DAPC : Domain Adaptation People Counting via Style-level Transfer Learning and Scene-aware Estimation

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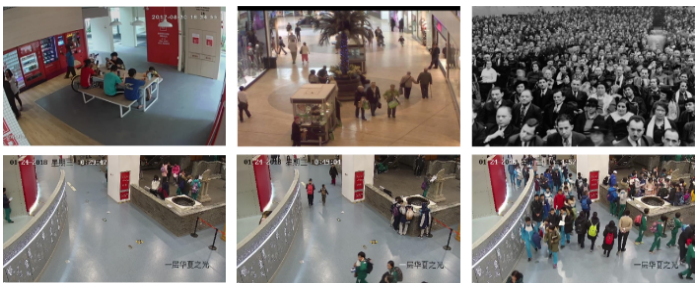
Problems

- Rich variations in scene type
- Crowd density
- The result generalization of the closed-set is limited



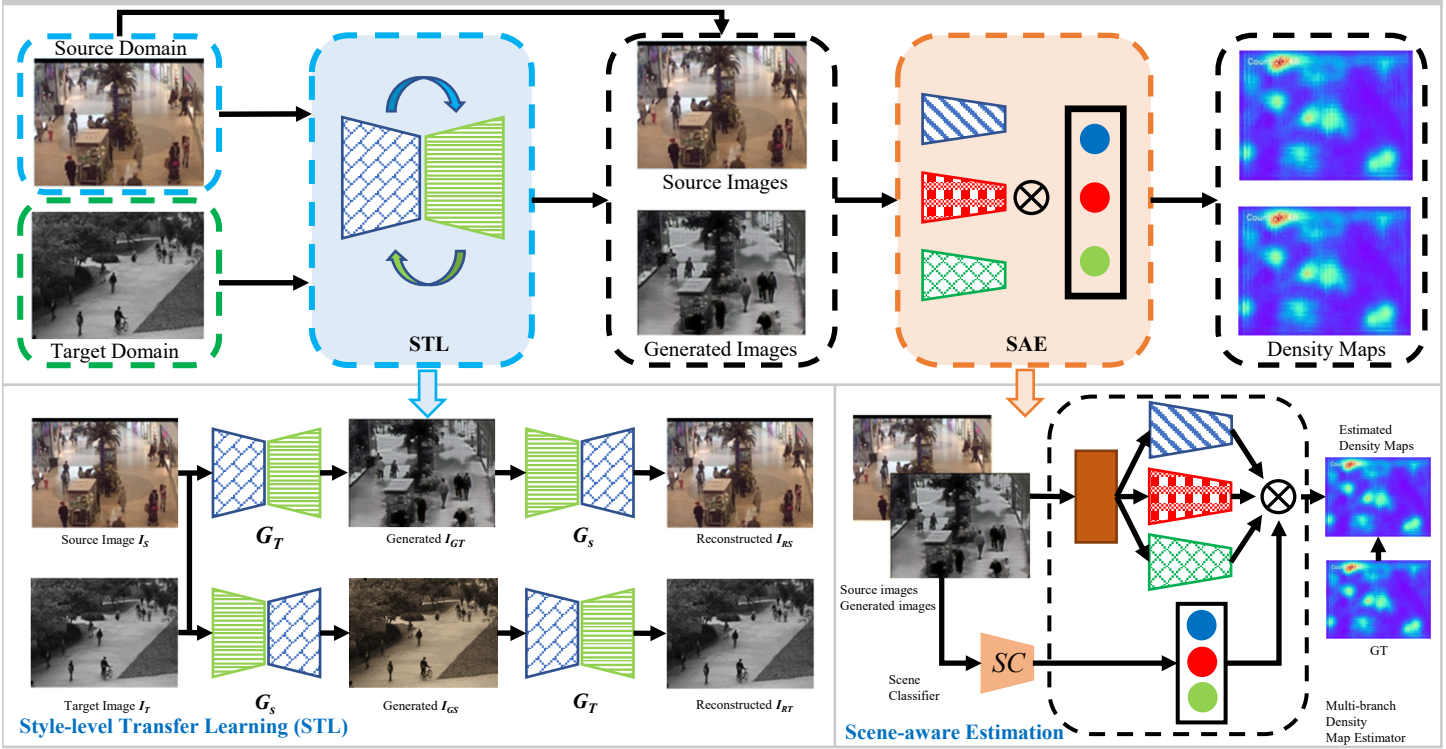
Motivations

- Improving the current general approach through domain adaptation
- Alleviates interference of variations in scene type and crowd density on domain adaptation people counting

Contributions

- Propose a style-level transfer learning
- Propose a scene-aware estimation
- Method achieves the state-of-the-art generalization in domain adaptation experiments

Our Approach



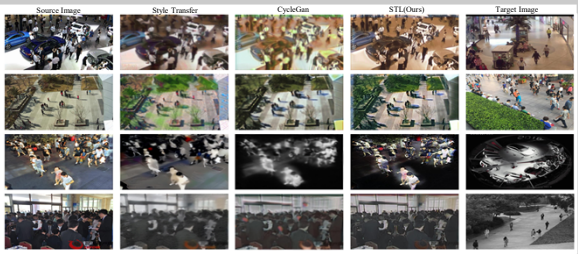
Experiments

Ablation results of different cross-domain groups

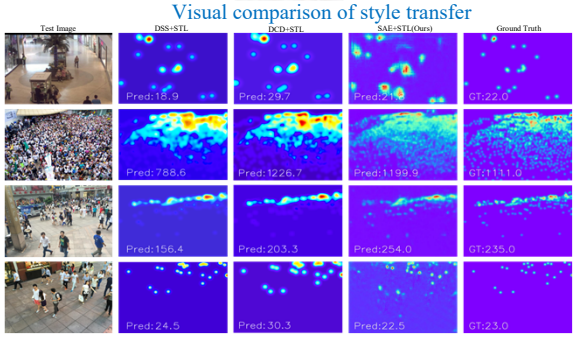
Configuration	TL	A:Baidu→Mall			A:Mall→Baidu			C:Mall→UCSD			D:SHA→Mall		
		MAE↓	MSE↓	C_{rate}↑	MAE↓	MSE↓	C_{rate}↑	MAE↓	MSE↓	C_{rate}↑	MAE↓	MSE↓	C_{rate}↑
Baseline	N	8.3	11.9	-	25.3	33.7	-	16..3	22.5	-	9.5	13.4	-
SAE	N	6.6	8.3	0.27	25.0	32.9	0.02	13.1	17.5	0.22	7.9	9.3	0.22
STL+Baseline	Y	4.5	6.3	0.61	24.3	30.7	0.06	5.4	8.3	0.74	5.5	7.2	0.54
STL+SAE	Y	2.9	3.4	0.87	23.4	28.1	0.12	3.1	5.1	0.89	3.8	4.1	0.77
SUP	-	2.1	2.8	-	9.0	14.6	-	1.5	1.7	-	2.1	2.8	-

Comparative results of domain adaptation people counting

Method	TL	Baidu→SHA		Baidu→SHB		Baidu→Mall		Baidu→UCSD	
		MAE↓	MSE↓	MAE↓	MSE↓	MAE↓	MSE↓	MAE↓	MSE↓
Baseline	N	246.4	310.4	35.4	45.7	13.5	18.5	20.5	25.3
CSRNET	N	169.3	237.5	24.5	33.1	8.5	12.5	18.5	23.5
MCNN+CLG	Y	210.5	25.4	30.7	39.0	7.9	12.9	15.0	19.6
CSRNET+CLG	Y	149.9	233.6	20.6	30.4	6.5	8.9	8.5	13.5
MCNN+STL	Y	178.4	230.1	25.4	25.1	7.5	15.9	8.0	13.9
CSRNET+STL	Y	140.3	202.7	19.4	27.4	4.3	7.1	4.9	9.1
DAPC(ours)	Y	119.3	190.1	18.3	24.0	2.9	3.4	2.6	3.0
Method	**TL**	**GCC→SHA**		**GCC→SHB**		**PE09+UC→Mall**		**PE09+Ma→UCSD**	
		MAE↓	MSE↓	MAE↓	MSE↓	MAE↓	MSE↓	MAE↓	MSE↓
DA-ELM	Y	-	-	-	-	3.58	5.27	2.71	4.86
SeCyleGan	Y	125.7	194.3	19.9	28.3	-	-	-	-
DAPC(ours)	Y	120.6	191.2	18.8	26.4	3.34	4.76	2.60	4.11



Visual comparison of style transfer



Estimated density maps of DAPC