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ROBUST REAL-TIME AND ROTATION-INVARIANT AMERICAN SIGN LANGUAGE ALPHABET RECOGNITION USING RANGE CAMERA

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Abstract. The automatic interpretation of human gestures can be used for a natural interaction with computers without the use of mechanical devices such as keyboards and mice. The recognition of hand postures have been studied for many years. However, most of the literature in this area has considered 2D images which cannot provide a full description of the hand gestures. In addition, a rotation-invariant identification remains an unsolved problem even with the use of 2D images. The objective of the current study is to design a rotation-invariant recognition process while using a 3D signature for classifying hand postures. An heuristic and voxelbased signature has been designed and implemented. The tracking of the hand motion is achieved with the Kalman filter. A unique training image per posture is used in the supervised classification. The designed recognition process and the tracking procedure have been successfully evaluated. This study has demonstrated the efficiency of the proposed rotation invariant 3D hand posture signature which leads to 98.24% recognition rate after testing 12723 samples of 12 gestures taken from the alphabet of the American Sign Language.

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