

CNN-Based Joint Clustering and Representation Learning for Large-Scale Image Data

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ABSTRACT

Given a large unlabeled set of images, how to group them into clusters based on extracted visual representations efficiently and effectively remains a challenging problem. To address this problem, we propose a convolutional neural network (CNN) to jointly solve clustering and representation learning in an iterative manner. In the proposed method, given an input image set, we first randomly pick k samples and extract their features as initial cluster centroids using the proposed CNN with an initial model pre-trained from the ImageNet dataset. Mini-batch k -means is then performed to assign cluster labels to individual input samples for a mini-batch of images randomly sampled from the input image set until all images have been processed. Subsequently, the proposed CNN simultaneously updates the parameters of the proposed CNN and the centroids of image clusters iteratively based on stochastic gradient descent. We also propose a feature drift compensation scheme to mitigate the drift error caused by feature mismatch in representation learning. Experimental results demonstrate the proposed method outperforms state-of-the-art clustering schemes in terms of accuracy and storage complexity on large-scale image sets containing millions of images.

BIOGRAPHY

Prof Chia-Wen Lin received his PhD degree in Electrical Engineering from National Tsing Hua University (NTHU), Hsinchu, Taiwan in 2000. He is currently a Professor with the Department of Electrical Engineering, National Tsing Hua University, Taiwan. He is also a Director of the Multimedia Technology Research Center, College of Electrical Engineering and Computer Science, NTHU. His research interests include image/video processing and video networking.

Prof Lin has served as an Associate Editor of IEEE Transactions on Image Processing, IEEE Transactions on Multimedia, IEEE Transactions on Circuits and Systems for Video Technology, IEEE Multimedia, and Journal of Visual Communication and Image Representation. He also served as a Steering Committee member of the IEEE Transactions on Multimedia during 2013-2015. He was Chair of the Multimedia Systems and Applications Technical Committee of the IEEE Circuits and Systems Society. He served as Technical Program Co-Chair of the IEEE ICME in 2010 and will be the TPC Chair of IEEE ICIP 2019 in Taipei. His papers won the Best Paper Award of IEEE VCIP 2015, and the Young Investigator Award of SPIE VCIP 2005.

All are welcome!



In case of questions, please contact Dr Shiqi WANG at Tel: 3442 7341, E-mail: shiqwang@cityu.edu.hk, or visit the CS Departmental Seminar Web at <http://www.cs.cityu.edu.hk/news/seminars/seminars.html>.

