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使用手部一維尺寸建立年輕男性人體手掌投影面積與身高之經驗公式

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摘　要 人體手掌投影面積(Palm Surface Area, PSA)與人體身高之估算模式，在有關工業衛生與安全、醫療與鑑識科學等領域是重要的參考資訊。一維的手部相對尺寸對於 PSA 與身高之估計值都是為高相關性之指標。近年來，攝錄影裝置已經在現代人的日常生活中大量使用，例如手持裝置與安全監視錄影系統。其錄影數據可提供所需資訊，本研究之目的在於利用影像量測所得之一維手部尺寸數據，分別建立 PSA 與身高之估算公式。並與以往研究文獻的手部尺寸相關模式比較。在此研究中，以手機作為攝影設備，拍攝受測者手掌圖像，進行影像處理與尺寸擷取，由此取得量測所需之數據資料。與前人研究手部尺寸量測方法之不同在於此研究之數據以 Image-J 軟體進行分析。樣本係依三種身體質量指數(Body Mass Index, BMI)數值進行分層抽樣，取樣共有 26 位男性樣本，年齡為 20-22 歲。量測所得數據使用線性與非線性迴歸模式建模。研究結果顯示本研究量測的手部尺寸統計數據，可為 PSA 與身高提供數種線性與非線性之估算模式。此資料擷取方法經驗證其數據量測準確度(Accuracy)，其誤差值低於 1.41%。預測公式之準確度 PSA 為 4.516 cm^2，身高為 3.992 cm。

關鍵詞：迴歸分析、手掌投影面積、身高、人體計測、鑑識科學。

Establishing Empirical Equations of Palm Surface Area and Stature by Using One-Dimensional Size of Young Male's Hand

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ABSTRACT The establishment model between the Palm surface area (PSA) and the stature is always very important in industrial hygiene and safety, medical, and forensic science. Higher correlation between one-dimensional hand size and PSA or stature have reported in literature. Recently, video recording devices have been largely utilized in our modern lives, such as handheld cellphone devices and security surveillance video systems. In this study, we tend to establish the PSA and stature estimation formula by using one-dimensional hand size from the image measurement of the mobile phone. Unlike most of previous hand size measurement methods, these data were analyzed by software Image-J method. The palm images of the subject that taken by the mobile phone is used for size capture and image processing. Sampling is executed by stratified random sampling technique with three body mass index (BMI) values. The age of the 26 male objects was ranged 20 to 22 years. Linear and nonlinear models were used to analyze these data. The results of this study indicated that several linear and nonlinear estimation equations of PSA and stature were establish with their hand size data. The accuracy of the proposed methods in this study was tested. The experimental error was less than 1.41%. The accuracy of prediction equations for PSA and stature was 4.516 cm^2 and 3.922 cm, respectively.

Keywords: Regression analysis, Palm surface area, Stature, Human measurement, Forensic science.

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