### Summary of heterogeneous transfer learning

Transfer learning tackles real-world problem with the context of deficiency of sufficient qualified data. In order to improve performance of model fed by limited data, researchers take advantage of sufficient data deriving from different field (source domain).

Therefore, the main task of Heterogeneous Transfer Learning (HTL) is to find a efficient way to bridge different field (Domain Adaptation --DA), and to make good use of knowledge from source domain to improve the target task. There are two approaches to tackle DA ---symmetric and asymmetric transformation

Symmetric: symmetric one tries to find a way to project both source and target features in the the same new subspace. In the new subspace, source and target features are homogeneous, and then the sufficiency of source data compensates the deficiency of target data and boost the performance model in target task.

Asymmetric: asymmetric way projects target feature space into source feature space, or projects source feature into feature space of target task. After asymmetric transformation, using feature in source space (or target space) to train model.

For the specific applications of HTL, one common technique is make use of co-occurrence information. In webpage context, author mentions that ‘one can use this co-occurrence information as a bridge to relate text features and image features’. Another common pattern is the use of Canonical Correlation Analysis (CCA) to solve the differing feature space issue.

In ‘A survey on heterogeneous transfer’, there are many different approaches of DA in symmetric or asymmetric way. However, the complexity of real-world application in HTL, like the case of requiring no target or source label , or the case of requiring limited target label, requires researcher select different strategies in different context, and many of these methods are application-specific.