BOOTSTRAPPING SEMANTIC SEGMENTATION WITH REGIONAL CONTRAST

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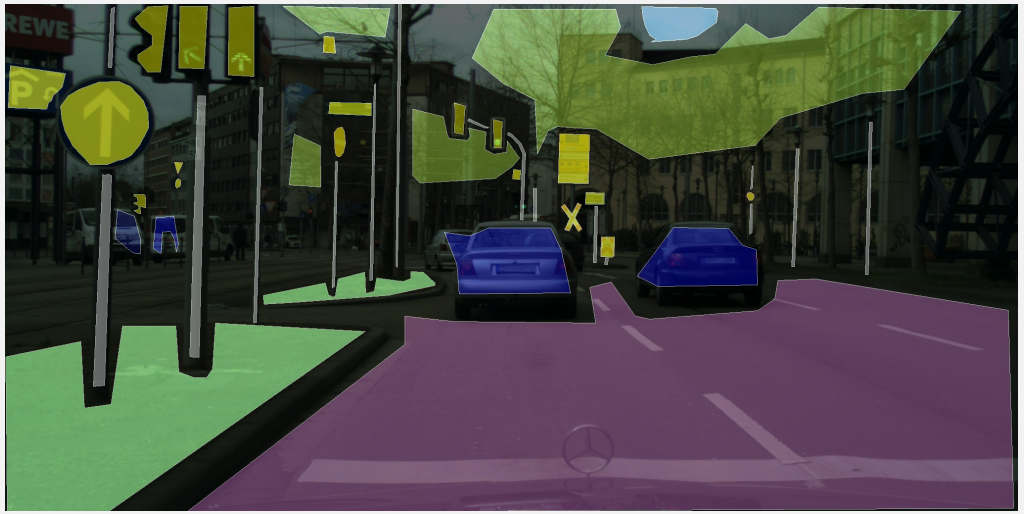
SEMI-SUPERVISED SEGMENTATION

Annotation and quality control required more than 90 minutes on average for a single image in Cityscapes dataset.

SEMI-SUPERVISED SEGMENTATION

- Case 1: Few labelled images. Label information is complete. *(evaluated in prior works)*
- Case 2: Many labelled images. Label information is partial.

PARTIAL LABELLED IMAGES



Each partially labelled image is asked to correctly annotate as many pixels as possible within a given span of less than 7 mins.

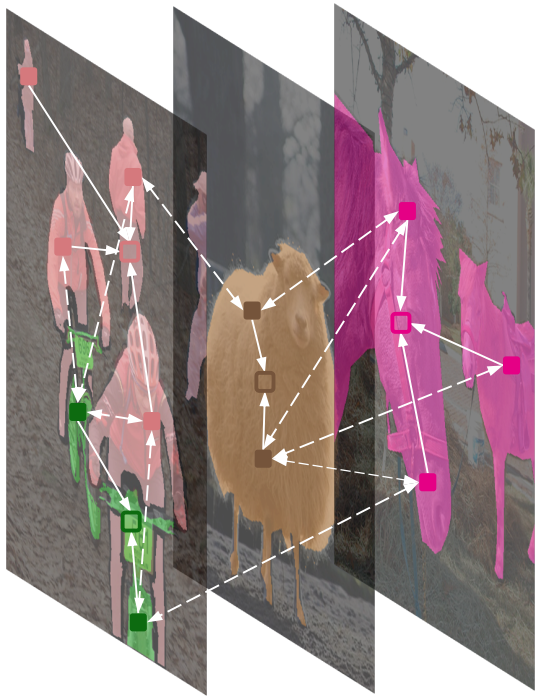
Ground-Truth

Trained with Supervised Learning
(mIoU 38, Acc. 85+)

LIMITATIONS ON SUPERVISED SEGMENTATION MODELS

- Focus only on local context (in a single image) by convolutional or attention models.
- Cross-entropy loss produces minimal meaningful information.

INTRODUCING RECO [REGIONAL CONTRAST]



Semantic Class	Sampling Distribution
Person	Bicycle, Sheep, Horse
Bicycle	Person, Horse, Sheep
Sheep	Horse, Person, Bicycle
Horse	Sheep, Person, Bicycle

KEY AND QUERY SAMPLING

Active Key Sampling

$$G[p,q] = \cos\left(r_k^{p,+}, r_k^{q,+}\right), \quad \forall p,q \in \mathcal{C}, \text{ and } p \neq q.$$

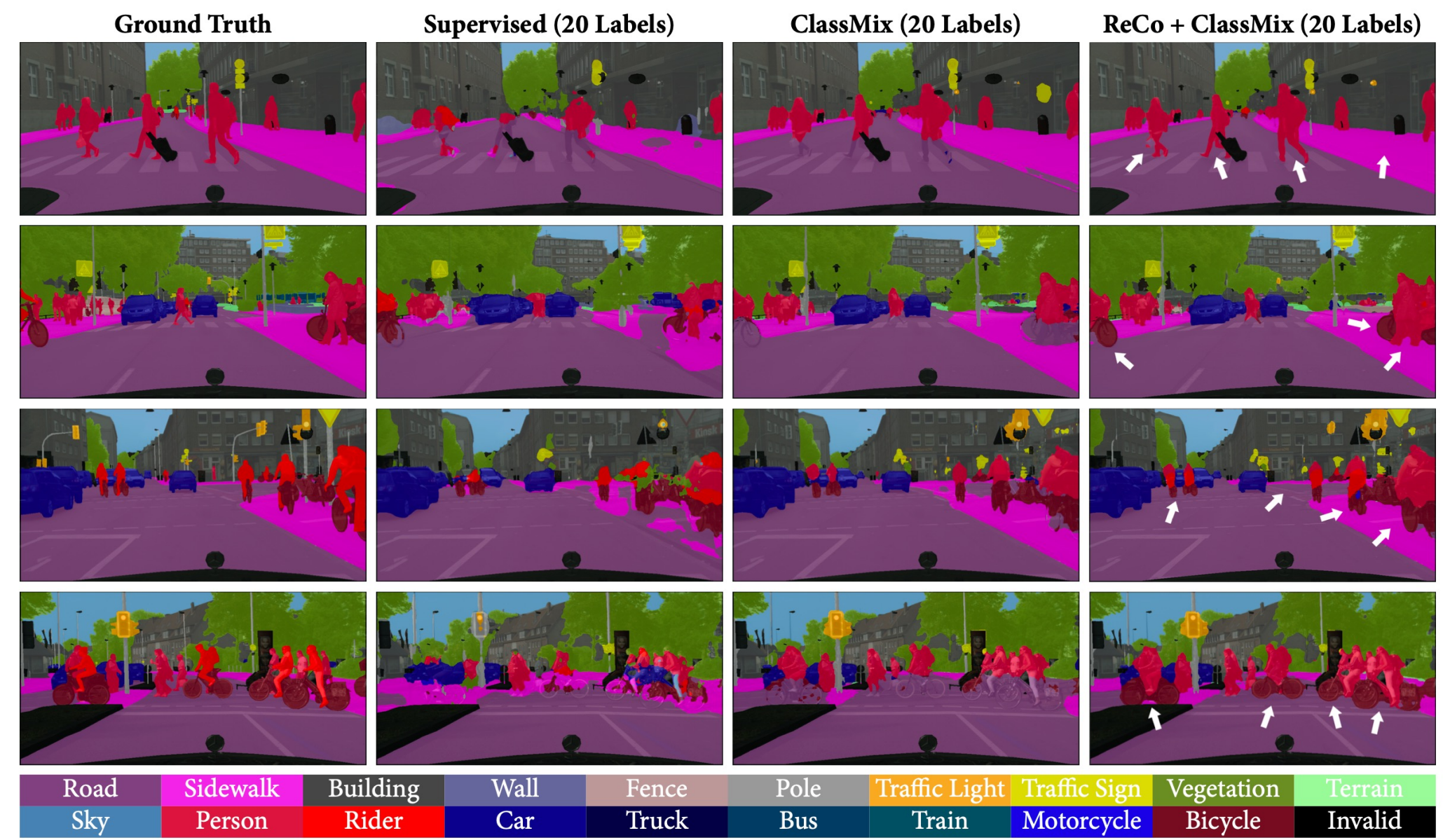
Active Query Sampling

(a) Confidence Map

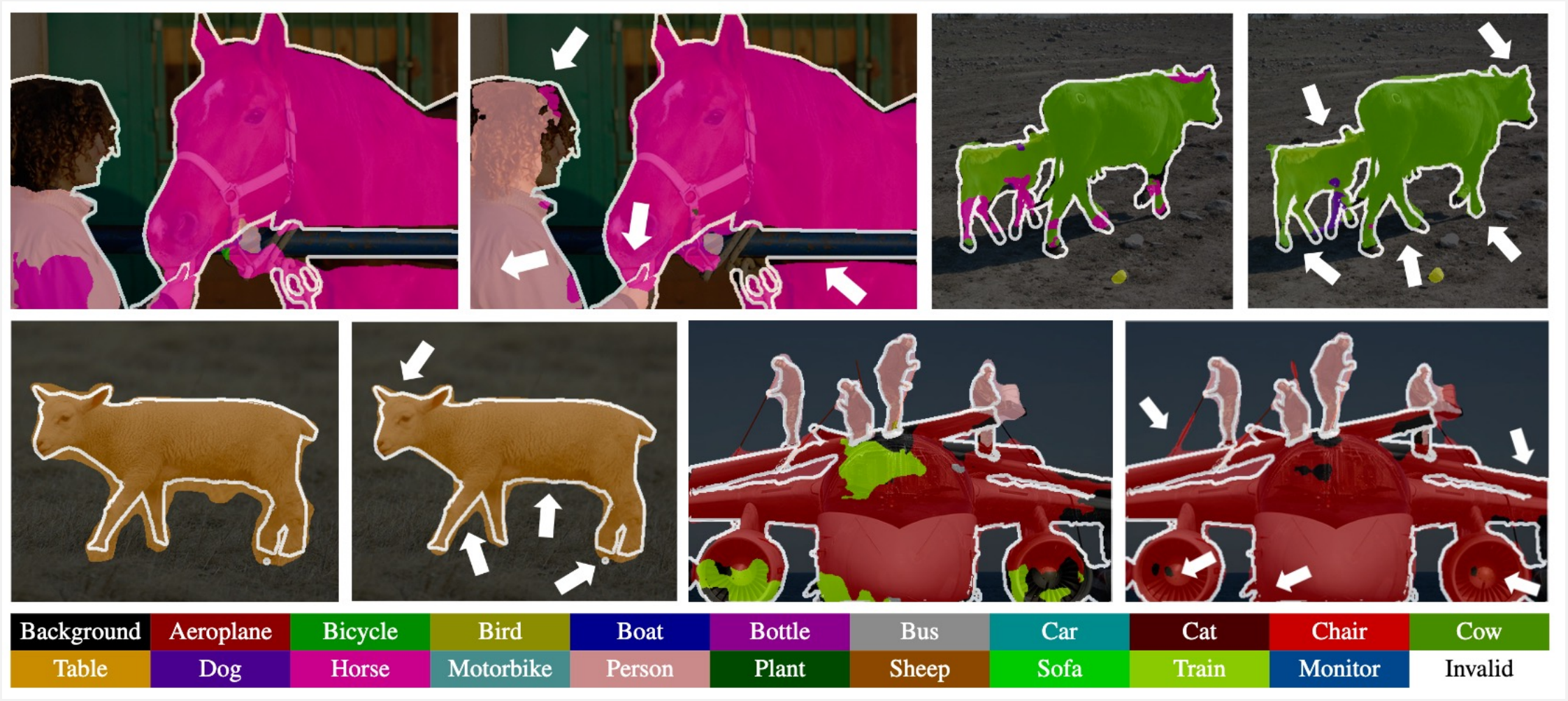
(b) Easy Queries

(c) Hard Queries

RESULTS ON CITYSCAPES (CASE 1)

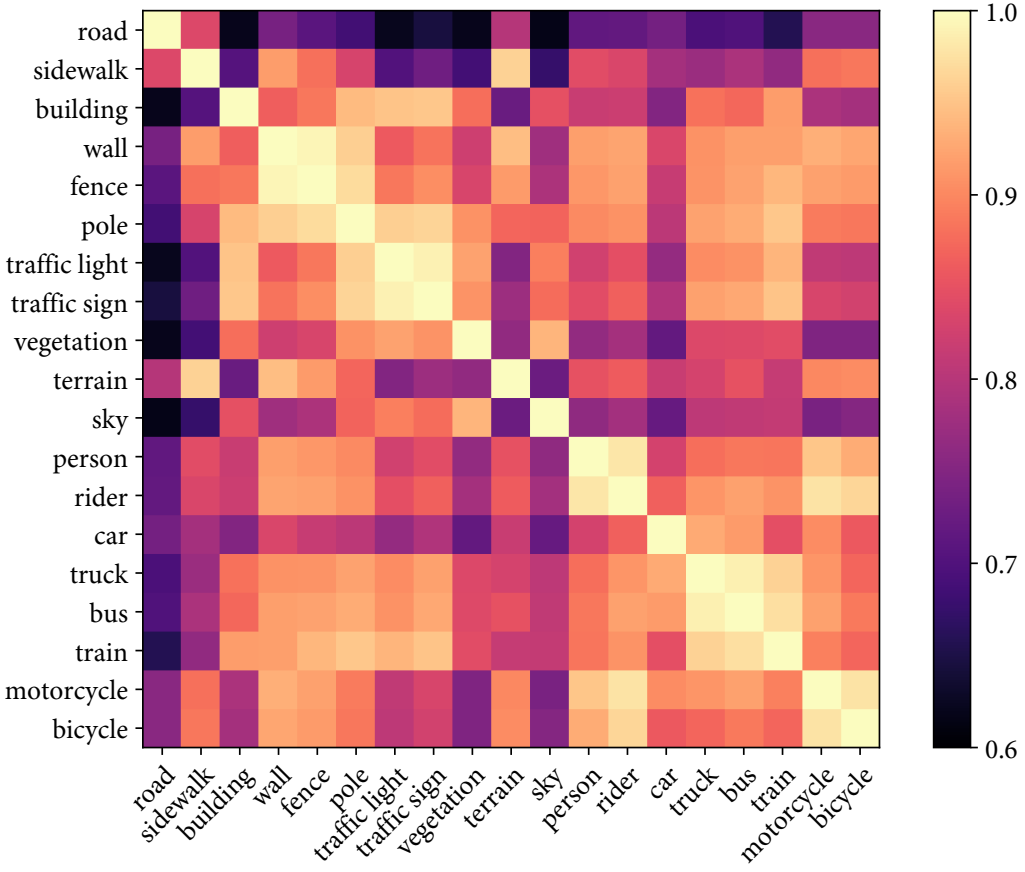


RESULTS ON PASCAL VOC (CASE 2)

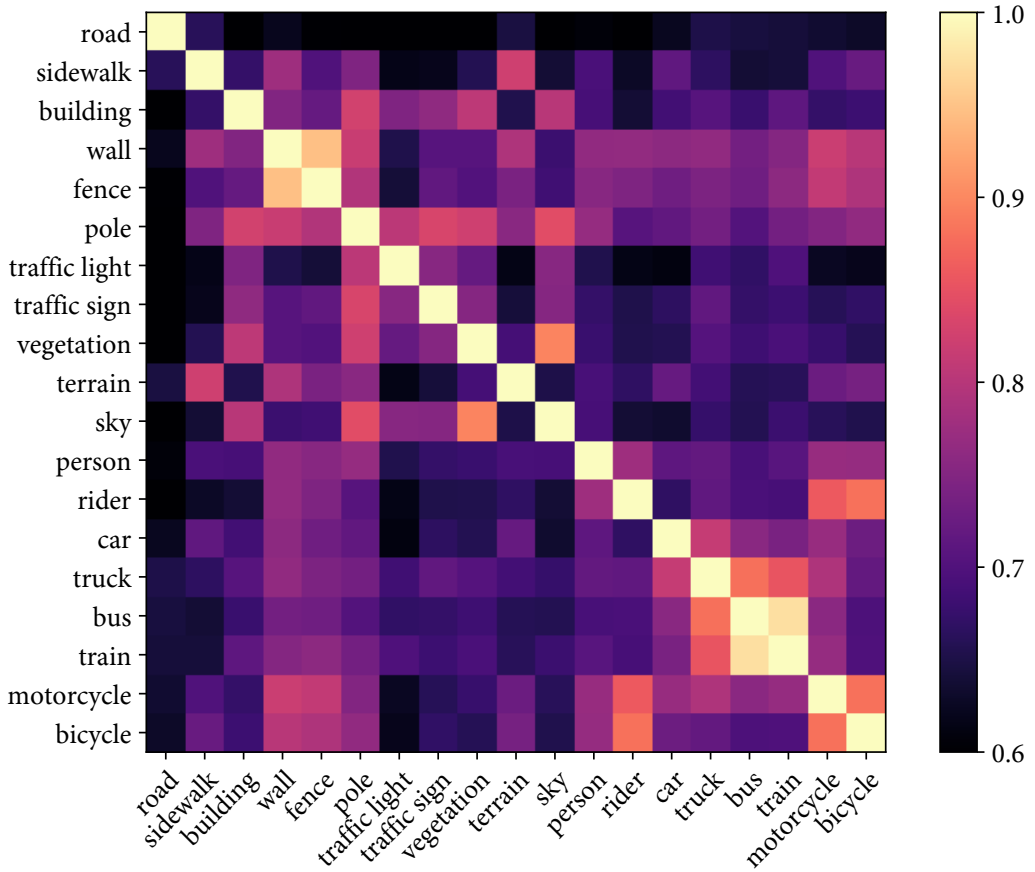


Left: ClassMix; Right: ClassMix + ReCo

Supervised



ReCo + Supervised



INTERPRETABILITY OF CLASS RELATIONSHIP

THANKS FOR LISTENING!

Project Page:
https://shikun.io/projects/regional-contrast