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Approximation of feature pyramids in the transform domain for object detection

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Feature extraction from each scale of an image pyramid to construct a feature pyramid is considered as a computational bottleneck for many object detectors. In this paper, we present a novel technique for the approximation of feature pyramids in the transform domain, namely, the 2D discrete Fourier transform (2DDFT) or the 2D discrete cosine transform (2DDCT) domain. The proposed method is based on a feature resampling technique in the 2DDFT or the 2DDCT domain, exploiting the effect of resampling an image on the feature responses. Experimental results show that the proposed scheme provides feature approximation accuracy which is higher than that of the spatial domain counterpart when gradient magnitude or gradient histogram features are used. Further, when the proposed method is employed for object detection, it provides a detection accuracy superior to that provided by the spatial domain counterpart and compares favorably with that of the state-of-the-art techniques, while performing in real-time.

Biography

Mohamed A Naiel received the BSc degree in Electronics and Communications Engineering from Tanta University, Tanta, Egypt in June 2006 and MSc degree in Communications and Information Technology from Nile University, Giza, Egypt in June 2010. He is currently pursuing his PhD degree in Electrical and Computer Engineering with Concordia University, Montreal, QC, Canada. He has been a Research Assistant with the center for signal processing and communications, Concordia University, since 2011. His research interests include image and video processing, computer vision, human action recognition, object detection and recognition, and multi-object tracking.

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