

Title	多重解像度解析による顔濃淡・距離画像の特徴解析に関する研究
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2-D Shade and 3-D Facial Images Analysis by Multi-Resolution Analysis

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The facial image analysis method can divide into the method of an appearance base and the method of a model base. One is that the luminosity value and color information of facial image is mapped to the feature space and extracts the feature of facial image. The other is that an outline and the feature point are extracted from a facial image, and extracts the form feature of a face. The method of an appearance base and the method of a model base are difficult to determine which method to be excellent in the local or global feature extraction of facial image. The research method, such as excepting about a problem and argues or choosing for the research method specialized in the purpose to apply in the spot of research facial image, is taken.

There is resolution to express the grade of fineness on a image. By resolution transformation, the same image can be expressed in different resolution. It is called multi-resolution analysis to decompose one image into two or more images. The multi-resolution analysis of a image can extract the global and local feature of a image from the image of different resolution and can be analyzed. By multi-resolution analysis of the facial image, if the facial feature of global and local can dissociate or extract or analyze, the problem of the method of an appearance base and the method

of a model base is mitigated, and the facial image analysis which has each strong point is expectable.

Furthermore, facial image analysis is considered from another viewpoint. Most features of a face have appeared in form. The method of an appearance base is method that extract and analyze from pixel information on a facial image as the form feature of a face. This method is that light hits a face and the reflective characteristic of the light gives the face form feature, and the form feature is indirectly extracted and analyzed as a pixel value by picture borrowed light and create a image. On the other hand, the method of a model base extracts and analyzes the form feature directly from the outline and the feature point of a facial image. Accordingly the outline and the feature point are made to represent the form feature. In addition, laser to a face, and distance is measured. This is equipment which pictures directly 3-dimensional form as a distance image. If a distance image(it is called a facial distance image) can be obtained, the middle-method which united the method of an appearance base and the method of a model base, or the 3rd method is probably realizable.

By old facial image research, multi-resolution analysis of a facial image, analysis of a facial distance image are still not done sufficient research. In this research, multi-resolution analysis separates a facial image into multi-resolution. And in each resolving, it will show clearly what facial feature information included. If the facial feature information acquired to every resolution can use as the analysis (facial expression analysis) of the expression by the face, or information on specification (individual discernment) of an individual, facial image analyses using it, such as expression analysis and individual discernment, are expectable. Then, we analyze the feature information on the facial image divided into multi-resolution, and we evaluate about whether the feature information includes the information which specifies an individual.

Facial image Analysis tried two kinds of images, 2-dimensional shade pattern information, 3-dimensional form information. The discrete cosine transform and the discrete Wavelet transform which can perform analysis which held the position information on a image in the method of multi-resolution analysis are used. The result which carried out the feature analysis, it turns out that the analysis using discrete Wavelet conversion has

caught the feature information which specifies an individual in both the facial shade image and the facial distance image.

Furthermore, by comparison of a facial shade image and a facial distance image, it turns out that a facial distance image caught the feature information which specifies an individual than a facial shade image.

It has information which is different from a facial shade image and a facial distance image about the individual nature of people's face. That is, Highly precise face image analysis is expectable by combining each.