

100 學年度大四工工專題摘要

第 組	基於三維顏面計測資料之面膜客製化設計 Customized facial mask design based on 3-Dimension Facial Data	
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摘 要		
本研究建立台灣年輕女性三維顏面計測資料庫，結合以 PCA (Principal Component Analysis) 與線性迴歸為基的參數化模型，以及資料分群演算法，提供一套面膜設計客製化系統。消費者可藉由量測臉部的特徵尺寸，快速且自動決定出最適合的面膜款式。本研究利用結構光原理的三維臉部掃描技術，蒐集 50 組 18~25 歲東方女性顏面三維計測資料，接著進行網格修補與特徵點標示的後處理，建立適用參數化之樣本幾何模型。並透過網格攤平的技巧，進行顏面資料等網格化的計算。再以特定顏面參數組合進行分群分類，建構量測參數與三維幾何間之對應關係。最後藉由 N 群交叉驗證 (N-fold cross validation) 進行驗證，測試結果顯示本研究方法於顏面產品客製化的良好效能。 In this research, we construct a 3D face anthropometric database for young Taiwanese women. A parametric model based on integration of PCA (Principal Component Analysis) and linear regression techniques is developed. A data clustering algorithm is applied to separate the data into groups. This work aims at providing a customization design system of 3D cosmetic masks. Consumers are allowed to quickly and precisely determine the most suitable mask geometry with a simple set of facial parameter values. The anthropometric data was acquired using a non-contact metrology technology based on structured-light. Totally 50 models of Taiwanese young women aged 18-25 were obtained. Post-processing operations including mesh re-sampling and landmarks labeling were conducted. The processed models work as valid training data for constructing the parametric model. The data was re-meshed by developing techniques to guarantee the same number of mesh vertices and mesh connection. A best set of facial parameters that drives the parameter model were identified. The test results of N-fold cross validation demonstrate the effectiveness of the proposed methods. This work provides a feasible approach for customized design of products related to human face.		