GraphBit: Bitwise Interaction Mining via Deep Reinforcement Learning
Yueqi Duan, Ziwei Wang, Jiwen Lu, Xudong Lin, Jie Zhou

Motivation
- Most deep binary descriptor learning approaches rely on quantization loss [1], whose limitation lies in ambiguous bits.
- Our ideas:
  - Probabilistic modeling of bits, instead of explicit quantization.
  - Mining bitwise relationships to teach ambiguous bits.

Flowchart
- Utilizing reinforcement learning to learn bitwise interaction graph.
- Sequentially add or remove directed connections until finalizing the structure of the graph.

GraphBit
- For each input image, we first learn a normalized feature which represents the possibility of being binarized into one.
- We simultaneously train the parameters of the backbone CNN and the structure of the graph for ambiguity elimination in an unsupervised manner.

Objective Function
- Overall
  - The first term to make each bit evenly distributed.
  - The second term encourages the non-interacted bits $b_{\phi}$ to obtain most information from the input samples.
  - The third term aims to prevent the interacted bits to become trivial.

Experiments
- The CIFAR-10 dataset
- The Brown dataset

References

Code: https://github.com/duanyq14/GraphBit