Machine Learning

Modeling with Data Limitation

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Teaching, Training and Coaching for more than a decade!

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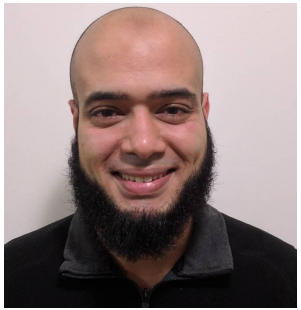
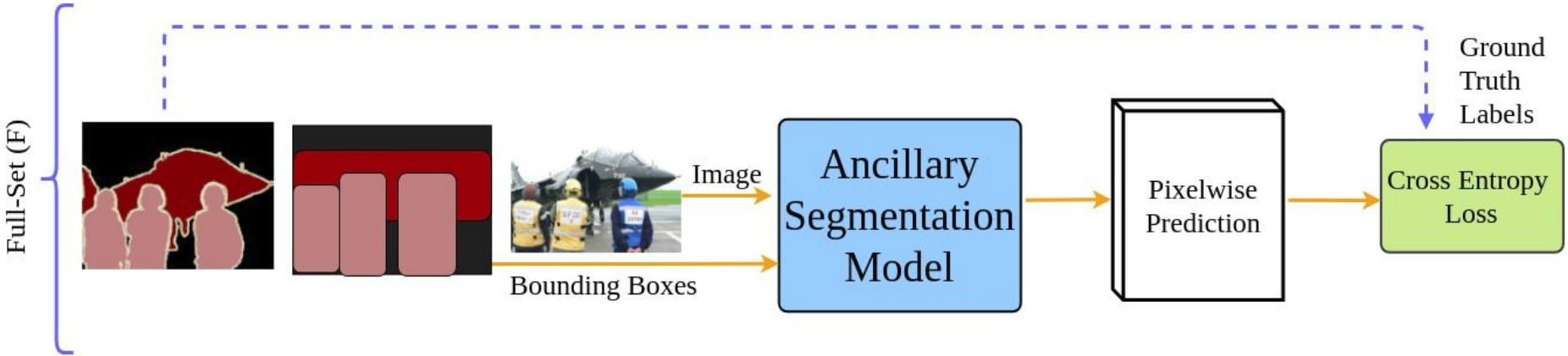


Framework Overview

- **Ancillary** segmentation network
  - Goal: Generate Initial segmentation for the weak-set
  - Network Input: **image & bounding boxes**
    - Training Data: fully annotated dataset
    - Inference: on weakly annotated dataset
  - Network Output: segmentation labels (logits)
- **Primary** segmentation network
  - Standard Segmentation + Refine psduelo-labels during training
  - **Self correction**: 2 approaches for refining logits

Ancillary segmentation network

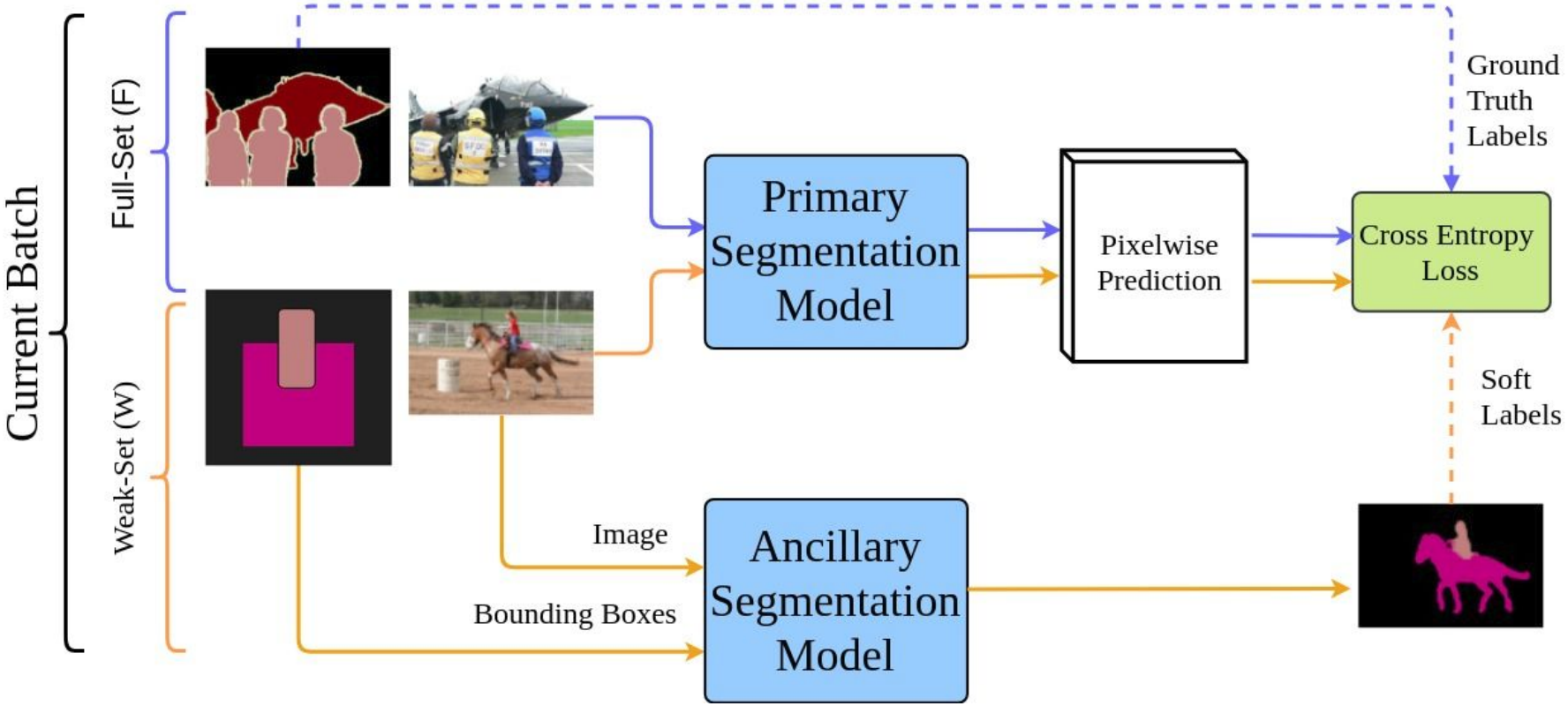
- Use the 2 types of annotation to train on the full model
- Then inference on the weakly labeled (with image / bbox as inputs)
- Now build **pseudo labels** for the weakly-set



No Self-Correction Approach

- Use the generated **pseudo labels** of from the ancillary model
- Train **Primary** segmentation network
  - Dataset: full-set (proper labels) + weak-set(pseudo labels)
- In training:
  - If the image is from the full-set, use the ground truth
  - If the image is from the weak-set, use its generated pseudo label

Full Training

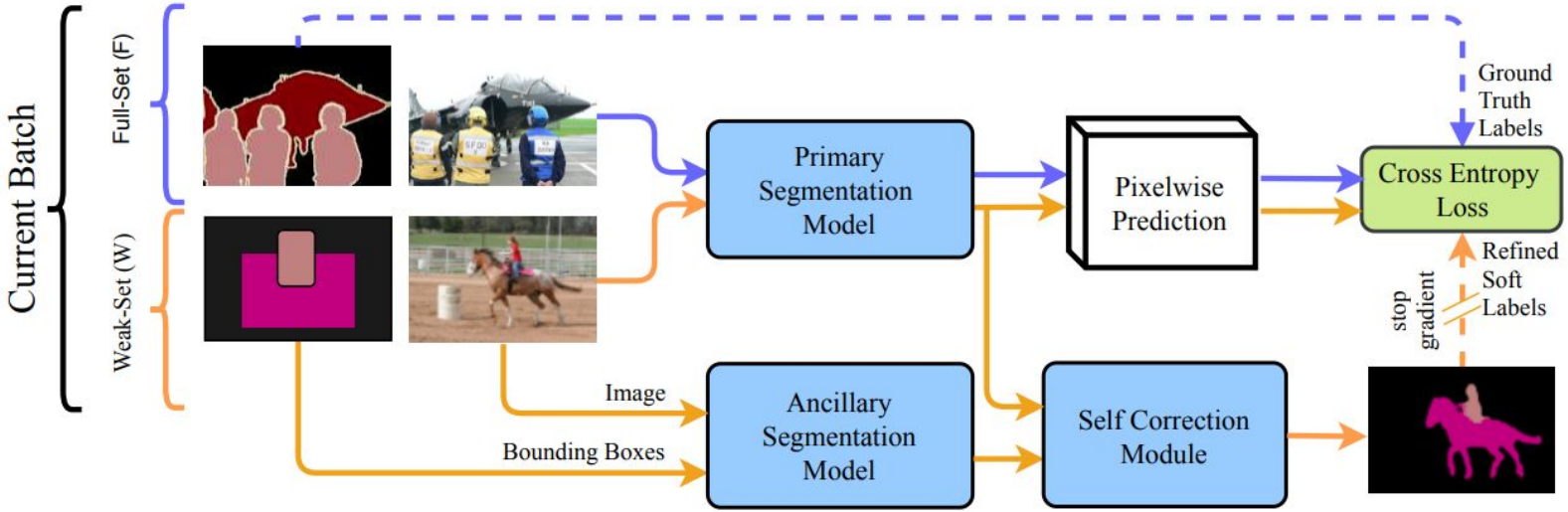


Self-Correction

- We may think in one more DNN that takes the current predictions from the ongoing primary network and from the ancillary network and improve it
- Adel suggestion: feed the the full set also to the ancillary and use its ground truth to guide the correction module (nice)

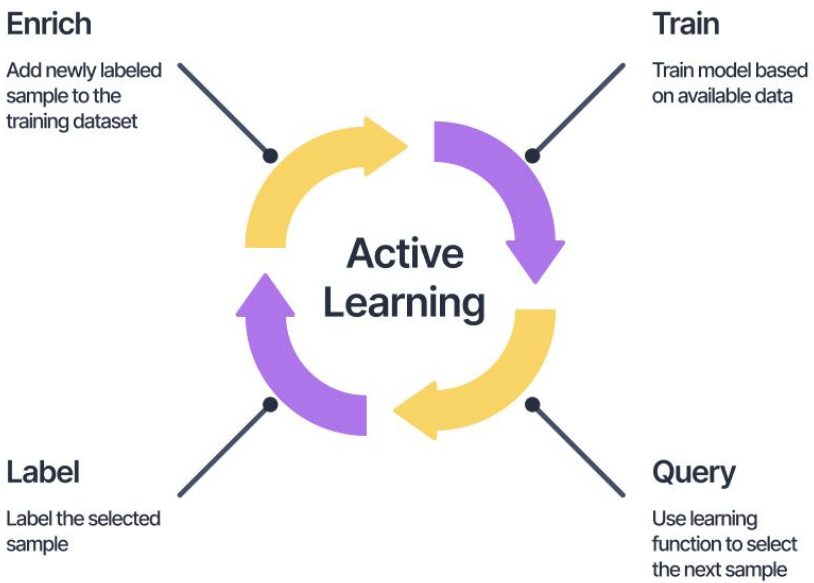
Semi-supervised Labeling

- Refer to my CVPR 20 paper (slides, video)
  - Mostafa S Ibrahim, et al, Semi-Supervised Semantic Image Segmentation with Self-correcting Networks
- Good resume implementation project and experience in Computer Vision



Active Learning Labeling

- **Goal**: Minimize the number of labeled examples ⇒ less cost
- Active learning involves **iteratively** labeling the data instances that the model finds **most confusing**
- Annotators only annotate the most **informative** subset
  - Hence overall **avoid annotation** examples that won't help the model
- Participated in this paper: Active learning for structured prediction from partially labeled data



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"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."