Actively Preventing Negative Transfer

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MODEL PRUNING FOR TRANSFER LEARNING

Vertically Integrated Projects

AM²

Problem – Negative Transfer in Computer Vision

- Weights and biases learned by deep learning models in a source domain, may negatively affect its ability to learn effectively in a new domain – think muscle memory.

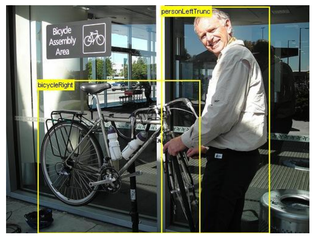


Image from PASCALVOC Dataset

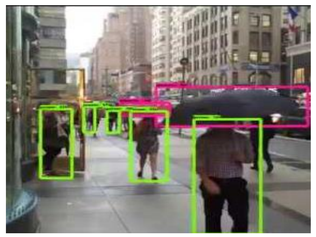
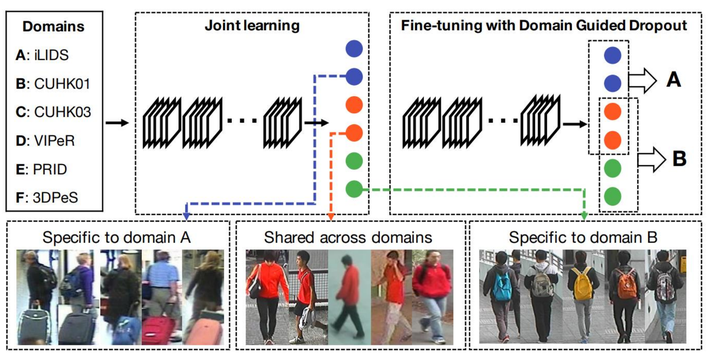


Image from network camera Dataset

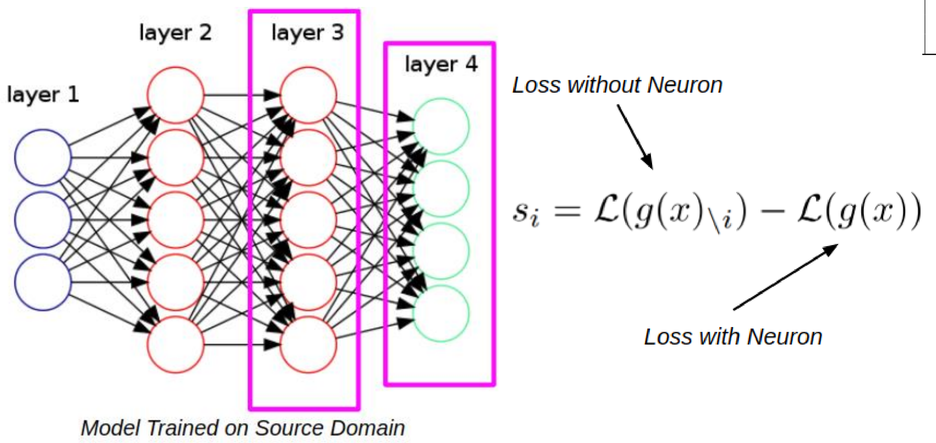
Related Works – Domain Guided Dropout

- Analyze *"impact"* of neurons in a target domain, drop them and retrain if they negatively impact the model's ability in the target domain.



Proposed Solution

- Expand and improve this *"impact"* analysis and prune method to all layers of the network.



Goals

- Eliminate *"knowledge"* gained in the source domain that is harmful in a target domain.
- Retain the *"knowledge"* that is helpful in the target domain.
- Identify a "cutting point" at which to begin the retraining process for best knowledge transfer.

Previous Results

- This analysis should also provide us with insight into our cross-dataset-generalization experiment results from a previous paper.

Training on: \ Testing on:	COCO	ImageNet	VOC	Caltech	INRIA	SUN	KITTI	CAM2
COCO	0%	+11%	+47%	-55%	+58%	- 8%	-37%	-37%
ImageNet	-44%	0%	+18%	-68%	+47%	-36%	-44%	-73%
VOC	-46%	-26%	0%	-77%	+14%	-43%	-56%	-71%
Caltech	-37%	-54%	-28%	0%	+145%	-31%	+11%	-53%

Further Analysis

- Developing plans to use MIT's *Network Dissection* tool to determine what low-level features were retained by the network when the cut is made before retraining.