) increase the demand for algorithms that allow to get precise information about the human body from digital data. While the data can be represented in quite different ways (3d body scan, multiview images, one image, body contour, etc.), we believe that a single image (under some reasonable constraints on human pose) may contain necessary amount of information to get precise tailoring measurements as well as a natural 3d model. Despite the fact that the reconstructed model looks similar to a person, it is not precise enough for taking human measurements. Therefore we primarily address the problem of estimating human measurements with a single image of a person wearing clothing.

We suppose that using visually realistic and detailed models in 3d is not necessary for solving the human measurements problem, so we propose our statistical model that is not based on a 3d mesh. We found that 2d slices (a spline-based closed curve) could be extremely helpful here. Therefore, our statistical model is represented by 2d slices that are located on areas that are expected to be measured. Here we should emphasize that statistical model is not based on 2d slices themselves, but on their parameters. In such way, we significantly simplify the model and reduce the dimensionality.

To get the measurements, we use PCA for regularization and make the initial guess. We found that the measurement error can be decreased by considering submodels that correspond to human features (arms, legs, etc.). Next, we compensate our changes in the submodels to get adequate human measurements in general.

Our second interest is to generate a 3d mesh from the measurements obtained. Here we use the idea close to the feature wireframe approach that was proposed recently. In fact, it compensates our human measurements one more time to get a more human-like 3d mesh.

Keywords: Statistical model, human measurements, 3d human body, PCA



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