RECALL: Replay-based Continual Learning in Semantic Segmentation

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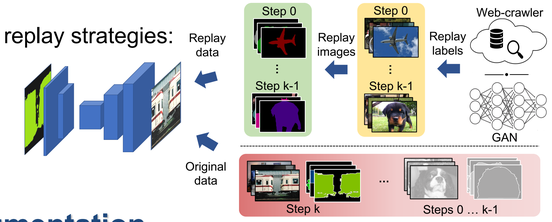
Abstract

Deep networks forget old tasks when learning new ones. We focus on *class incremental continual learning (CL) in semantic segmentation*.

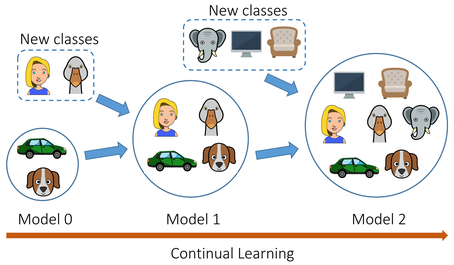
We exploit two data replay strategies:

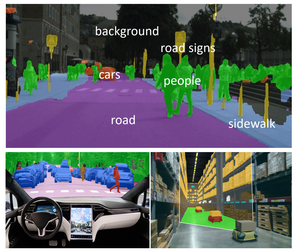
- **Gan** (BigGan)
- **Web** (Flickr)



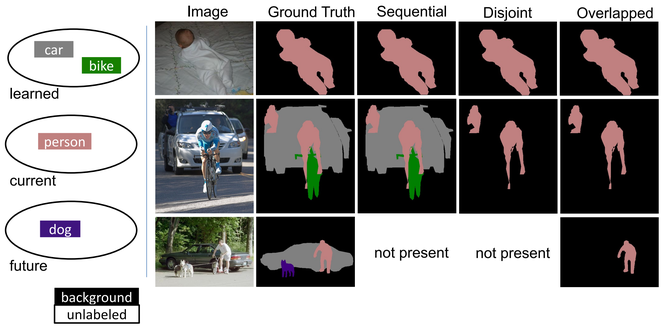
Continual Segmentation

Our Focus: Class-Incremental Continual Learning in Semantic Segmentation





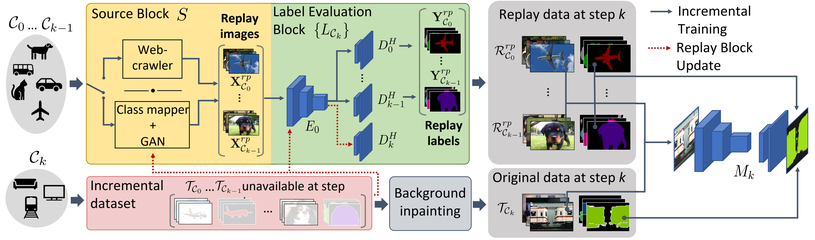
Many setups have been prposed with different background representations and annotation of previous classes in future steps.



Our Approach (RECALL)

RECALL: **Re**play **C**ontinu**al** **L**earning

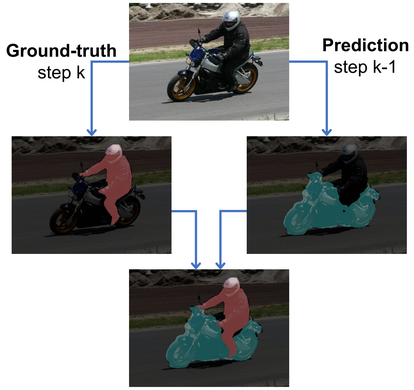
- We use replay data via generative models or web-crawling to alleviate catastrophic forgetting
- We address the *background shift* by a self-inpainting scheme



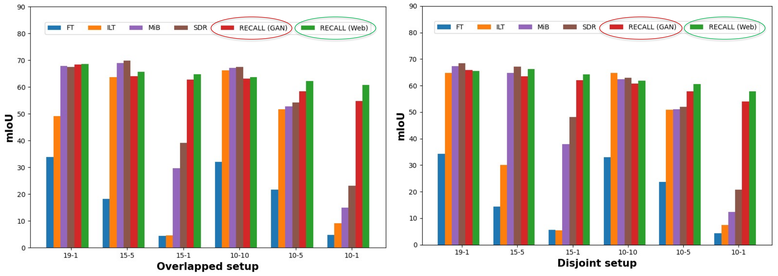
Background Inpainting

Incremental step k:

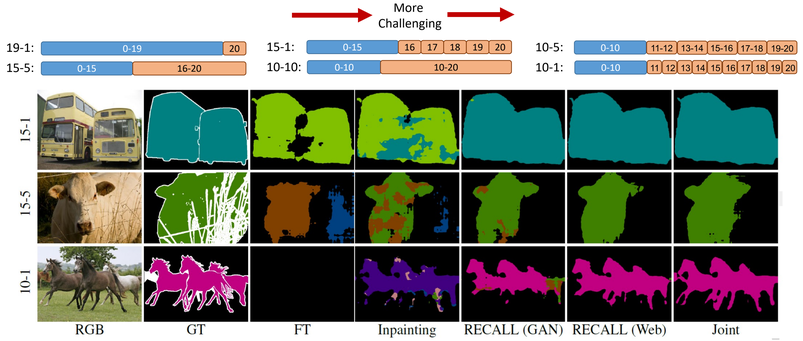
- Labels available only for **new categories**
- **Past classes** learnt in previous steps are annotated by *pseudo-labeling*
- *Background Inpainting* to merge new data with predicted ones



Results



Visual Results on Pascal VOC2012



Conclusion

- Replay data to alleviate *forgetting* in class-incremental learning:
  - GAN (BigGan)
  - Web crawler (Flickr)
- Self-inpainting to handle the *background shift*
- RECALL outperforms state-of-the-art methods
  - Especially when multiple incremental steps are performed

Code available: https://github.com/LTTM/RECALL