DESIGN RULE EXTRACTION FROM A TRAINED ANN MODEL USING GA FOR PRODUCT FORM DESIGN OF MOBILE PHONES

K.Y. FUNGa, C.Y. TANGa, ERIC W.M. LEEb, G.T.S. HOa, MICHAEL K.W. SIUC, W.L. MOUb

aDepartment of Industrial and Systems Engineering, The Hong Kong Polytechnic University Hung Hom, Kowloon, Hong Kong

bDepartment of Building and Construction, City University of Hong Kong 83 Tat Chee Avenue, Kowloon Tong, Kowloon, Hong Kong

cSchool of Design, The Hong Kong Polytechnic University Hung Hom, Kowloon, Hong Kong

ABSTRACT—An artificial neural network (ANN) model and rule extraction from a trained ANN using genetic algorithm (GA) are applied to predict and advise on the rules for optimal product form design for a particular customer feeling. To map design elements and the affected impressions, principal component analysis (PCA) is employed to determine the essential dimensions for data analysis. By using ANN to examine the relationships between perceptual value and form elements, black-box ANN knowledge can be extracted by applying GA to generate design rules. A case study on the product form of a mobile phone design was conducted to implement the proposed approach. The resultant rules can be used to help product designers to better understand key design elements and to verify optimal solutions suggested by using ANN models.