Smile lab
Synergetic Media Learning Lab

Learning Transferable Subspace for Human Motion Segmentation

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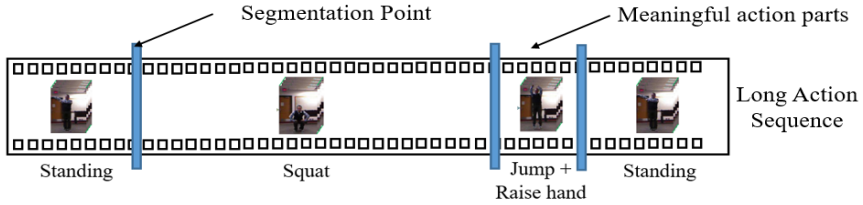
Goal:

Segmenting temporal data is a critical technique.

- Action Recognition
- Motion Prediction
- Temporal data analysis



Background:

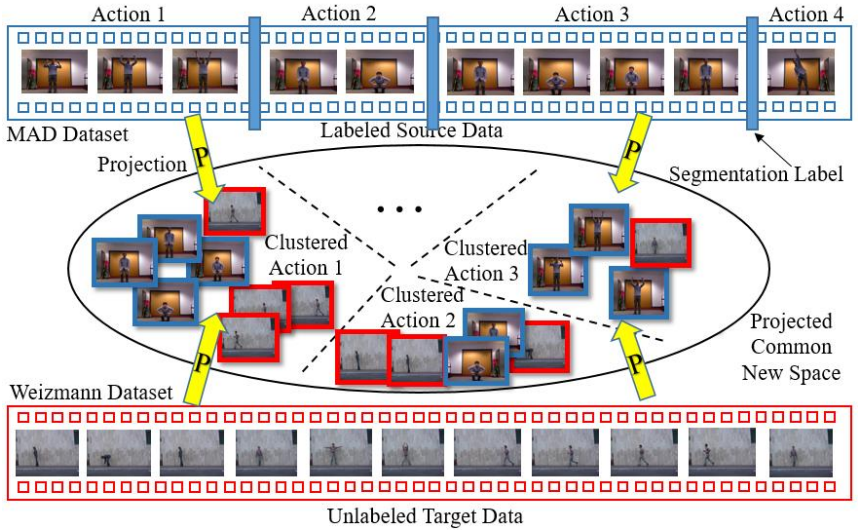
- Existing subspace clustering methods have no prior information for guidance.
- Current self-representation strategy which may hinder the clustering performance in insufficient or corrupted data situation.
- In real-world conditions, a lot of external, well-labeled data are available.

Proposed Strategy:

Explore well-labeled source knowledge from other domains to facilitate the target temporal data clustering.

$$\min_{P,Z} \|PX - PX_sZ\|_F^2 + \lambda_1(\|V\|_F^2 + \|P\|_F^2) + \lambda_2 tr(ZL_WZ^T)$$

$$\text{s.t.} \quad V = Z, Z \geq 0, PXHX^TP = I$$



(a) Result of MAD Dataset

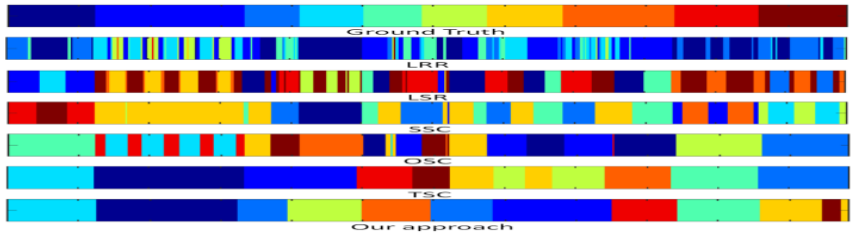
Method	Acc	NMI
LRR	0.2397	0.2249
LSR	0.3979	0.3667
TSC	0.5556	0.7721
TSC (Weiz)	0.5418	0.7684
TSC (Keck)	0.5473	0.7691
Ours (Weiz)	***0.5736***	***0.8202***
Ours (Keck)	**0.5792**	**0.8286**

(b) Result of Keck Dataset

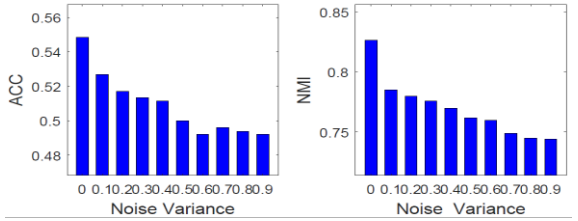
Method	Acc	NMI
LRR	0.4297	0.4862
LSR	0.4894	0.4548
TSC	0.4781	0.7129
TSC (MAD)	0.4653	0.6935
TSC (Weiz)	0.4548	0.6862
Ours (MAD)	***0.5395***	**0.8049**
Ours (Wei)	**0.5485**	***0.7928***

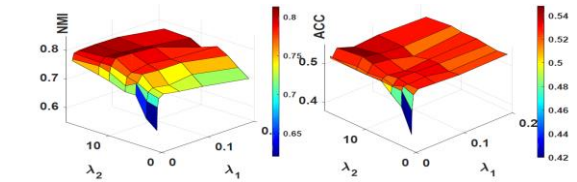
(c) Result of Weizmann Dataset

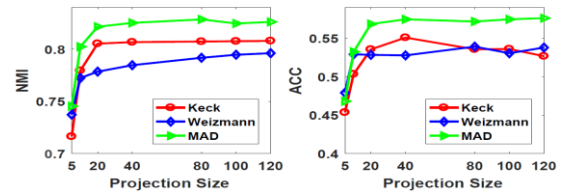
Method	Acc	NMI
LRR	0.3638	0.4382
LSR	0.5091	0.5093
TSC	**0.6111**	0.8199
TSC (MAD)	***0.5961***	0.8032
TSC (Keck)	0.5931	0.7971
Ours (MAD)	0.5585	**0.8267**
Ours (Keck)	0.5775	***0.8247***

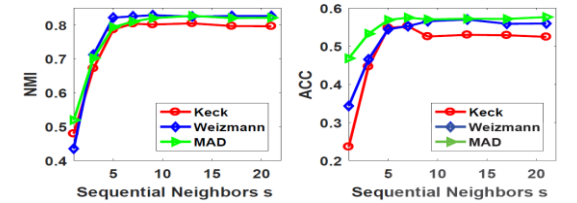


Modified Model	Accuracy	NMI
Ours	**0.5415**	**0.8111**
$\|X - X_SZ\|_F^2$	0.5224	0.8066
$\|X - [X_SX_T]Z\|_F^2$	0.5268	0.7736
$\|PX - PXZ\|_F^2$	0.4530	0.6866









[1] Sheng Li, Kang Li, and Yun Fu. Temporal subspace clustering for human motion segmentation. ICCV
[2] Guangcan Liu, Zhouchen Lin, Shuicheng Yan, Ju Sun, Yong Yu, and Yi Ma. Robust recovery of subspace structures by low-rank representation. TPAMI