

# Unsupervised Domain Adaptation for Zero-Shot Learning

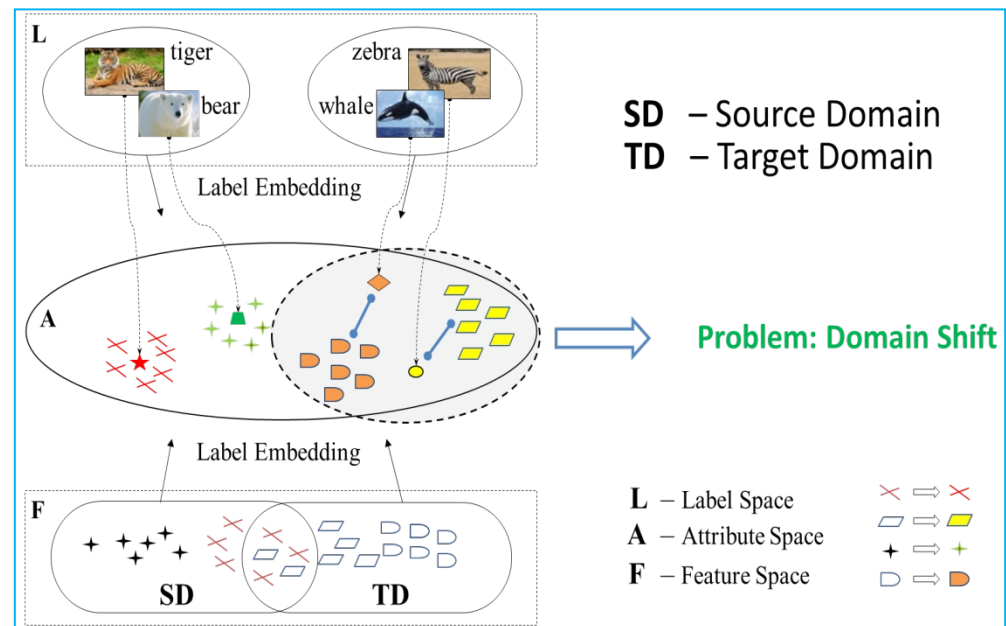
Elyor Kodirov, Tao Xiang, Zhenyong Fu, Shaogang Gong

## Problem:

- Naïve knowledge transfer, that is, learning projection/mapping function from a source domain, and apply it to a target domain *without adaptation*;
- The learned projection is prone to the **domain-shift problem** [1] (Figure 1).

## Our approach:

- First attempt at solving ZSL as an unsupervised domain adaptation problem;
- Proposes a regularised sparse coding-based unsupervised domain adaptation framework solve the domain-shift problem.



# The proposed regularised sparse coding model

$$\min_{D_t Y_t} \|X_t - D_t Y_t\|_F^2 + \lambda_3 \|Y_t\|_1 + \lambda_1 \|D_t - D_s\|_F^2 + \lambda_2 \sum_{i,j} w_{i,j} \|y_i - p_j^t\|_2^2$$

## Adaptation-regularisation

**constraint:** controls the adaptation strength from source domain to the target domain. In other words, this term makes sure that the learned  $D_t$  is also a semantic dictionary.

## Visual-semantic-similarity

**constraint:** this is used to ensure that the learned coefficient vector  $y_i$  for each target data is close to its true class label embedded in the embedding space as  $p_j^t$