

Pattern Recognition
Lecture 05-2

Weak & Semi-supervised Learning

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Chung-Ang University
Fall 2022

This Class

- Weak Supervised Learning
 - Concept
 - Examples
- Semi-supervised Learning
 - Concept
 - Examples

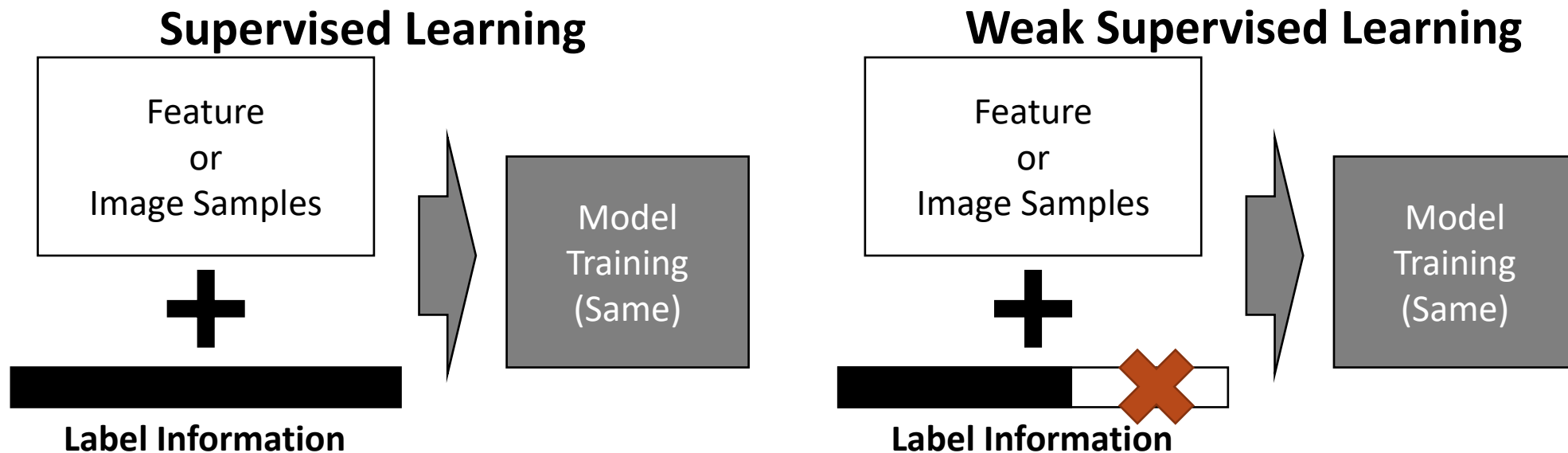
Weak & Semi-Supervised Learning

- Concept
 - Train a model when only a part of labels are given
 - Definition of “A part of labels”
 - Weak Supervised Learning
 - All the samples are labelled
 - But the label information is not perfect
 - Semi-supervised Learning
 - Only partial samples are labelled
 - But the label information is perfect

Weak Supervised Learning

- Concept

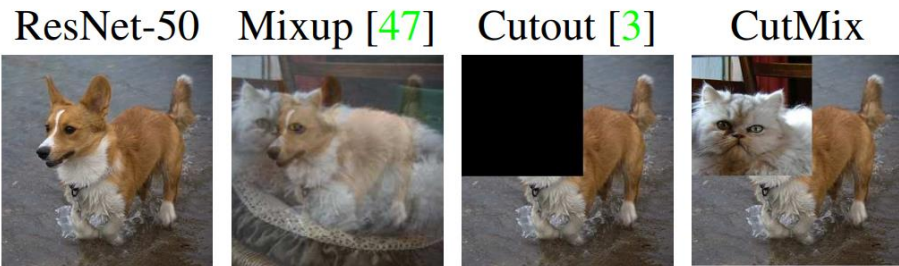
- Train a model when only a part of labels are given
 - All the samples are labelled
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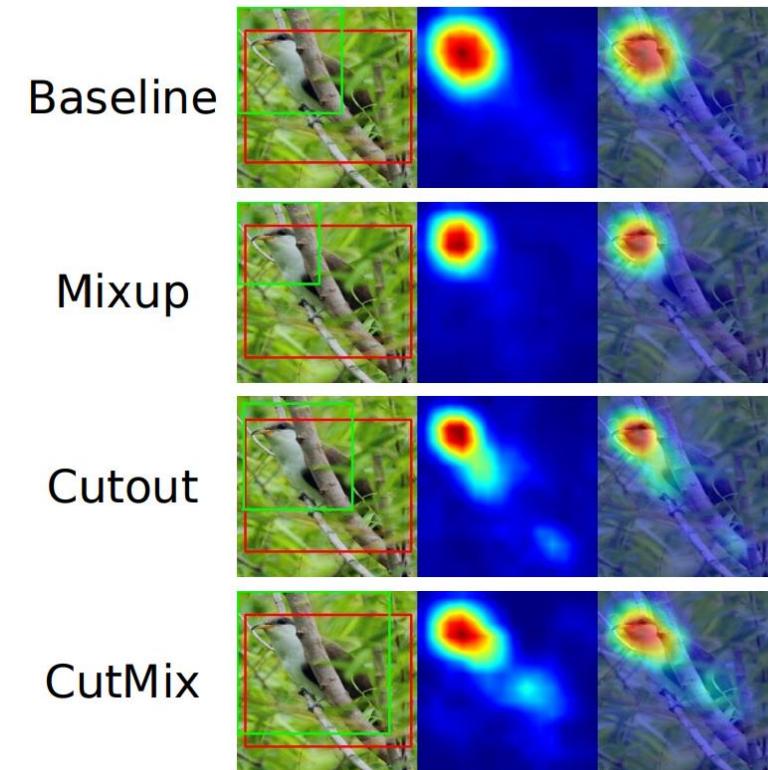
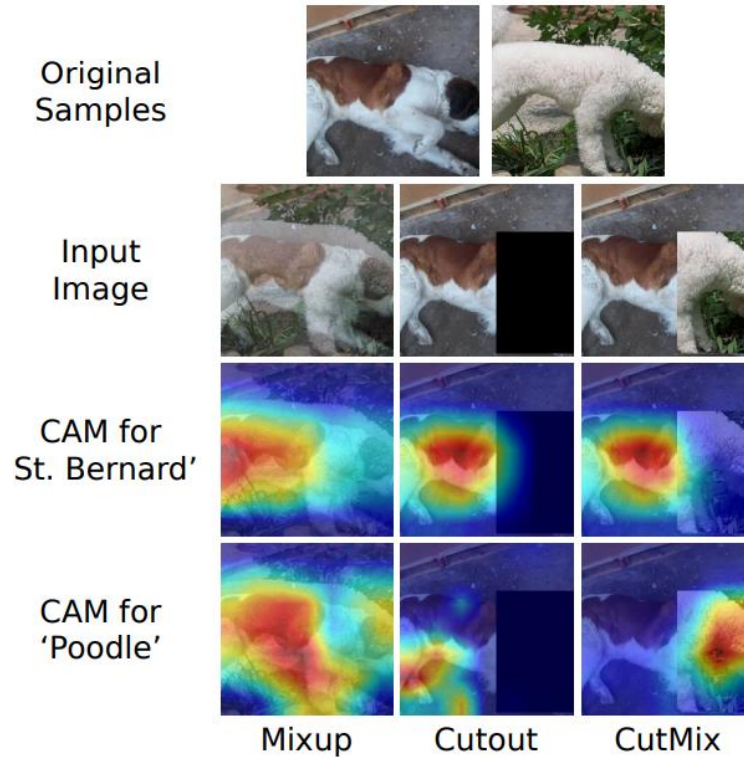
Weak Supervervised Learning - Examples

ICCV2019 - CutMix: Regularization Strategy to Train Strong Classifiers with Localizable Features

Yun et al., NAVER



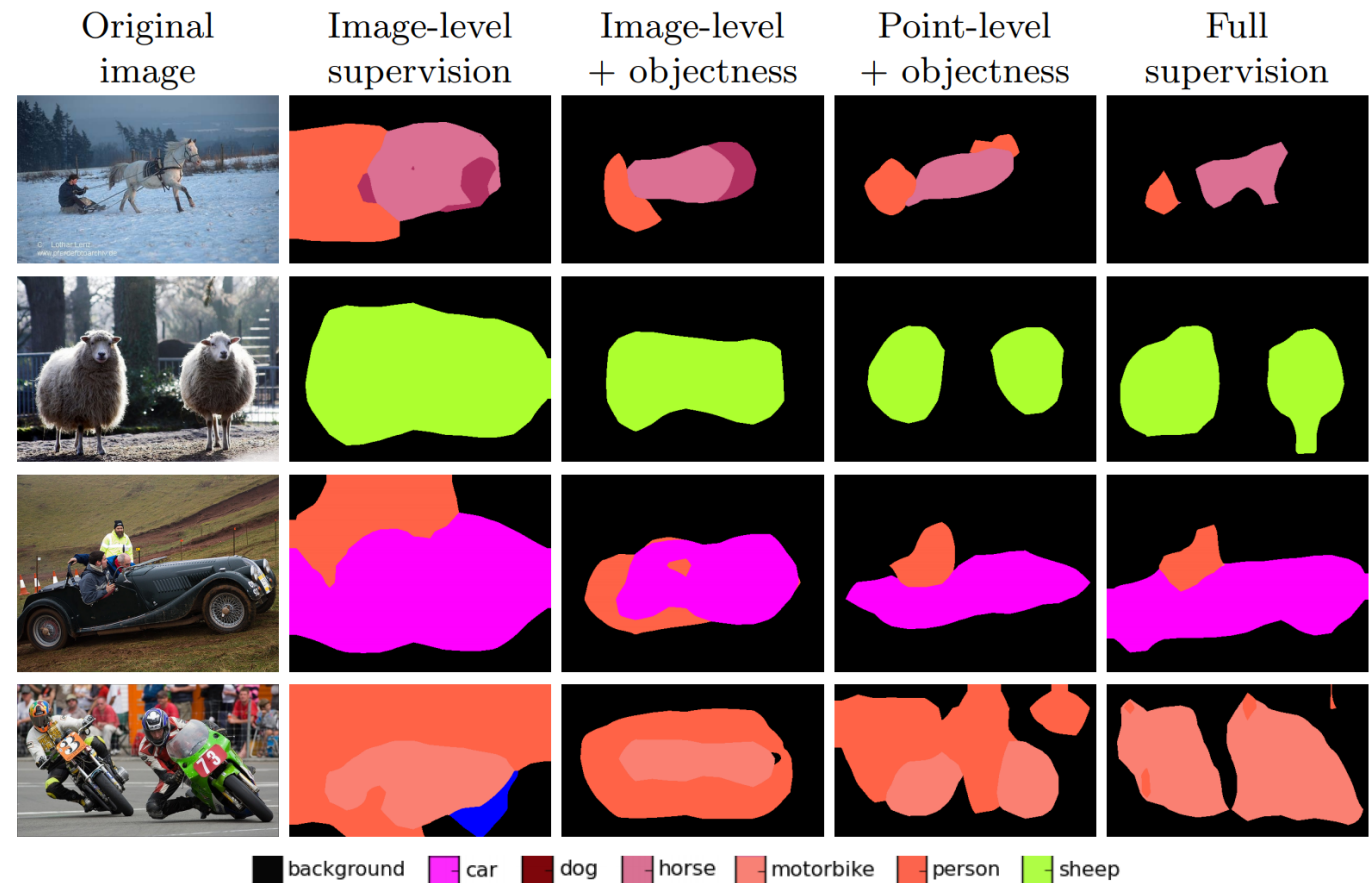
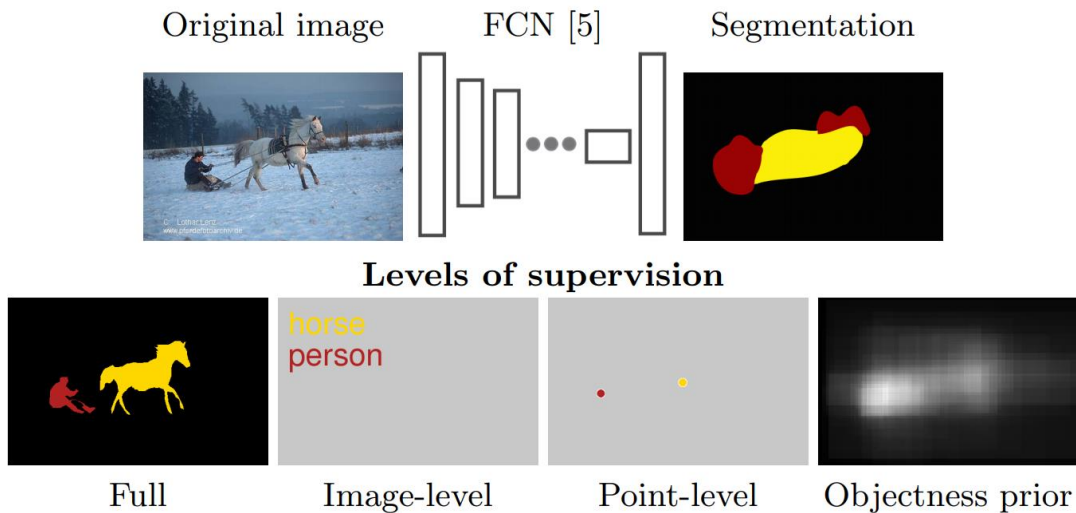
ResNet-50	Mixup [47]	Cutout [3]	CutMix
Dog 1.0	Dog 0.5 Cat 0.5	Dog 1.0	Dog 0.6 Cat 0.4
76.3 (+0.0)	77.4 (+1.1)	77.1 (+0.8)	78.6 (+2.3)
46.3 (+0.0)	45.8 (-0.5)	46.7 (+0.4)	47.3 (+1.0)
75.6 (+0.0)	73.9 (-1.7)	75.1 (-0.5)	76.7 (+1.1)



Weak Supervised Learning - Examples

ECCV2016 - What's the Point: Semantic Segmentation with Point Supervision

Amy et al., Stanford (Li Fei-Fei)



Weak Supervised Learning - Examples

CVPR2017 - Learning to Detect Salient Objects with Image-level Supervision

Wang et al., Dalian University of Technology

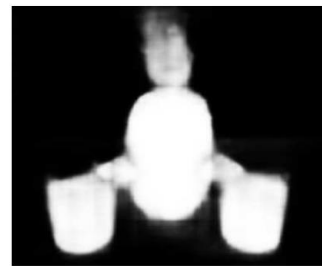
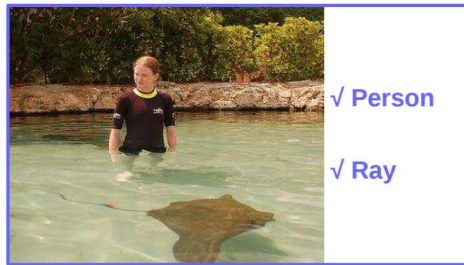
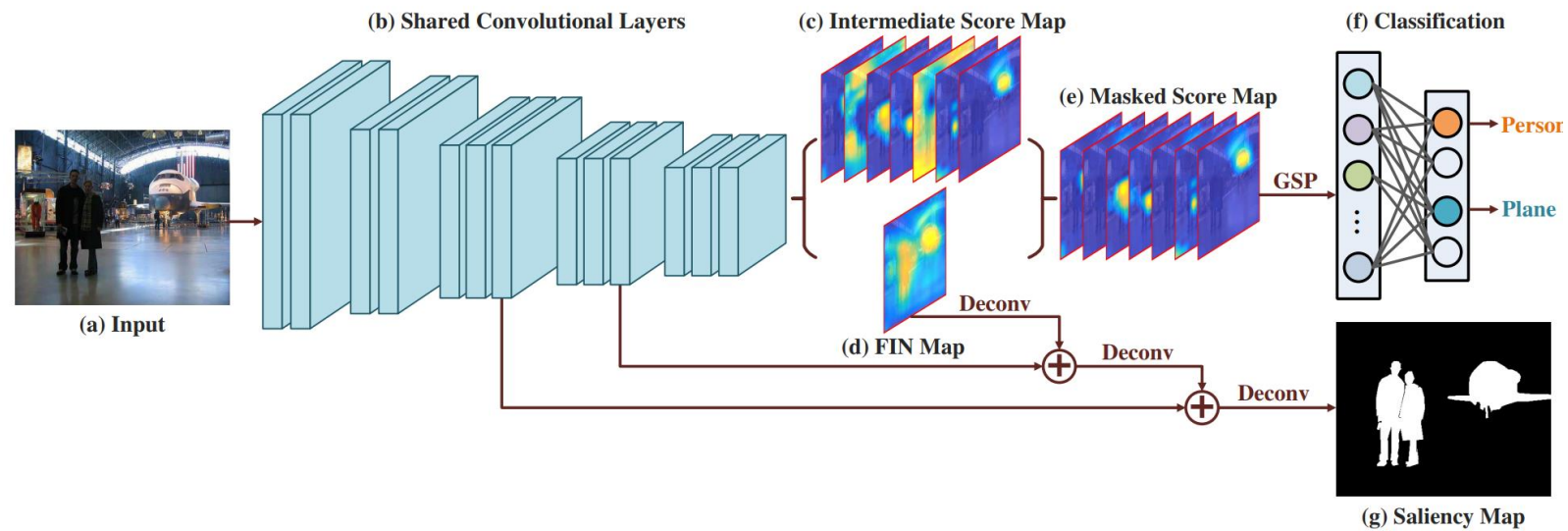


Image-Level
Class-Specific

Weak
Supervision

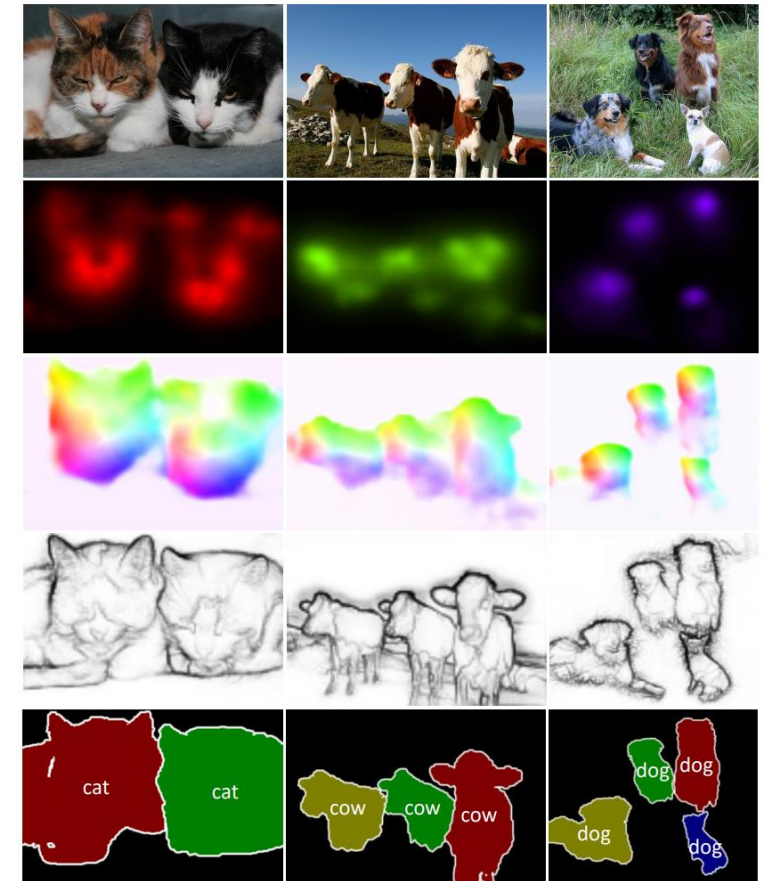
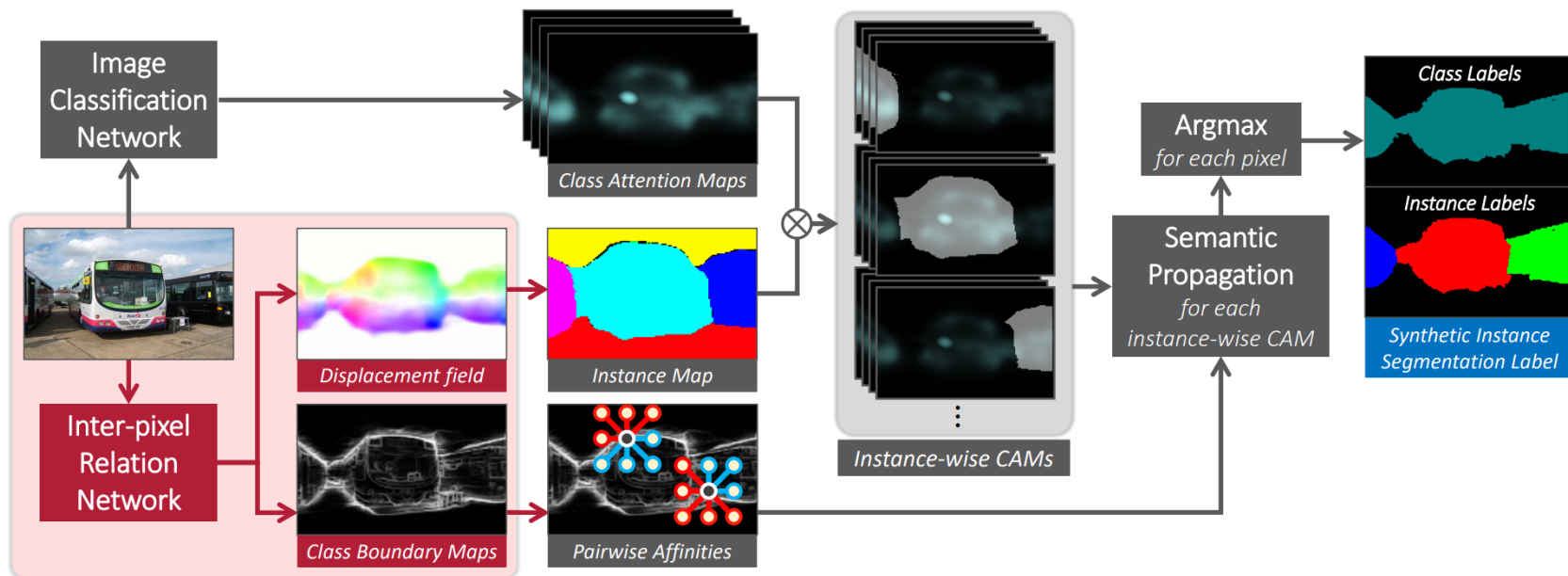
Pixel-Level
Class-Agnostic



Weak Supervised Learning - Examples

CVPR2019 - Weakly Supervised Learning of Instance Segmentation with Inter-pixel Relations

Ahn et al., DGIST

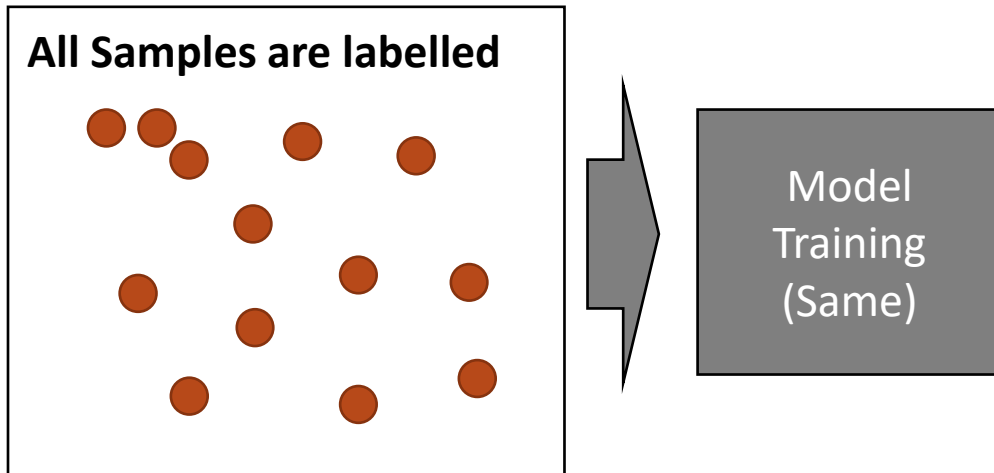


Semi-supervised Learning

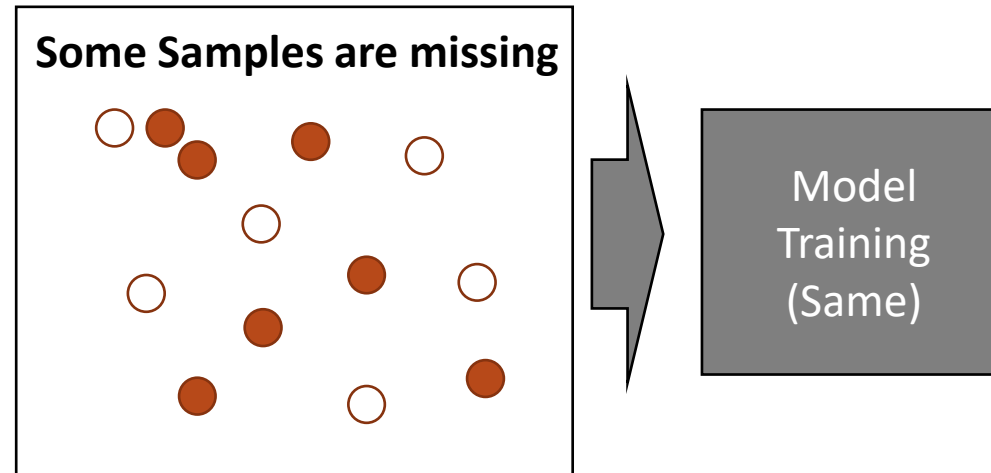
- Concept

- Train a model when only a part of labels are given
 - Only partial samples are labelled
 - But the label information is perfect

Supervised Learning



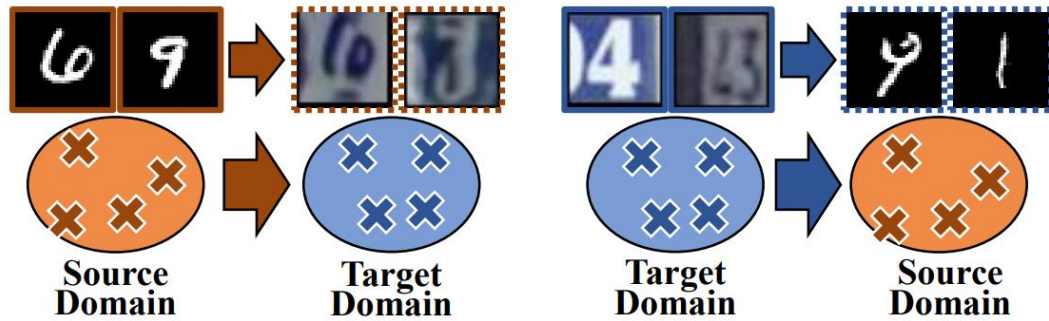
Semi-Supervised Learning



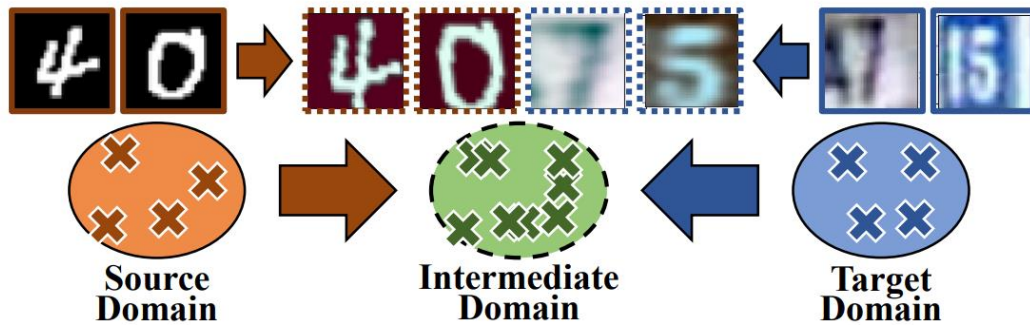
Semi-supervised Learning - Examples

AAAI2020 - Visual Domain Adaptation by Consensus-based Transfer to Intermediate Domain

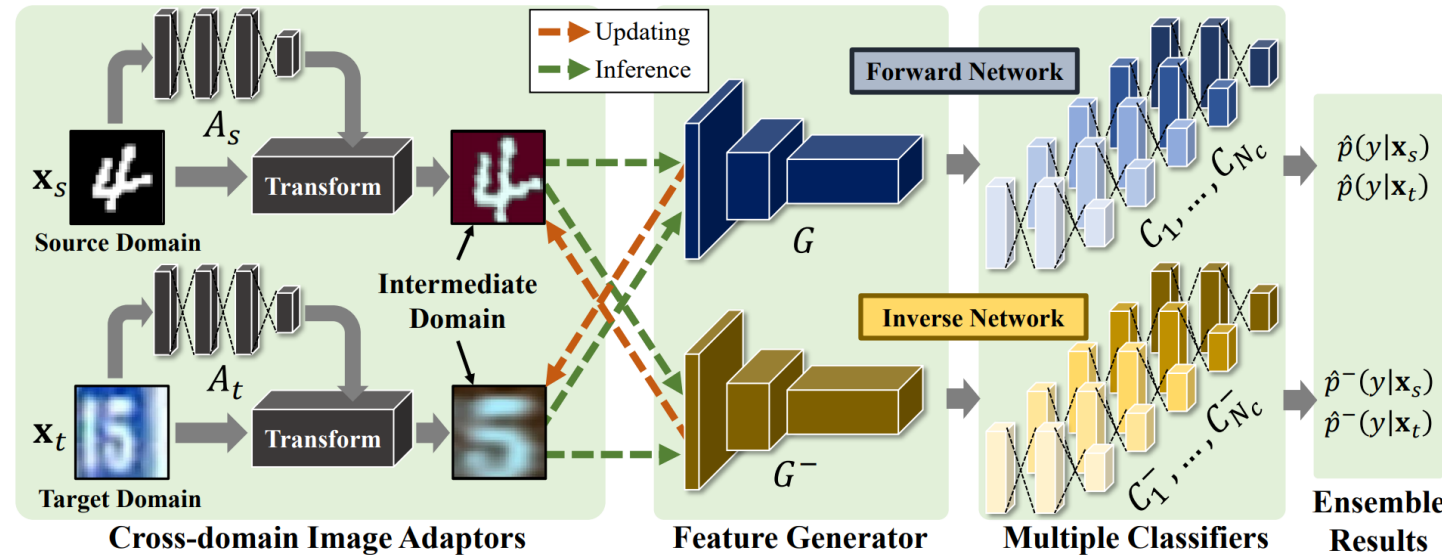
Choi et al., Samsung SDS



(a) Wrong results from generative model-based scheme



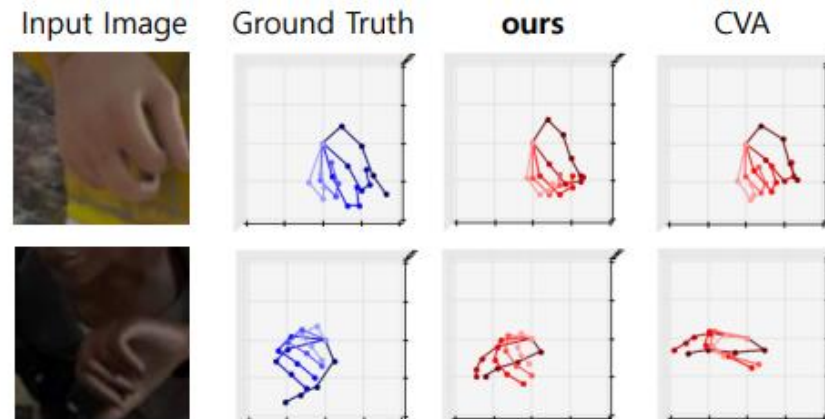
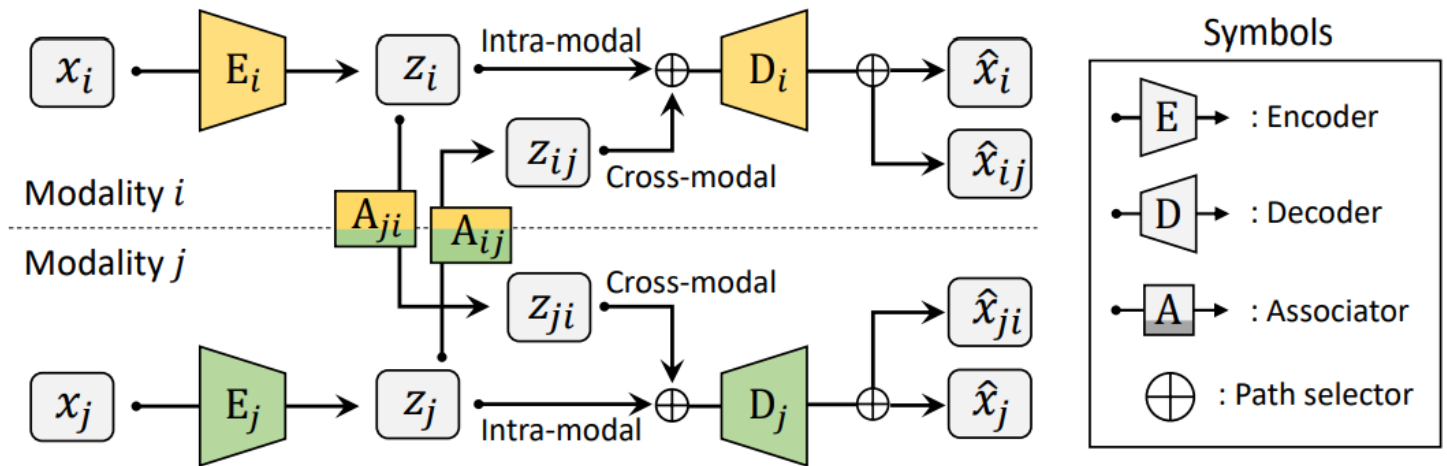
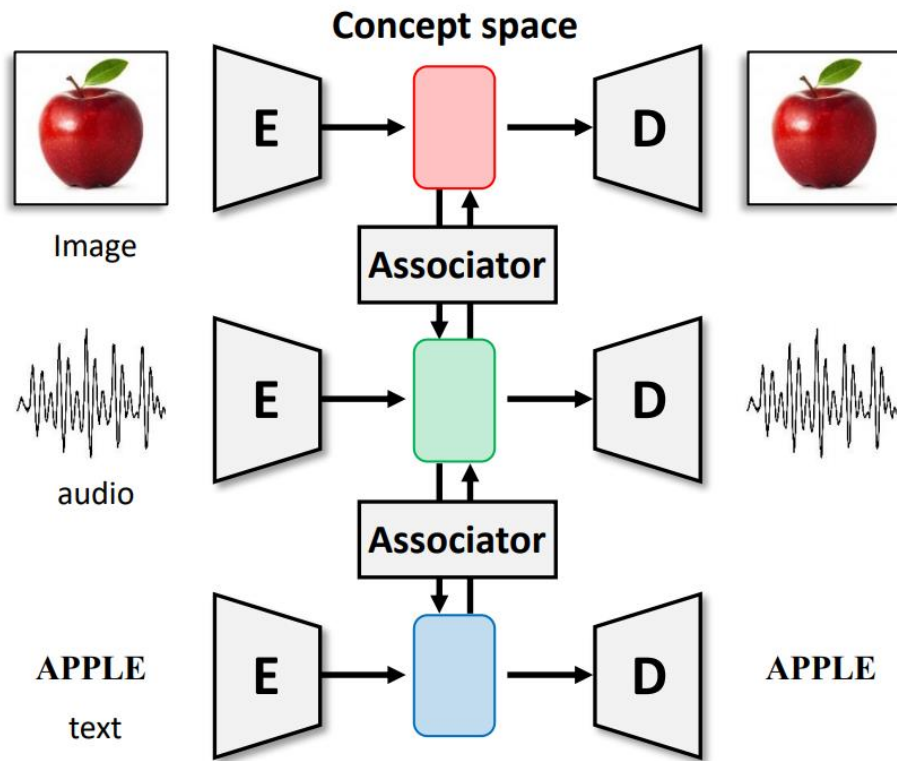
(b) Aligned samples in intermediate domain



Semi-supervised Learning - Examples

AAAI2020 - Cross-modal Variational Auto-encoder with Distributed Latent Spaces and Associators

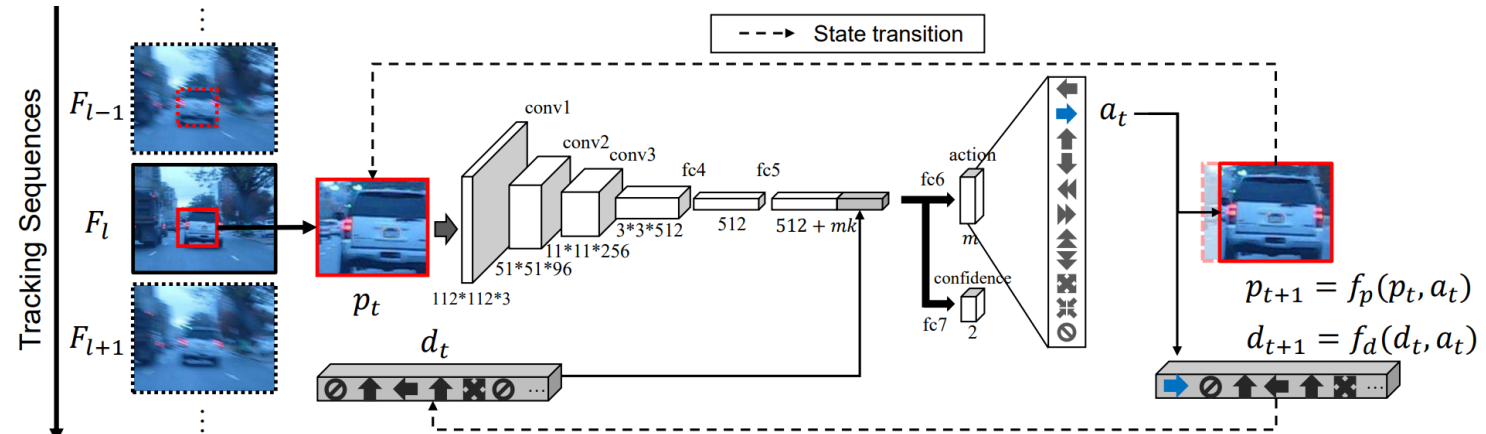
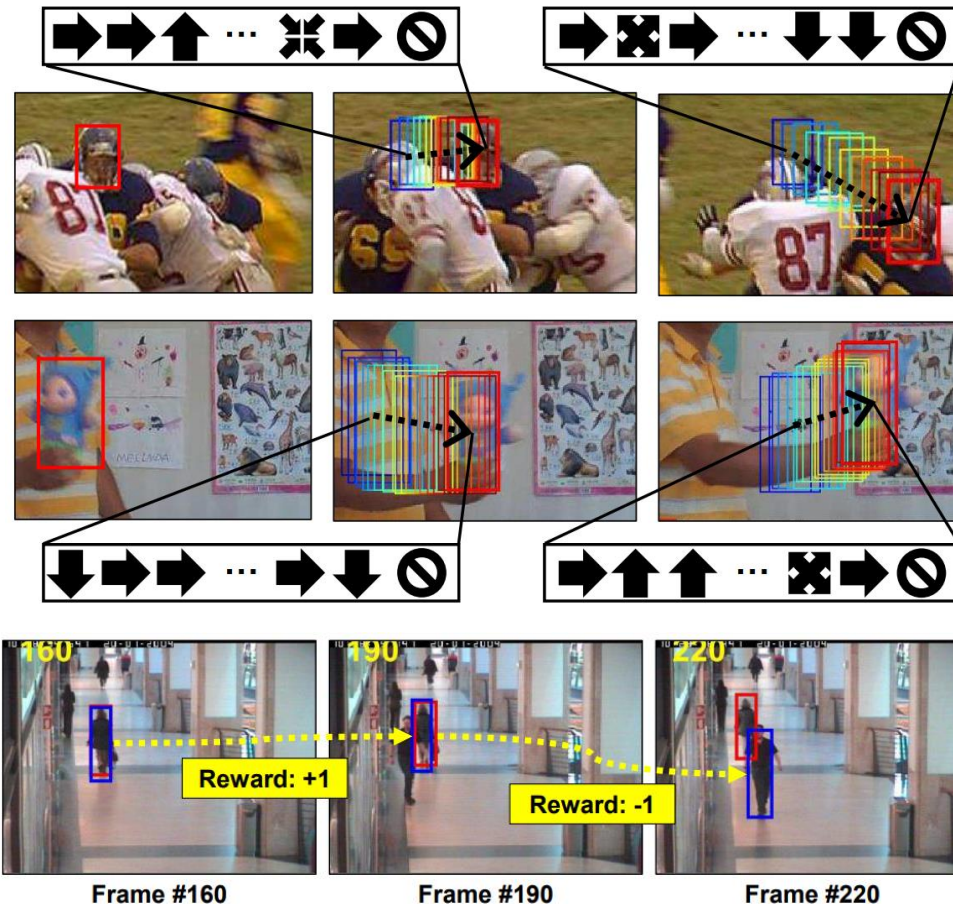
Cho et al., Seoul National University



Semi-supervised Learning - Examples

CVPR2017 - Action-Decision Networks for Visual Tracking with Deep Reinforcement Learning

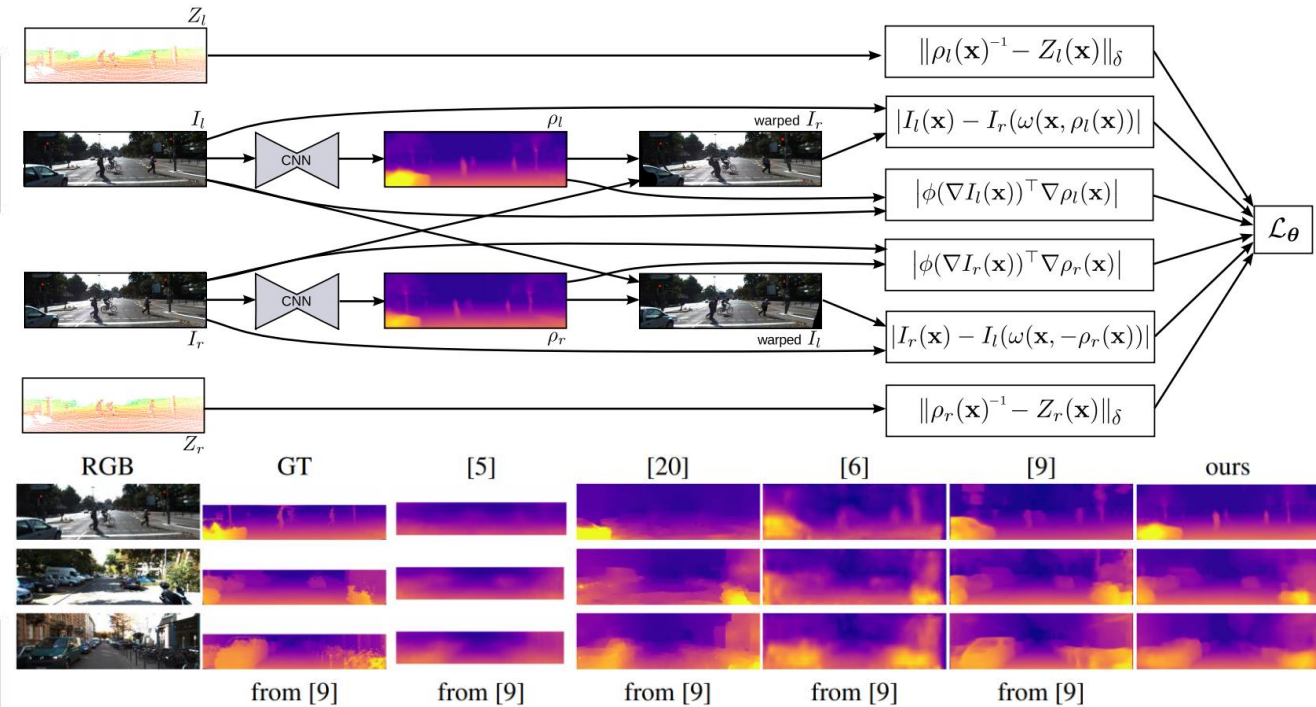
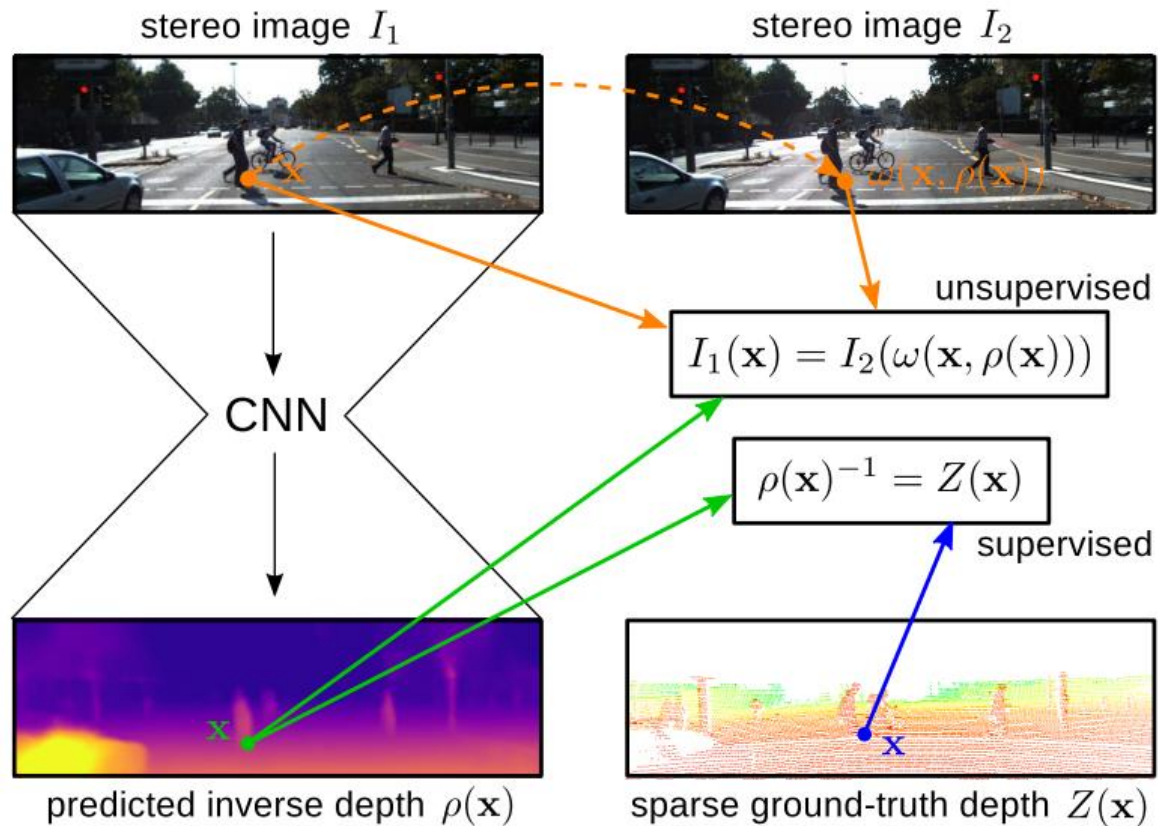
Yun et al., Seoul National University



Semi-supervised Learning - Examples

CVPR2017 - Semi-Supervised Deep Learning for Monocular Depth Map Prediction

Kuznietsov et al., RWTH Aachen University



Summary

- Weak supervised Learning

- Concept
- Examples

- Semi-supervised Learning

- Concept
- Examples