

Human Action Recognition Using Variational Bayesian HMM with Dirichlet Process Mixture of Gaussian Wishart Emission Model

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Abstract : In this paper, we present the human action recognition method using the variational Bayesian HMM with the Dirichlet process mixture (DPM) of the Gaussian-Wishart emission model (GWEM). First, we define the Bayesian HMM based on the Dirichlet process, which allows an infinite number of Gaussian-Wishart components to support continuous emission observations. Second, we have considered an efficient variational Bayesian inference method that can be applied to drive the posterior distribution of hidden variables and model parameters for the proposed model based on training data. And then we have derived the predictive distribution that may be used to classify new action. Third, the paper proposes a process of extracting appropriate spatial-temporal feature vectors that can be used to recognize a wide range of human behaviors from input video image. Finally, we have conducted experiments that can evaluate the performance of the proposed method. The experimental results show that the method presented is more efficient with human action recognition than existing methods.

Keywords : human action recognition, Bayesian HMM, Dirichlet process mixture model, Gaussian-Wishart emission model, Variational Bayesian inference, prior distribution and approximate posterior distribution, KTH dataset

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