Conditional Stroke Recovery for Fine-Grained Sketch-Based Image Retrieval

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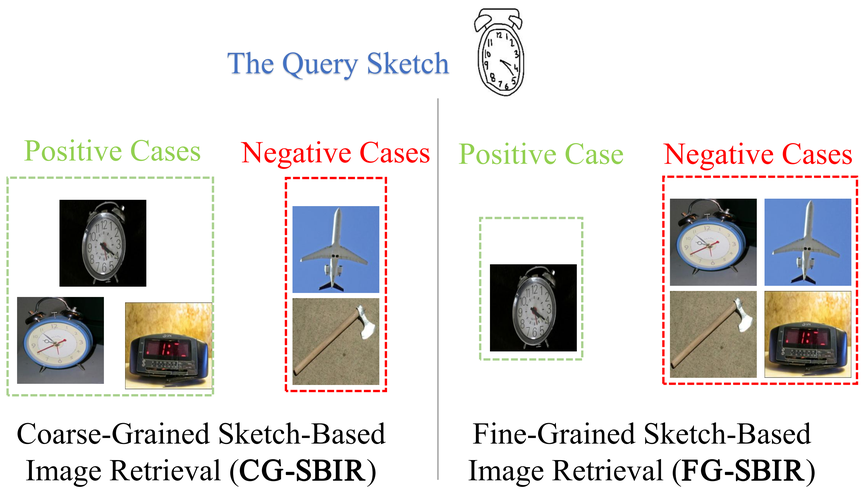
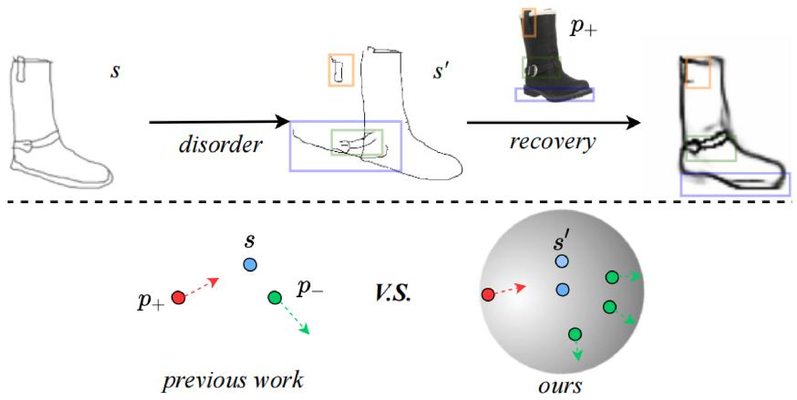
CG-SBIR & FG-SBIR



Main Idea



1) The top part shows an auxiliary recovery task conditioned by the paired image $\boldsymbol{p}_+$.

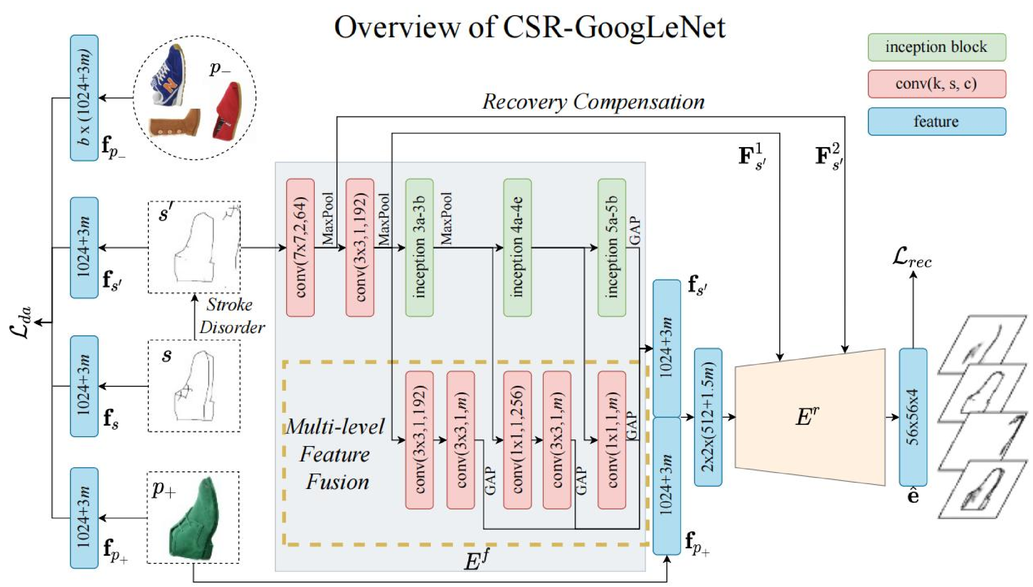
2) The bottom part compares common triplet losses with our double-anchor InfoNCE loss.

$$\mathcal{L}_{da} = -\log \frac{e^{sim(\mathbf{f}_s,\mathbf{f}_{p_+})} + \alpha e^{sim(\mathbf{f}_{s'},\mathbf{f}_{p_+})}}{e^{sim(\mathbf{f}_s,\mathbf{f}_{p_+})} + \alpha e^{sim(\mathbf{f}_{s'},\mathbf{f}_{p_+})} + \sum_{p_-}(e^{sim(\mathbf{f}_s,\mathbf{f}_{p_-})} + \alpha e^{sim(\mathbf{f}_{s'},\mathbf{f}_{p_-})})}$$

$$\mathcal{L}_{rec} = CE(\hat{\mathbf{e}}, \mathbf{e})$$

$$\mathcal{L}_{total} = w \times \mathcal{L}_{da} + \mathcal{L}_{rec}$$

Overview



1) E^f extracts sketch/image features.
2) E^R performs stroke recovery.

Quantative Results

Method	Backbone	Side	Sketchy(%)		QMUL-Chair(%)		QMUL-Shoe(%)		QMUL-ShoeV2(%)	
			acc@1	acc@10	acc@1	acc@10	acc@1	acc@10	acc@1	acc@10
Song *et. al.* [32] (BMVC'16)	SaN	E	-	-	78.4	99.0	50.4	91.3	-	-
SaN Triplet [41] (CVPR'16)	SaN	DE	25.9	-	69.1	**97.9**	39.1	87.8	30.9	-
DSSA [33] (ICCV'17)	SaN	E	-	-	81.4	95.9	**61.7**	**94.8**	**33.7**	-
Radenovi *et. al.* [26] (ECCV'18)	VGG16	D	-	-	**85.6**	**97.9**	54.8	92.2	-	-
GN Triplet [29] (TOG'16)	GoogLeNet	-	37.1	-	-	-	-	-	-	-
DCCRM [38] (PR'19)	GoogLeNet	DE	46.2	**96.5**	-	-	-	-	-	-
Pang *et. al.* [23] (CVPR'20)	GoogLeNet	D	-	-	86.0	-	56.5	-	36.5	-
CSR (ours)	GoogLeNet	-	**50.8**	85.4	**93.8**	**99.0**	**58.3**	**90.5**	**48.7**	**84.8**
Ayan *et. al.* [3] (CVPR'20)	InceptionV3	E	-	-	-	-	-	-	-	79.6
Bhunia *et. al.* [2] (CVPR'21)	InceptionV3	D	-	-	-	-	-	-	39.1	87.5
CSR (ours)	InceptionV3	-	**58.9**	**89.7**	**94.8**	**100.0**	**64.4**	**91.3**	**52.1**	**87.9**
Quadruplet [31] (ACMMM'17)	ResNet18	-	42.2	-	-	-	-	-	-	-
AE-Net [7] (PR'22)	ResNet18	-	46.0	-	-	-	-	-	-	-
CSR (ours)	ResNet18	-	**47.6**	**82.9**	**93.8**	**97.9**	**55.5**	**89.1**	**45.1**	**85.5**
TC-Net [16] (ACMMM'19)	Densnet169	E	40.8	-	95.9	**100.0**	63.5	94.8	40.2	-
CSR (ours)	Densenet169	-	**56.2**	**88.6**	**97.9**	**100.0**	**67.8**	**97.4**	**47.6**	**85.0**

Top-5 Retrieval Cases

Recovery Visualization