主　論　文　要　旨

論文題名　Fast and natural Individual-Adapted Facial Shape Transformation

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主論文要旨

Easily editing and processing of high-quality image contributes immeasurably to many research and application field, such as high-accuracy digital face beautification. It is granted that face beautification should be high-speed, natural and maneuverable to end users. There are mainly two strategies, shape based and texture based for digital face beatification. Our work focuses on shape based methods and tries to realize fast and natural face beautification. In conventional shape based face beautification methods, in order to achieve high accuracy shape deformation the computational cost is always too large. Furthermore, the features of original images are not considered enough in conventional methods, which causes the problem of unnatural shape deformation.

With the problems mentioned above, several improved methods are proposed in this research. The main contributions of this thesis are summarized as follows.

(1) The method of shape deformation. To solve the problem of conventional shape deformation methods, such as the inaccuracy of B-spline and the high computation cost, a fast shape deformation method based on B-spline with optimized transformation parameter estimation is proposed.

(2) Fast shape deformation by using template. By a predefined template table of deformation, a fast and natural shape deformation is realized. A face beatification application based on the developed techniques has been successfully loaded in the cell phone.

(3) Deformation estimation based on machine learning. The deformation can be fully automatically estimated based on subspace learning. In the proposed method, a shape subspace is learned and the deformation parameters can be calculated by a mapping function in the shape subspace. An expression deformation method is also proposed based on this technique.

(4) Base on the techniques mentioned above, a makeup transformation system is developed, in which the face shape beatification and makeup transformation can be implemented at the same time. Now, the production of this system is under way.