(a) Source and Target Domain Training Data
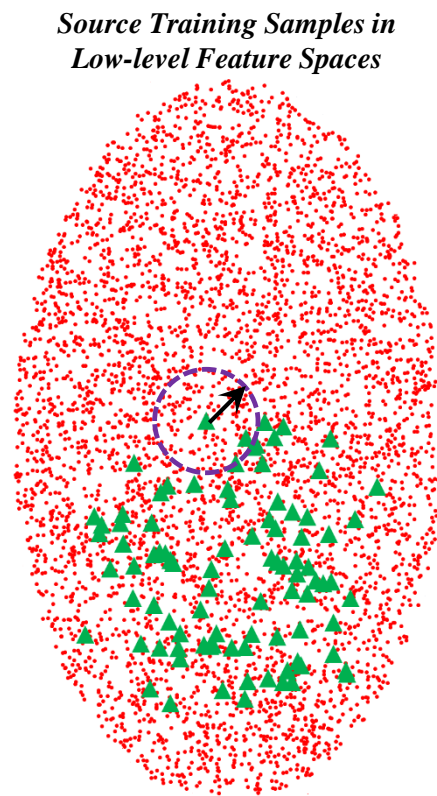
Source Domain Data
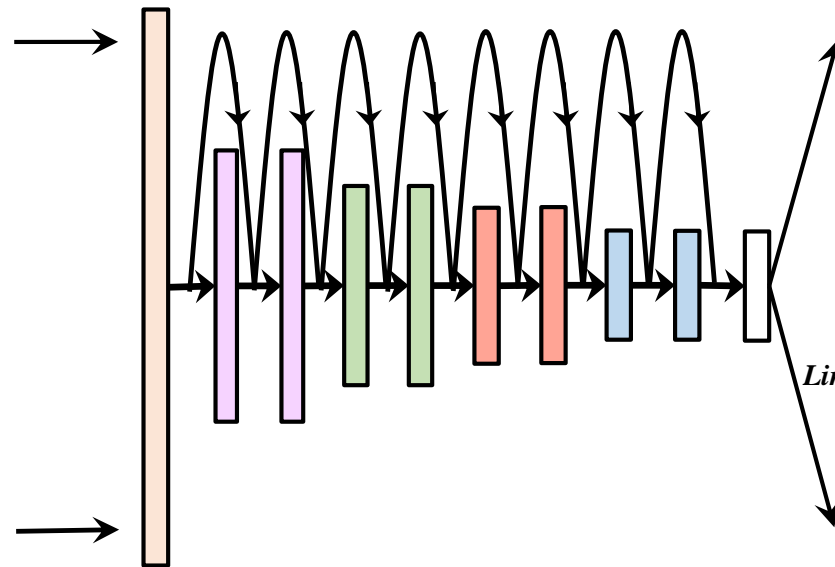
Target Domain Data

(b) Search k Nearest Neighbors in Low-level Feature Space

Source Training Samples in Low-level Feature Spaces
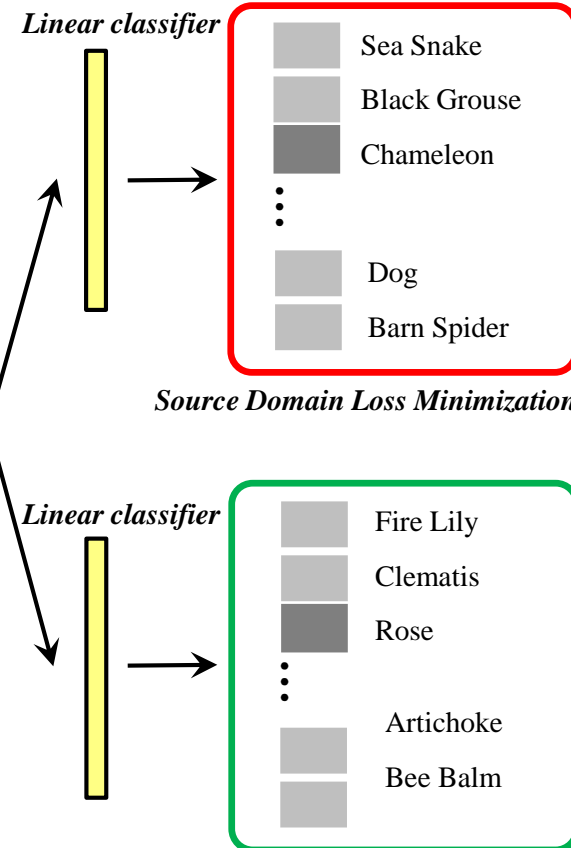
Target Training Samples in Low-level Feature Spaces

(c) Deep Convolutional Neural Networks

Convolutional layers shared by the source and target learning tasks

(d) Joint Optimization in Different Label Spaces

Linear classifier

Sea Snake
Black Grouse
Chameleon
⋮
Dog
Barn Spider

Source Domain Loss Minimization

Linear classifier

Fire Lily
Clematis
Rose
⋮
Artichoke
Bee Balm

Target Domain Loss Minimization
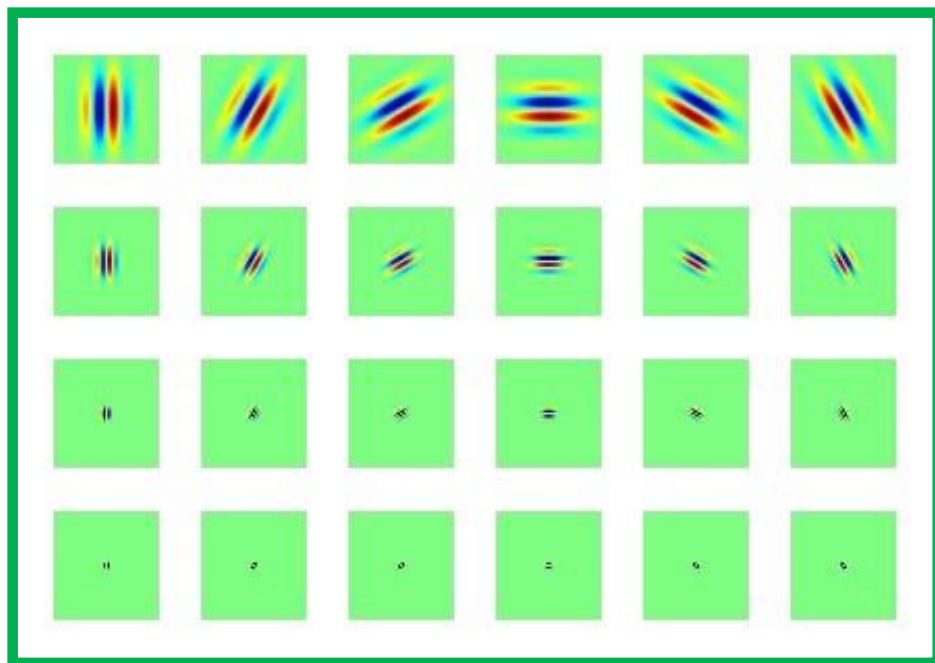
(a) Image Part of the Used Gabor Filters
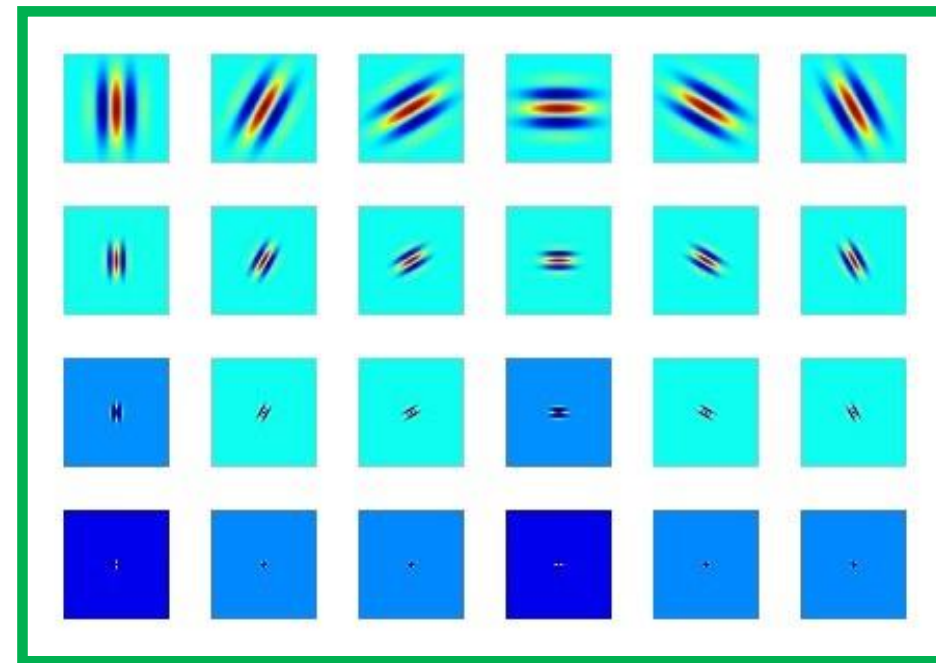
(b) Real Part of the Used Gabor Filters

Dataset	Category Number	Training Set	Validation Set	Testing Set
Caltech 256	256	1280~15360	about 3840	6400
Oxford Flowers 102	102	1020	1020	6149
Stanford Dogs 120	120	12000	10% training set	8580
Oxford DTD 47	47	1880	1880	1880
MIT Indoor 67	67	5360	10% training set	1340

Oxford Flowers-102

Approach	Accuracy
Murray & Perronnim	84.6%
Sharif Razavian et al.	86.8%
Qian et al.	88.4%
MagNet	91.4%
Compact Bilinear Pooling	91.4%
Fine-tuning	90.4%
Joint-training with the Whole ImageNet Training Samples	91.8%
Joint-training with Randomly Selected Samples	1
Joint-training using Gabor Features	3
Joint-training without Boost Manner	1
Joint-training without MMD	92.6%
Joint-training	92.8%

Stanford Dogs -120

Approach	Accuracy
Angelova & Long	48.3%
Graves et al.	50.1%
Xie et al.	57.0%
Qian et al.	69.1%
MagNet	75.1%
Fine-tuning	80.4%
Joint-training with the Whole ImageNet Training Samples	84.8%
Joint-training with Randomly Selected Samples	1
Joint-training using Gabor Features	3
Joint-training without Boost Manner	1
Joint-training without MMD	88.6%*2
Joint-training	3

Caltech 256

Approach	5	10	15	20	25	30	40	45	60
CNN-S									
VGG								86.1%	
Fine-tuning	1	1	1	1	1	1	1	1	1
Joint-training	6	6	6	6	6	6	6	6	6

Oxford DTD 47

Approach	1	2	3	4	5	6	7	8	9	10
Fine-tuning										
Joint-training	2	2	2	2	2	2	2	2	2	2

MIT Indoor 67

Approach	Accuracy
CNN-S	
VGG	
Fine-tuning	1
Joint-training	3