KIDELTA LEARNING

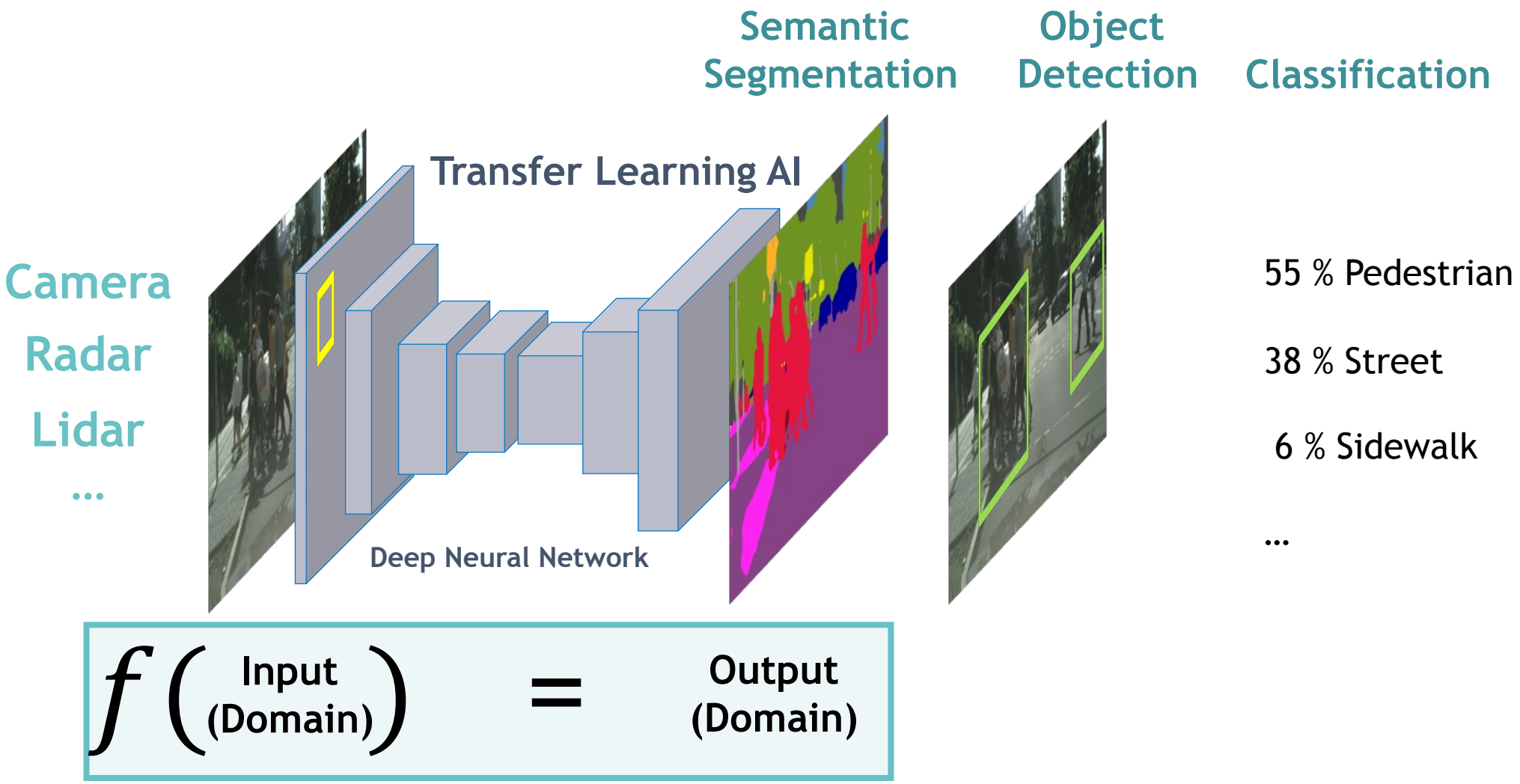
Scalable AI for Automated Driving

Final Event | March 09, 2023

Transfer Learning - Overview

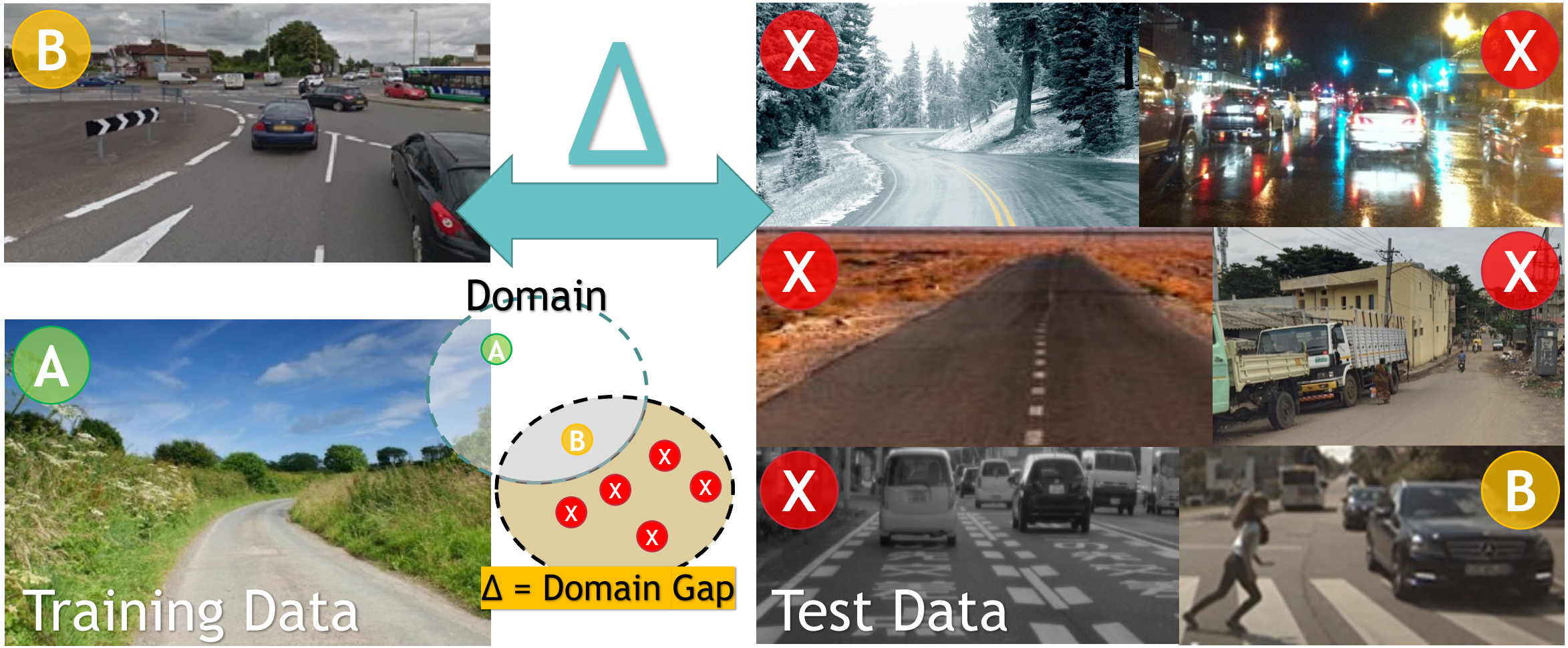
Jens Mehnert | Bosch

Transfer Learning Tasks



$$f\left(\text{Input (Domain)}\right) = \text{Output (Domain)}$$

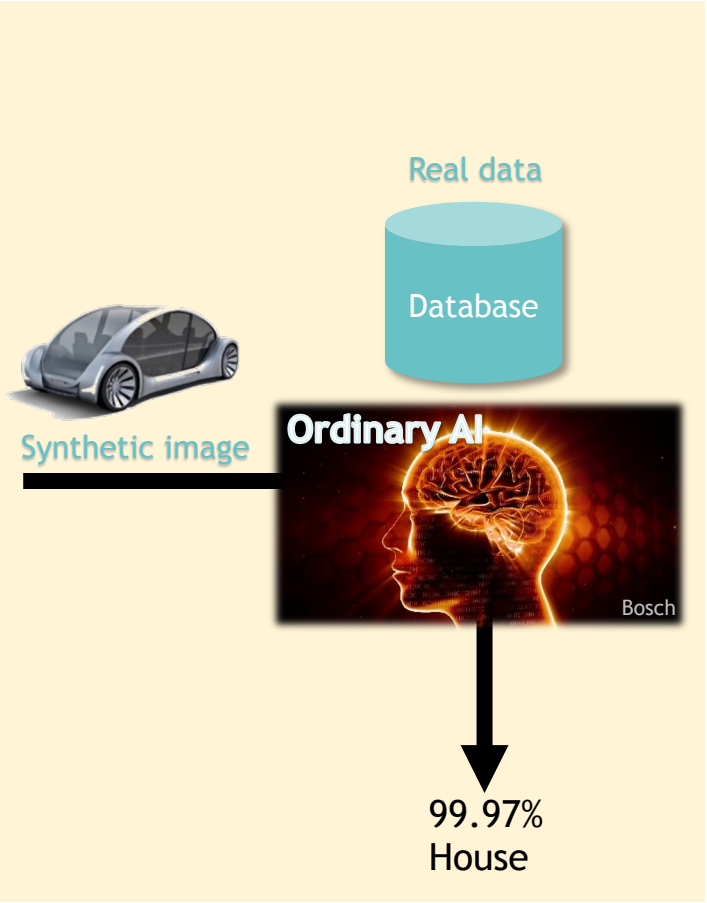
Transfer Learning Problem Statement



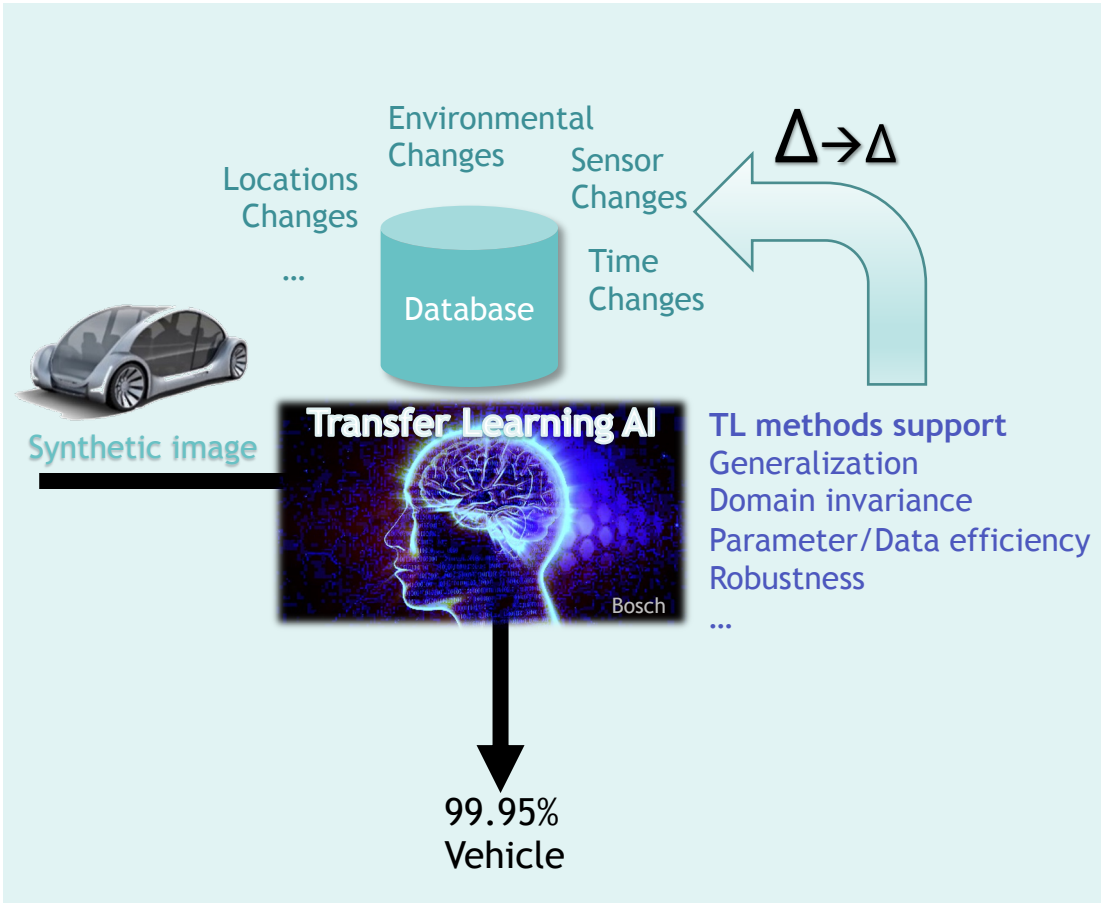
Bosch

Transfer Learning
In a Nutshell

Human



AI Today



AI with Transfer Learning

Transfer Learning
In the Project

Continuous Learning

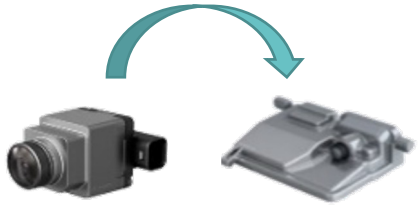
Bosch

Synthetic data

Bosch

Bosch

Cross-Sensor-Adaption



Bosch

Time and place adaptation

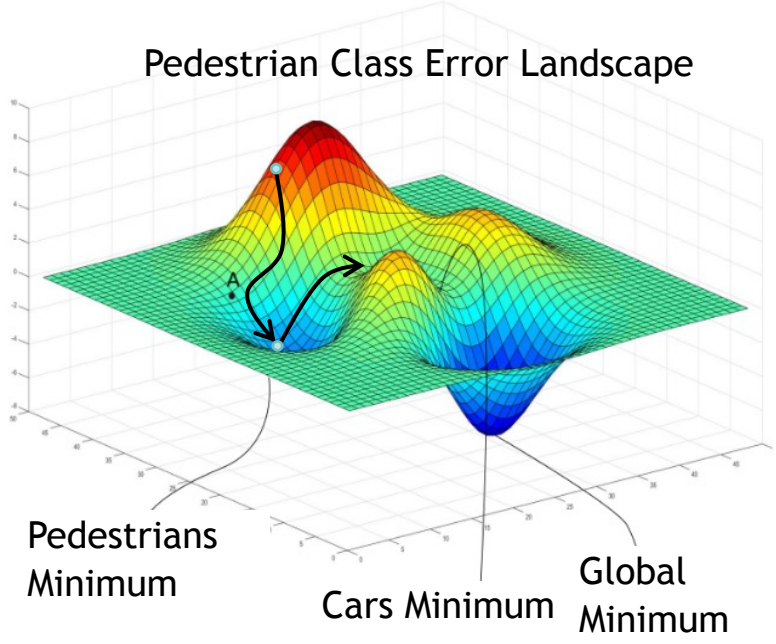
Bosch

Environmental adaptation

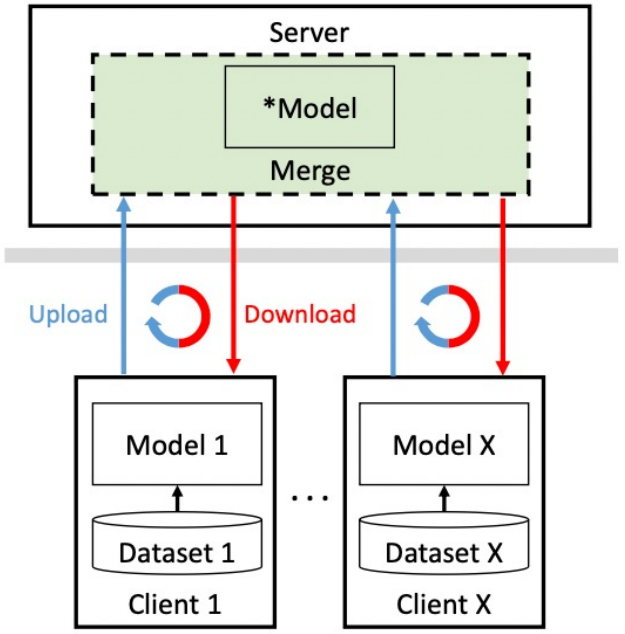
Bosch

Transfer Learning Solutions
Continuous Learning

Catastrophic Forgetting
- Important for transfer learning
- **Competitive relevant benchmarking**
- Class/Domain continual



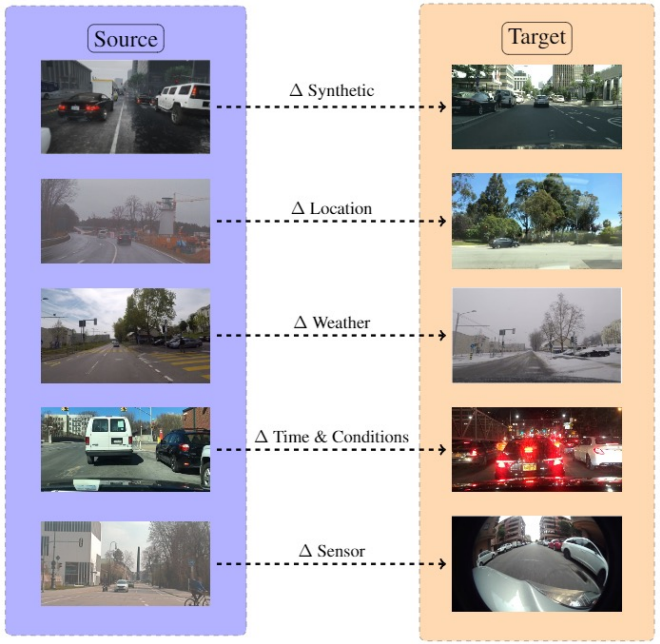
Federated Learning
- If Data and/or model(s) cannot leave a country
- **Train in a secured virtual space**



Transfer Learning Solutions
Synthetic data

Causal Learning

- Avoid learning non-relevant features
- Invariant features
- Synthetic data→ easy to change Δ



Simulation to Real

- Analyse Deltas of special cases
- Transfer annotations from simulated data
- Inject the rendered objects into real scenes
  →More training data

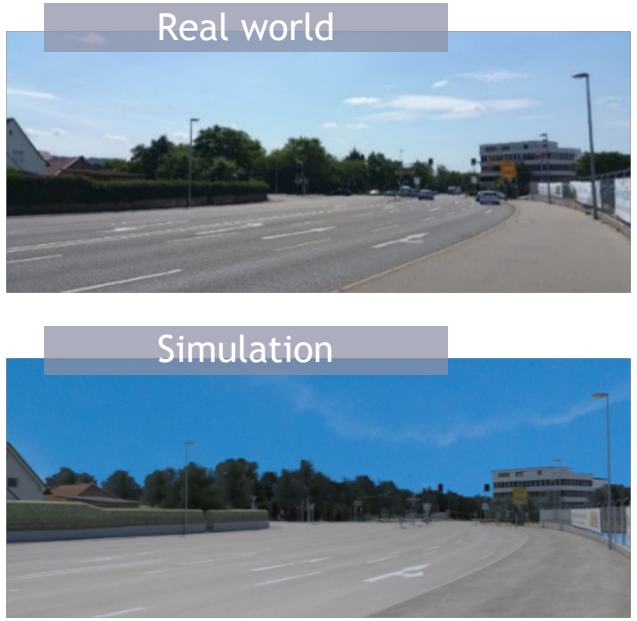
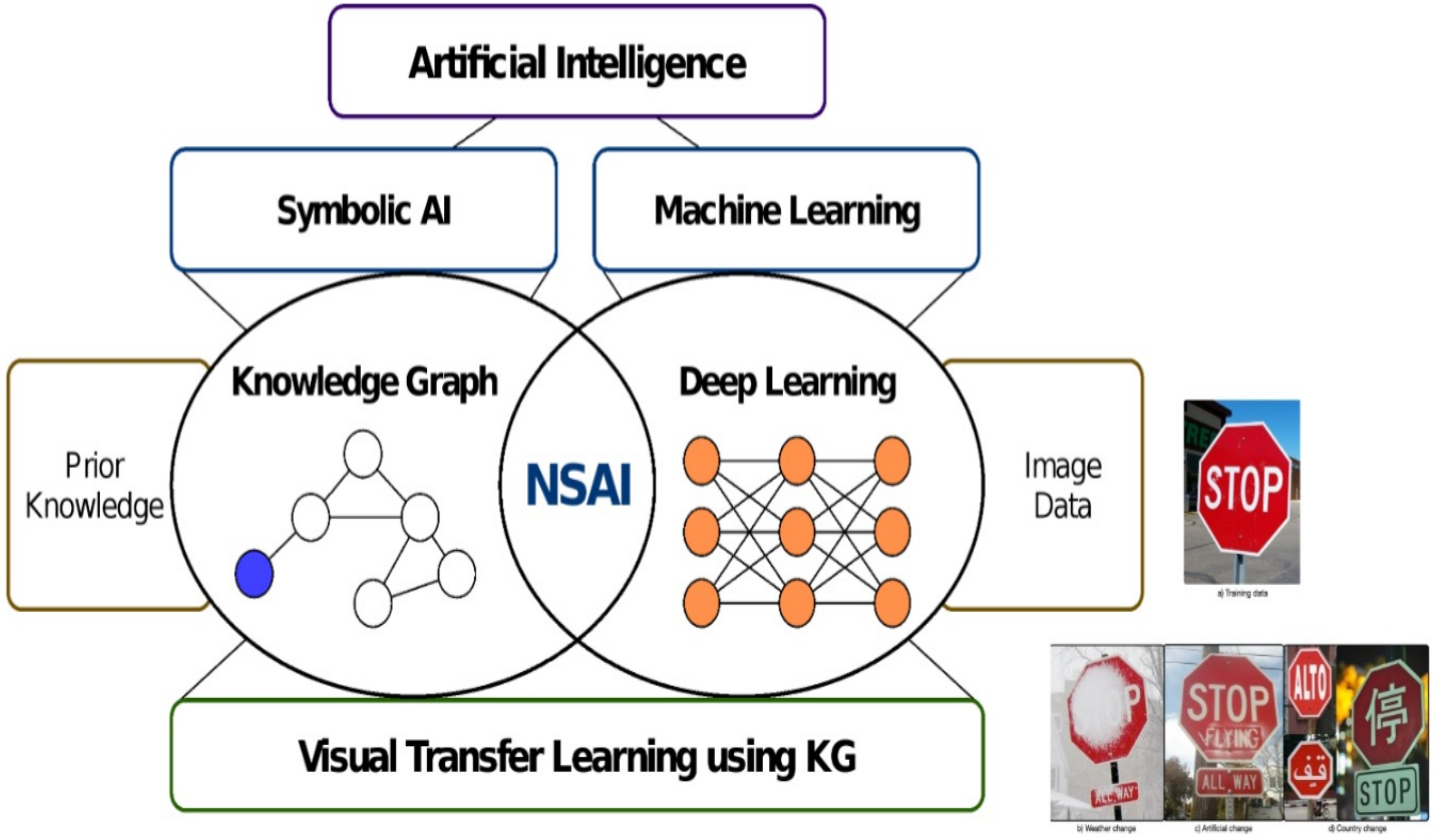


Image © PEG & Bosch

Transfer Learning Solutions
Cross-Sensor Adaptation

Knowledge Graphs

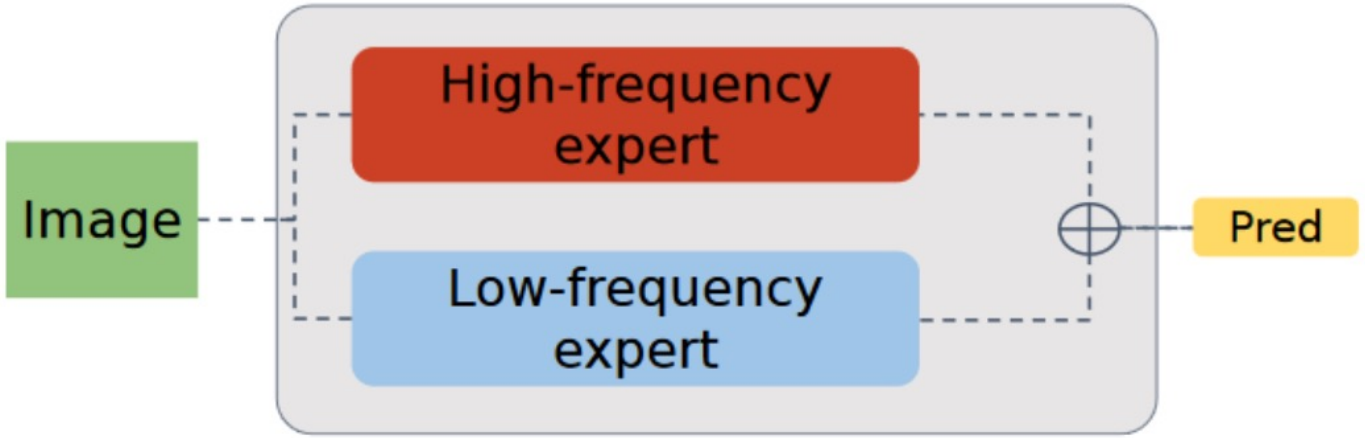
- Use arbitrary Data to improve your ML Algorithm
- Realising a better knowledge transfer (embedding)



Transfer Learning Solutions
Time and place adaptation / Environmental adaptation

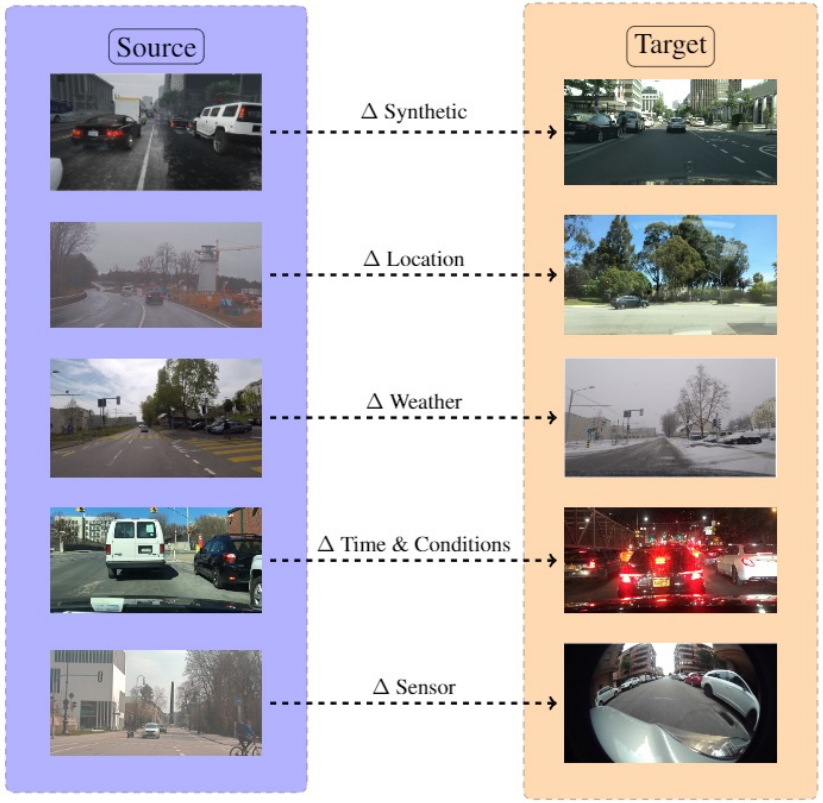
Robustness

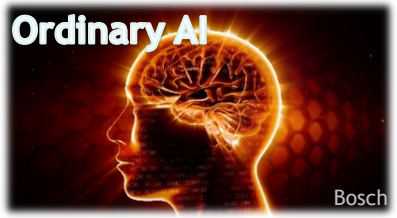
- Robust against noise/corruptions
- Robust against corner cases
- Remain quality on clean data



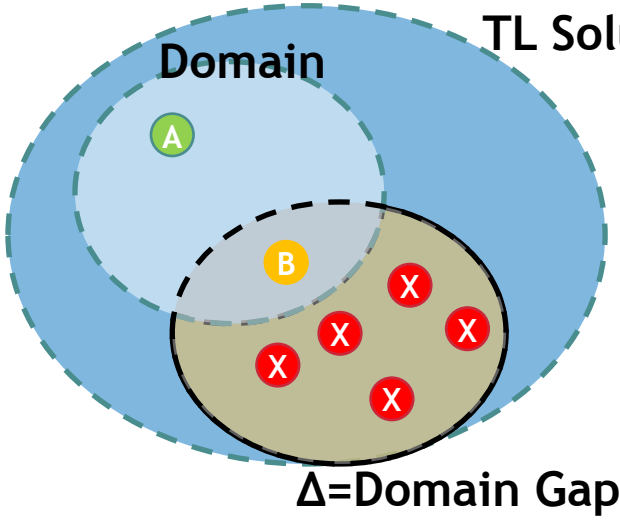
Summary

Too much data variation
→ Expensive/Impossible





Minimize Δs



TL methods support
Generalization
Domain invariance
Parameter/Data efficiency
Robustness
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KI DELTA LEARNING

Scalable AI for Automated Driving

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