Table 1: Additional experimental data

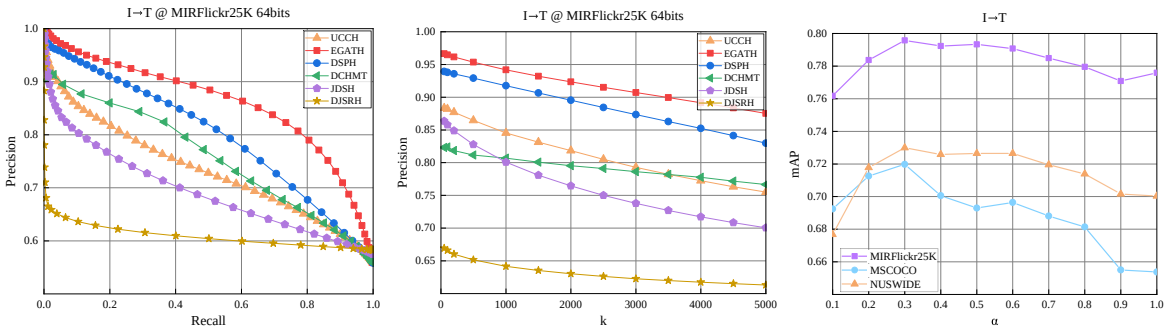
Task	Method	MIRFlickr25K			NUS-WIDE			MS-COCO		
		16bit	32bit	64bit	16bit	32bit	64bit	16bit	32bit	64bit
I → T	CDTH(2024)	0.7317	0.7461	0.7477	0.6596	0.6613	0.6700	0.5853	0.6411	0.6573
	SCAHN(2024)	0.8123	0.8131	0.8336	0.6588	0.6621	0.6669	0.6727	0.7108	0.7528
	CMGCAH(2023)	0.7901	0.8030	0.8150	0.6213	0.6440	0.6462	-	-	-
	GASKN(2024)	0.7610	0.7720	0.7830	**0.7200**	0.7260	0.7470	0.7210	0.7360	0.7410
	EGATH	**0.8411**	**0.8562**	**0.8637**	0.7191	**0.7345**	**0.7480**	**0.7259**	**0.7688**	**0.7945**
T → I	CDTH(2024)	0.7315	0.7464	0.7503	0.6788	0.6815	0.6910	0.5846	0.6427	0.6573
	SCAHN(2024)	0.7890	0.7971	0.8186	0.6718	0.6803	0.6980	0.7183	0.7504	**0.8093**
	CMGCAH(2023)	0.7823	0.7932	0.8045	0.6782	0.6801	0.6844	-	-	-
	GASKN(2024)	0.7450	0.7560	0.7720	0.7080	0.7170	0.7450	0.7090	0.7200	0.7280
	EGATH	**0.8064**	**0.8185**	**0.8293**	**0.7270**	**0.7437**	**0.7539**	**0.7247**	**0.7729**	0.8015

Table 2: Algorithm Table

Algorithm 1 Learning of our EGATH

Input: Training set of image and text data $\{x_i, y_i\}_{i=1}^{n}$, label data $L = \{l_i | i \in [1, N]\}$, hash code length h, parameters α, β, and k
Initialisation: initialise network parameters, hash code $\mathbf{B}$ and hyperparameters
Output: hash codes $\mathbf{B}_I$ and $\mathbf{B}_T$, hash function
repeat
  for each mini-batch **do**
    Feature extraction operation by deep network to get f_I' and f_T'
    Feed the label glove vector and adjacency matrix to GAT
    The processed features and label features are combined and the hash code is obtained by the hash layer of the tanh function and sign function
    Solve the loss function using equations (15, 16, 17)
  end for
  R-step: Calculate $\mathbf{R}$ using equation (18)
  B-step: Calculate $\mathbf{B}$ using equation (19)
  P-step: Calculate $\mathbf{P}$ using equation (21)
  Q-step: Calculate $\mathbf{Q}$ using equation (22)
until convergence

Figure 1: PR, Top-K curves and the influence of hyper-parameters



(a) PR curve (b) Top-K curve (c) hyper-parameters