A project for hand gesture recognition

2 authors, including:

Carlos R. P. Dionisio
University of São Paulo
18 PUBLICATIONS   **43** CITATIONS

SEE PROFILE

A Project for Hand Gesture Recognition

CARLOS R. P. DIONISIO[1], ROBERTO M. CESAR JR[1]

[1]Department of Computer Science, Univ. of São Paulo - Caixa Postal 66.281, 05315-970 - São Paulo, SP, Brasil
{lobo,cesar}@ime.usp.br

Abstract. This work discusses an ongoing project for hands gesture recognition in computer vision systems. The proposed approach is based on the shape analysis tools introduced in [1]. More specifically, the wavelet transform will be used for generating features for the recognition of hand gestures based on contours.

1 Introduction

Hand gesture is an important way for communication between people. On a simple human-machine interface, the hand gesture recognition is very important. Possible applications include from console replacement to the communication with a deaf as a virtual reality device. In the development of systems based on gesture recognition, there are three problems:

- Static Recognition of Hands Form;

- Hand Tracking;

- Dynamic Gesture Recognition.

Firstly, we are interested in the static recognition of hands form. R. Cesar [1] on his doctoral thesis, introduces a new approach for object recognition based on contour analysis. This work discusses an application of this new approach for hand gesture recognition.

2 Multi-Scale Analysis of Two-Dimensional Forms

R. Cesar [1] introduces conceptual ideas and algorithms for representation and multi-scale analysis of shape contours in digital images. That work also presents several techniques for contour analysis by multi-scale curvature and Gabor transform including specific algorithms for corner detection, natural scale characterization, fractal analysis of self-similar curves and feature vector extraction associated with different shape aspects such as complexity and rectangularity. Figure 1 shows the contour of a hand gesture, while Figure 2 shows the corresponding continuous wavelet transform using the mexican hat wavelet. Our ongoing work deals with defining and extracting feature vectors from this type of representation, as well as the application of automatic feature selection algorithms for the design of more robust classifiers. It is worth noting that an analogous approach has been successfully applied for the recognition of neural cells in [2], thus paving the way for the development of the present project.

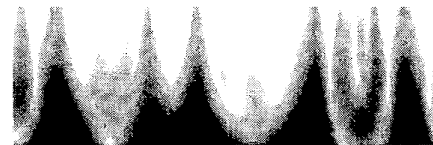Figure 1: Contour of a hand gesture, adapted from the data made available in [3].

Figure 2: Continuous wavelet transform using the mexican hat wavelet.

Acknowledgments

References

[1] R.M. Cesar Jr. and L. da F. Costa, *Análise Multi-Escala de Formas Bidimensionais*, Institute of Physic of São Carlos, Univ. of São Paulo (São Paulo, 1997).

[2] R.M. Cesar Jr. and L. da F. Costa, *Neural Cell Classification by Wavelets and Multiscale Curvature*, Biological Cybernetics, 79(4):347-360, 1998.

[3] E. Milios and E.G.M. Petrakis, *Shape Retrieval Based on Dynamic Programming*, IEEE Transactions on Image Processing, vol. 9, no. 1, 2000, 141-146.