SIZE STREAM

Body Weight from SS20 3D Body Scans

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Size Stream has developed a new formula for estimating human body mass from Size Stream SS20 3D body scans using machine learning.

These formulas were developed and cross-validated using a diverse set of over 1790 human 3D body scans (of 179 individuals). Machine learning techniques were utilized to correlate the 3D body scan data to calibrated body mass measurements. The resulting formulas were then cross-validated using two additional test groups of subjects at separate labs.

The 3D body scans and calibrated weight data were taken at the Department of Kinesiology and Sport Management at Texas Tech University under the oversight of Dr. Grant Tinsley. The 3D body scans were captured using the Size Stream SS20 body scanner. The validation data sets of over 300 body scans were taken at Pennington Biomedical Research Center at Louisiana State University under the oversight of Dr. Steven Heymsfield and at University of California San Francisco and the University of Hawaii Cancer Center under the oversight of Dr. John Shepherd. The 3D scans at the validation sites also used the Size Stream SS20 3D body scanner. One hundred percent of all the body scans captured and provided to Size Stream were used in the analysis.

Stepwise and Lasso Regression analysis was performed to develop the detailed formulas based on the variables presented. Approximately 200 measures from the Size Stream SS20 automatic measurement software were considered. The detailed formula results are:

$$\boldsymbol{Body\ Mass\ (Kilograms)}$$

$$= 24.781 + 5.2885 * X1 - 1.7318 * x5 - .0072279 * X6 + 1.5778 * X7 + .00087447 * X5 * X6$$

Where:

X1=Gender (1 for male, 0 for female)
X5=Stomach Circumference taken at forwardmost point between the waist and chest
X6=Surface Area Total
X7= Thigh Circumference Right

Units of measure are “inches” of circumference and “square inches” of surface area. The Thigh Circumference is the leg girth measured two inches below the crotch point.

The new formulas yield impressive results with R^2 (R SQUARED) > 0.95 in terms of kilograms body calibrated scale data and the estimate from the 3D body scan. The STD is 3.47.

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