

# Representation learning via an integrated autoencoder for unsupervised domain adaptation

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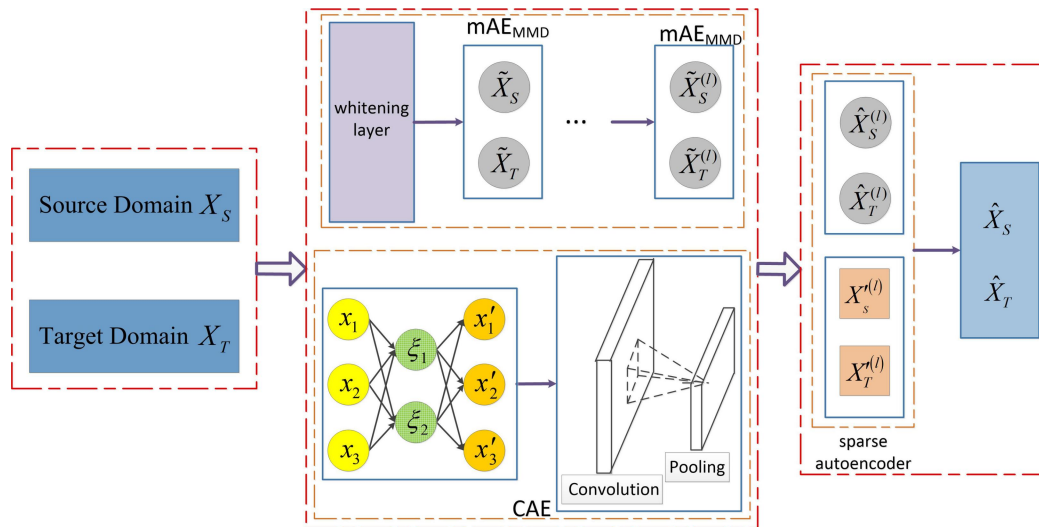
# Problems & Ideas

## Problems of unsupervised domain adaptation:

- Most existing methods just serially connect the different features which generated by different autoencoders.
- Most methods ignore the simultaneous learning of inter- and inner-domain representations, the features that belong to different categories may be disturbed by each other..

## Ideas:

- a novel method based on integrated autoencoders to combine the inter- and inner-domain features for minimizing deviations in different domains.



The whole framework of the proposed integrated autoencoders method for unsupervised domain adaptation

# Experimental results

Table 1. Accuracy of baselines and our method on Leaves and MNIST-USPS datasets(%).

Task	SVM	TCA	CORAL	DMM	JGSA	mSDA	MEDA	SSRLDA	J2WSA	IAUDA
Acer→Alnus	56.25	69.76	69.43	71.04	67.51	64.47	71.95	<b>75.11</b>	69.03	72.92
Acer→Quercus	63.75	71.15	74.16	75.95	<b>78.23</b>	71.93	68.97	76.07	72.33	73.47
Alnus→Acer	67.03	75.28	70.13	70.96	80.09	84.17	83.12	86.63	79.32	<b>87.69</b>
Alnus→Quercus	87.30	85.44	85.58	85.52	88.81	88.87	<b>91.08</b>	83.67	84.57	87.67
Quercus→Acer	43.67	57.68	60.21	66.04	74.13	73.30	77.61	76.55	73.81	<b>83.17</b>
Quercus→Alnus	45.44	56.52	64.78	66.52	70.54	69.89	67.33	68.73	67.16	<b>71.32</b>
M→U	67.32	55.76	47.28	67.15	77.42	74.28	85.88	83.29	81.95	<b>86.62</b>
U→M	61.48	52.63	30.11	46.93	67.37	62.58	70.46	67.11	67.31	<b>71.16</b>
Avg	61.48	65.53	62.71	68.76	75.51	73.69	77.05	77.15	74.44	<b>79.25</b>

Table 2. Accuracy baselines and our method on Office-Caltech dataset(%)

Task	SVM	TCA	CORAL	DMM	JGSA	mSDA	MEDA	SSRLDA	J2WSA	IAUDA
Ca→Am	51.98	43.76	50.21	42.84	53.28	54.70	55.12	<b>64.82</b>	63.55	63.71
Ca→We	34.92	39.11	33.56	37.59	42.24	37.29	52.86	54.58	57.69	<b>58.34</b>
Ca→Ds	43.61	46.68	47.52	40.91	49.05	40.21	50.11	52.34	54.33	<b>56.27</b>
Am→Ca	41.85	40.32	43.01	44.28	43.57	42.56	44.42	54.79	55.27	<b>55.62</b>
Am→We	29.83	37.87	32.54	34.67	48.15	34.92	<b>54.22</b>	38.64	42.89	42.61
Am→Ds	45.28	34.62	39.13	52.84	43.61	38.77	46.14	53.28	54.54	<b>55.48</b>
We→Ca	28.23	30.23	29.83	31.57	32.42	31.34	33.82	37.93	38.86	<b>40.21</b>
We→Am	30.79	32.67	30.06	36.25	40.39	34.66	41.91	43.01	<b>43.27</b>	42.36
We→Ds	73.22	87.21	87.28	86.17	89.92	79.85	87.37	86.85	87.16	<b>89.22</b>
Ds→Ca	28.71	33.86	34.71	33.23	29.78	29.17	35.19	39.32	39.95	<b>40.79</b>
Ds→Am	27.86	33.69	38.29	40.77	36.92	36.81	43.13	47.28	48.27	<b>50.37</b>
Ds→We	58.53	81.87	83.60	83.96	88.70	87.12	89.55	<b>90.74</b>	87.72	88.36
Avg	41.23	45.16	45.81	47.09	49.84	45.62	52.82	55.55	56.13	<b>56.95</b>

**Conclusions:** (1) Two different autoencoders can capture different features of data, and the combination of these features can improve the performance of domain adaptation; (2) Our method outperforms significantly all compared