MASTER'S THESIS

Learning hash codes for multimedia retrieval

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Abstract

The explosive growth of multimedia data in online media repositories and social networks has led to the high demand of fast and accurate services for large-scale multimedia retrieval. Hashing, due to its effectiveness in coding high-dimensional data into a low-dimensional binary space, has been considered to be effective for the retrieval application. Despite the progress that has been made recently, how to learn the optimal hashing models which can make the best trade-off between the retrieval efficiency and accuracy remains to be open research issues. This thesis research aims to develop hashing models which are effective for image and video retrieval. An unsupervised hashing model called APHash is first proposed to learn hash codes for images by exploiting the distribution of data. To reduce the underlying computational complexity, a methodology that makes use of an asymmetric similarity matrix is explored and found effective. In addition, the deep learning approach to learn hash codes for images is also studied. In particular, a novel deep model called DeepQuan which tries to incorporate product quantization methods into an unsupervised deep model for the learning. Other than adopting only the quadratic loss as the optimization objective like most of the related deep models, DeepQuan optimizes the data representations and their quantization codebooks to explores the clustering structure of the underlying data manifold where the introduction of a weighted triplet loss into the learning objective is found to be effective. Furthermore, the case with some labeled data available for the learning is also considered. To alleviate the high training cost (which is especially crucial given a large-scale database), another hashing model named Similarity Preserving Deep Asymmetric

Quantization (SPDAQ) is proposed for both image and video retrieval where the compact binary codes and quantization codebooks for all the items in the database can be explicitly learned in an efficient manner. All the aforementioned hashing methods proposed have been rigorously evaluated using benchmark datasets and found to outperform the related state-of-the-art methods.

Keywords: hashing, quantization, multimedia retrieval, image retrieval

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