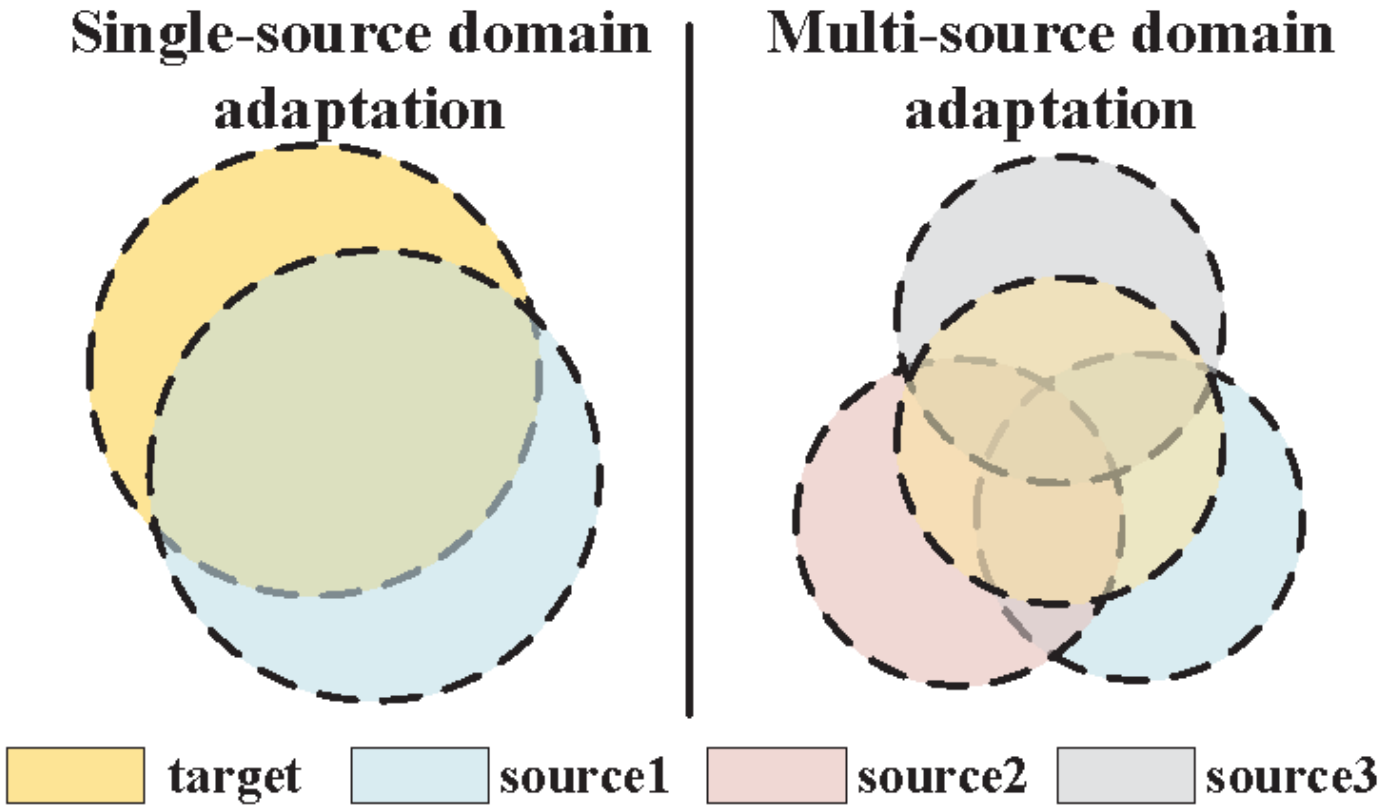
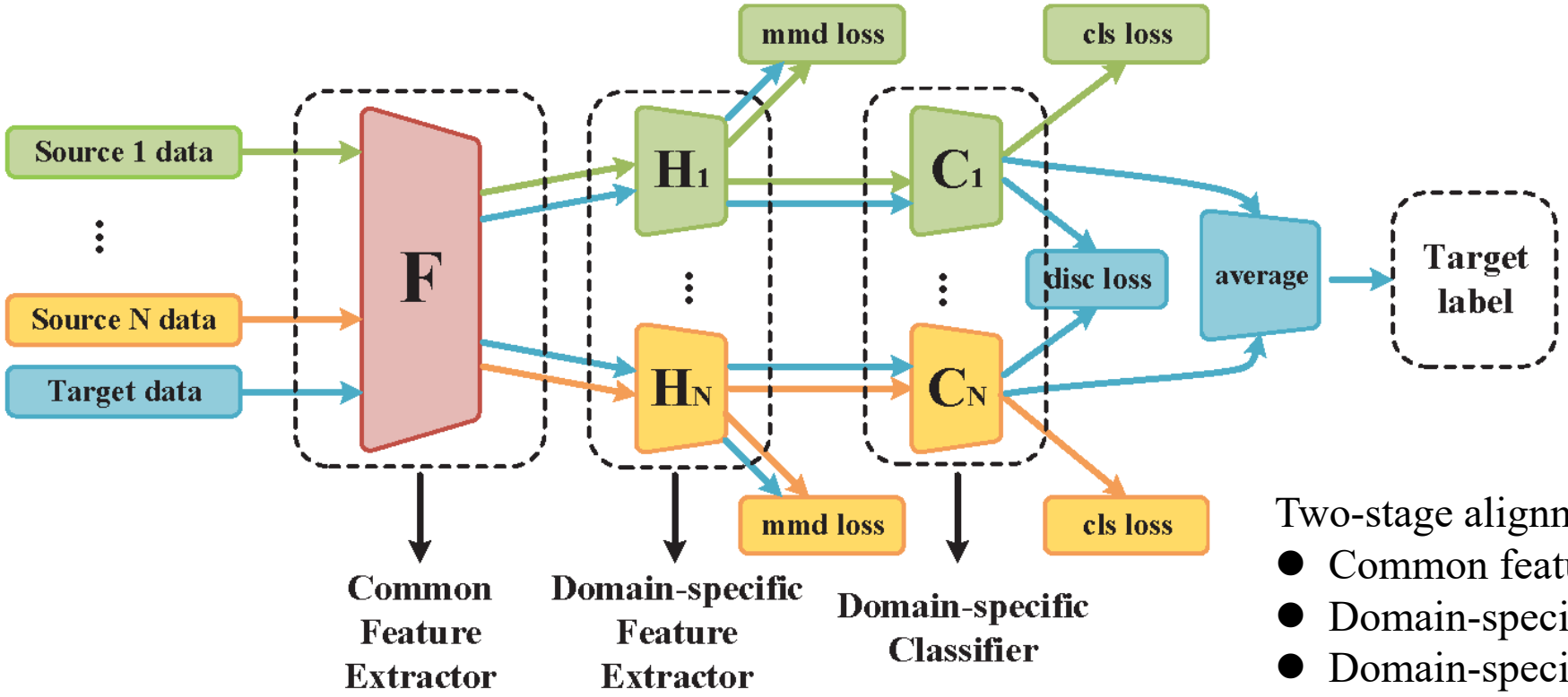
Aligning Domain-specific Distribution and Classifier for Cross-domain Classification from Multiple Sources

Yongchun Zhu[1,2], Fuzhen Zhuang[1,2], Deqing Wang[3]
1.Key Lab of Intelligent Information Processing of Chinese Academy of Sciences (CAS),Institute of Computing Technology, CAS, Beijing 100190, China
2.University of Chinese Academy of Sciences, Beijing 100049, China
3.$School of Computer Science, Beihang University, Beijing, China



- In Single-source Unsupervised Domain Adaptation (SUDA), the distribution of source and target domains cannot be matched very well.
- In Multi-source Unsupervised Domain Adaptation (MUDA), due to the shift between multiple source domains, it is much harder to match distributions of all source domains and target domains.

Two-stage alignment Framework(MFSAN)



Two-stage alignment Framework:

- Common feature extractor
- Domain-specific feature extractor
- Domain-specific classifier

cls loss

$$\mathcal{L}_{cls} = \sum_{j=1}^{N} \mathbf{E}_{x \sim X_{sj}} J(C_j(H_j(F(\mathbf{x}_i^{sj}))), \mathbf{y}_i^{sj})$$

mmd loss

$$D_{\mathcal{H}}(p, q) \triangleq \|\mathbf{E}_p[\phi(\mathbf{x}^s)] - \mathbf{E}_q[\phi(\mathbf{x}^t)]\|_{\mathcal{H}}^2$$

disc loss

$$\mathcal{L}_{disc} = \frac{2}{N \times (N-1)} \sum_{j=1}^{N-1} \sum_{i=j+1}^{N} \mathbf{E}_{x \sim X_t} [|C_i(H_i(F(x_k))) - C_j(H_j(F(x_k)))|],$$