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Deep Semantic Asymmetric Hashing

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Problem

In image similarity retrieval and deep hashing, most existing asymmetric deep hashing methods do not sufficiently discover semantic correlation from label information, which results in reducing the discrimination of learned binary codes.

Proposed Solution

Use a label auto-encoder (LAE) and some proper constrains between LAE and the asymmetric image hashing network (ImgNet) to guide the training process of ImgNet to learn more discriminative binary codes at semantic level.

The Architecture of Deep Semantic Asymmetric Hashing

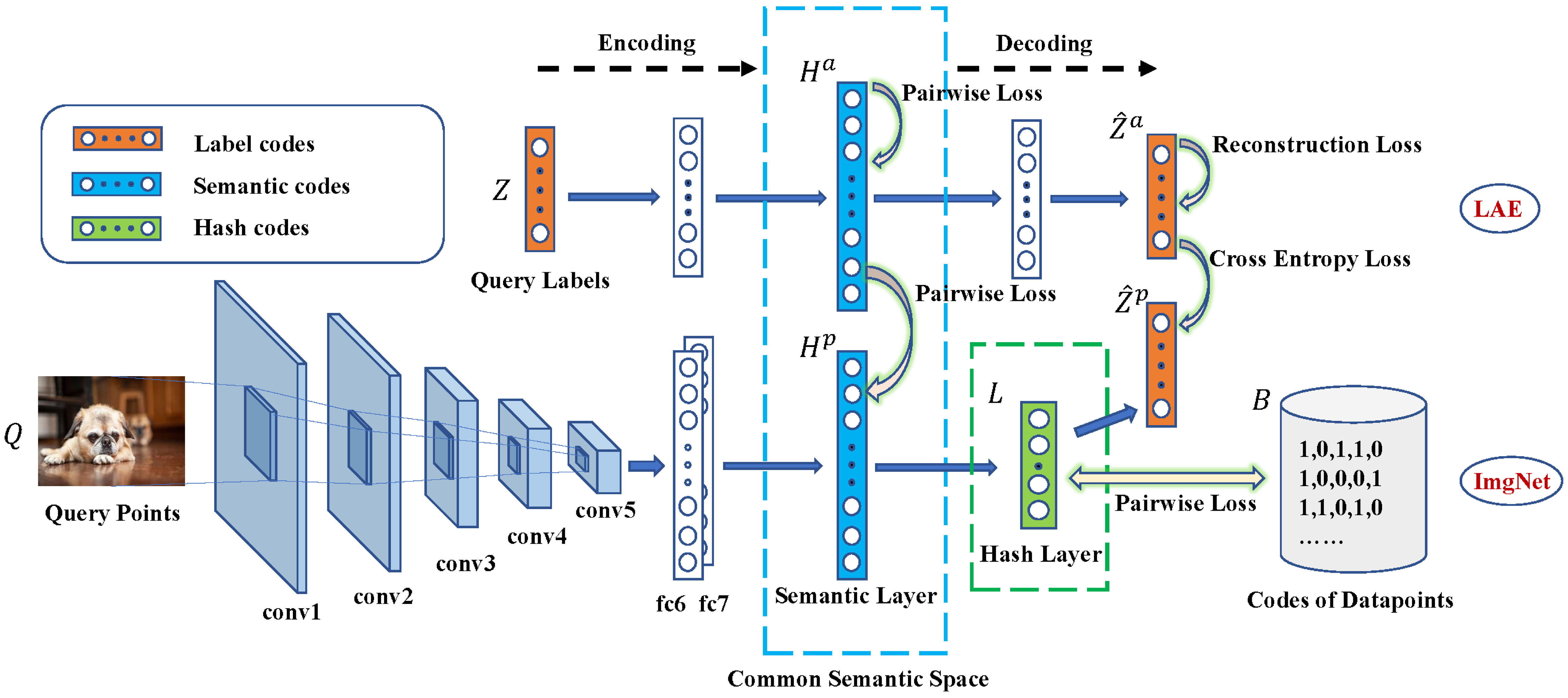


Fig.1 The whole Hashing Network

Learning Algorithm

Alternating optimization:

- Use back-propagation algorithm to update the parameters.
- Directly optimize the binary codes of database points.

Experiments

Dataset: CIFAR-10, MS-COCO, NUS-WIDE

Comparing methods:

- Traditional methods: KSH, SDH, ITQ, FATH
- DL methods: DNNH, HashNet, DAPH, ADSH

Mean Average Precision and Top-5K Precision on CIFAR-10.

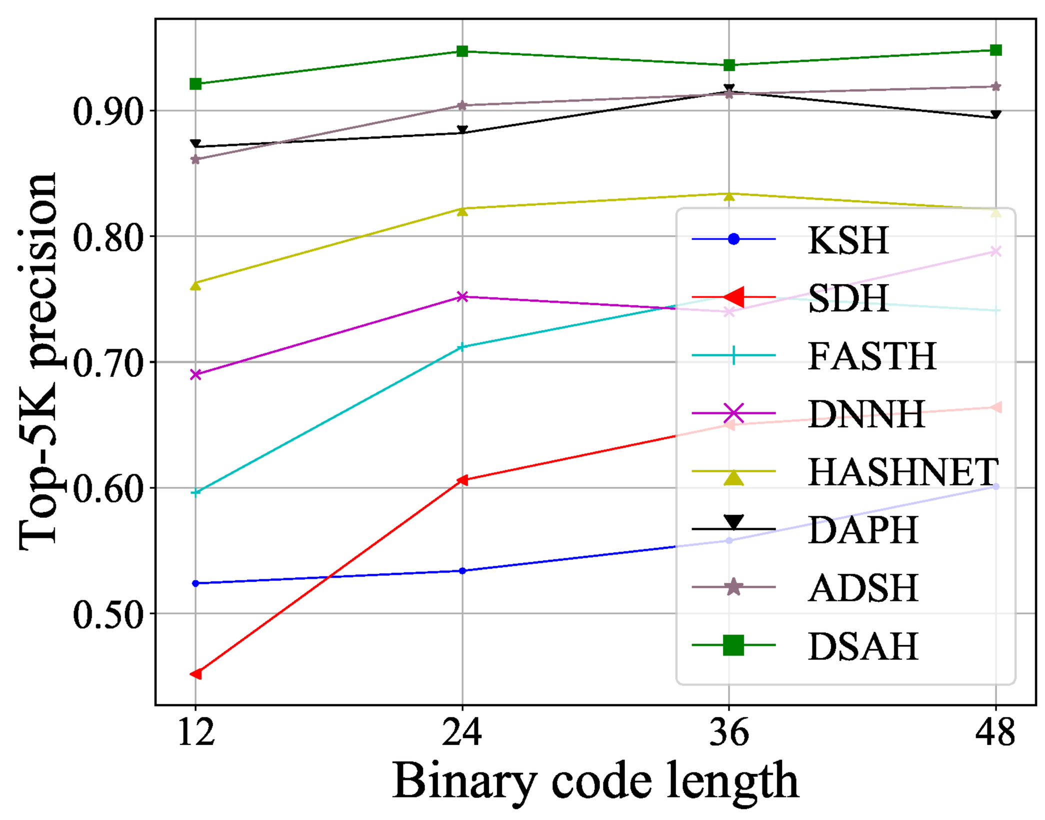


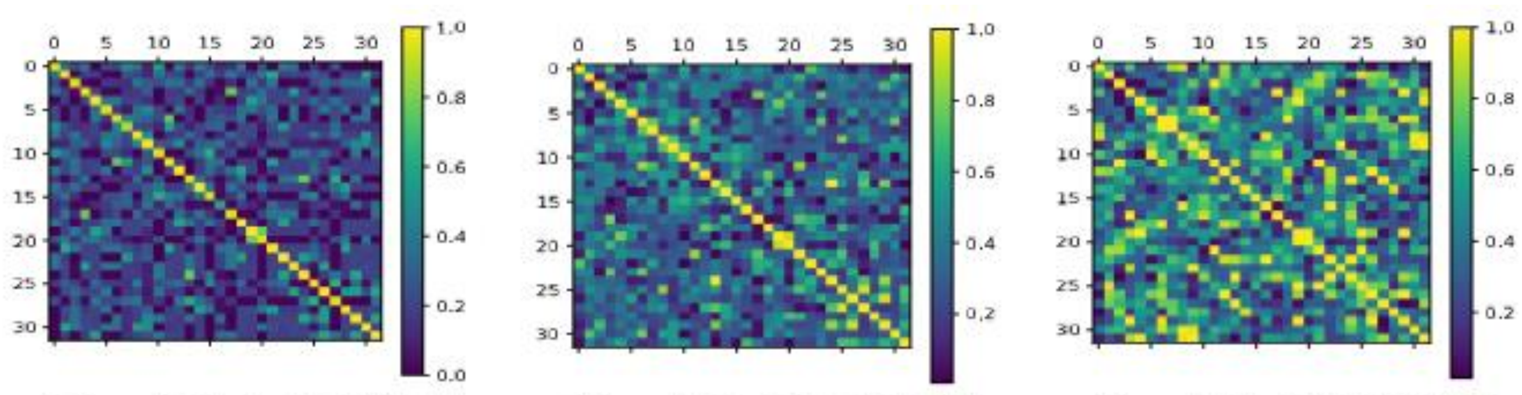
Fig.2 MAP Results

Method	CIFAR-10 12bits	24bits	36bits	48bits
KSH	0.524	0.534	0.558	0.601
SDH	0.461	0.606	0.650	0.664
ITQ	0.354	0.371	0.414	0.423
FATH	0.596	0.712	0.753	0.741
DNNH	0.690	0.752	0.740	0.788
HashNet	0.763	0.822	0.834	0.821
DAPH	0.871	0.887	0.915	0.894
ADSH	0.890	0.924	0.932	0.934
DSAH	**0.911**	**0.930**	**0.943**	**0.948**

Tab.1 Top-5K Results

Correlation results between binary codes.

mAC: mean Absolute Correlation



(a) mAC=0.21 DSAH (b) mAC=0.33 DAPH (c) mAC=0.45 DNNH

Fig.3 Correlation Matrix and mAC Values at 32 Bits.

Application

The proposed method can be applied to retrieval tasks which needs long binary codes to encode more information for high retrieval accuracy if larger memory or faster computing device are available.