

CGA CLUSTERING BASED VECTOR QUANTIZATION APPROACH FOR HUMAN ACTIVITY RECOGNITION USING DISCRETE HIDDEN MARKOV MODEL

CGA CLUSTERING BASED VECTOR QUANTIZATION APPROACH FOR HUMAN ACTIVITY RECOGNITION USING DISCRETE HIDDEN MARKOV MODEL

Tác giả: Trường Đại học Bách Khoa*

Tóm tắt bằng tiếng Việt:

Activity recognition has been paid much consideration by many scientists over the world. However, the conventional research results need to be improved because of the complexity and unstability of object recognition. Especially with human activity recognition (HAR) in 3-dimensional space, the vector quantization based on k-means was not able to cluster two objects rotating around a common point but is not same a plane because they have the same cluster centroid. In this paper, we propose a new method of vector quantization (VQ) performance optimally distribute VQ codebook components on Hidden Markov Model (HMM) state. This proposed method is carried out through two steps. First, the proposed method use Conformal Geometric Algebra (CGA) clustering algorithms to optimize VQ. Then, the proposed method uses discrete HMM to recognize the human activity. The experimental result with the CMU graphics lab motion capture database shows that the proposed method is better than conventional method.

Từ khóa: Hidden Markov Model; Vector Quantization; Clustering; k-mean; Conformal Geometric Algebra.

Tóm tắt bằng tiếng Anh:

Activity recognition has been taken into great consideration by many scientists all over the world. However, the conventional research results need to be improved because of the complexity and unstability of object recognition. Especially with human activity recognition (HAR) in 3-dimensional space, the vector quantization based on k-means was not able to cluster two objects rotating around a common point but on a different plane because they have the same cluster centroid. In this paper, we propose a new method of vector quantization (VQ) performance optimally distribute VQ codebook components on Hidden Markov Model (HMM) state. This proposed method is carried out through two steps. First, the proposed method use Conformal Geometric Algebra (CGA) clustering algorithms to optimize VQ. Then, the proposed method uses discrete HMM to recognize the human activity. The experimental result with the CMU graphics lab motion capture database shows that the proposed method is more effective than conventional method.

Key words: Hidden Markov Model; Vector Quantization; Clustering; k-mean; Conformal Geometric Algebra.