香港浸會大學理學院
HKBU Faculty of Science

DEPARTMENT OF COMPUTER SCIENCE

PhD Degree Oral Presentation

PhD Candidate:	Ms Mengke LI
Date	11 August 2022 (Thursday)
Time:	10:30 am – 12:30 pm (35 mins presentation and 15 mins Q & A)
Venue:	ZOOM (Meeting ID: 971 6966 3233) (The password and direct link will only be provided to registrants)
Registration:	https://bit.ly/sem-zm (Deadline: 12:00 nn, 10 August 2022)

Advances in Long-Tailed Visual Recognition

Abstract

Real-world data tends to have a long-tailed distribution. Existing classification models that perform well on artificially balanced datasets suffer severe performance degradation on long-tailed datasets. This thesis presents three methods from different perspectives to address the issues in long-tailed visual recognition.

Key point sensitive (KPS) loss is proposed to address the model biased towards the head classes caused by long-tailed distributed data. KPS loss assigns relatively large margins on tail classes to relieve this bias. In addition, we find that key points are more important for classification. Therefore, KPS loss regularizes the key points strongly. Furthermore, the gradient signals of stimulus and inhibit samples for each class are re-balanced via the proposed gradient adjustment (GA) optimization strategy. This GA strategy can circumvent excessive negative signals on tail classes. KPS loss with GA significantly improves the overall classification accuracy on tail class with slightly decreasing head class accuracy. To address the limitation in KPS loss and study the effect of feature norm on classification, feature-balanced loss (FBL) is proposed. We observe that a large feature norm helps to achieve a clear class margin and thereby propose the novel FBL, which adds an extra class-based stimulus to the logit. The class-based stimulus encourages large norms for tail classes. Moreover, the stimulus intensity is gradually increased in the way of curriculum learning. This robust training strategy helps to boost the classification performance and enables the model to be trained end-to-end. FBL incorporated with curriculum learning achieves considerable performance gain in middle and tail classes meanwhile maintaining competent performance in head classes. We further study the effect of softmax saturation on long-tailed learning, based on which we propose the Gaussian clouded logit (GCL). GCL perturbs different class logits with varied amplitudes to make the loss function with different degrees of softmax saturation for each class. The tail classes are set with relatively large amplitudes to decrease softmax saturation. Therefore, samples of tail classes are more active, and their embedding space can be enlarged. To alleviate the bias in a classifier, the class-based effective number (CBEN) sampling strategy with classifier re-training is proposed, which can further improve the classification performance. GCL with CBEN achieves superior performance compared with the state-of-the-art methods.

Comprehensive evaluation and comparison are conducted on various benchmarks. Visualization experiments and in-depth discussions of the proposed methods are provided. Experimental results demonstrate the superiority of the proposed methods.

***** ALL INTERESTED ARE WELCOME *****