

# iFS-RCNN: An Incremental Few-shot Instance Segmentation

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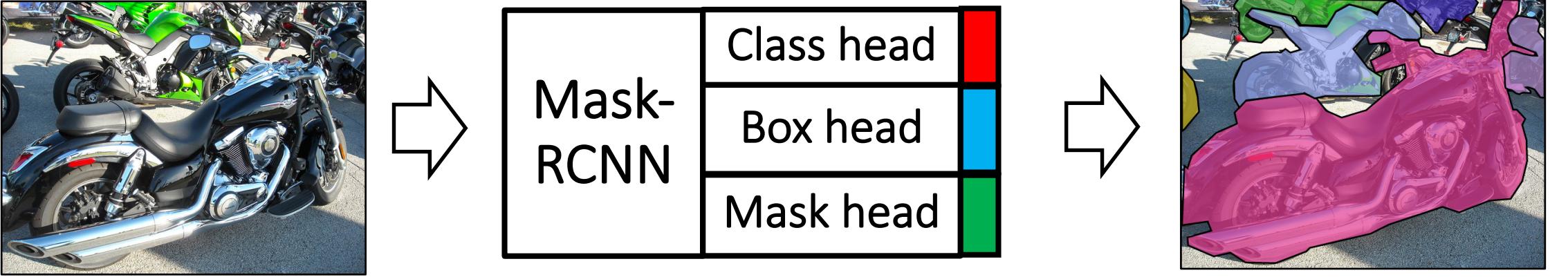


## Introduction

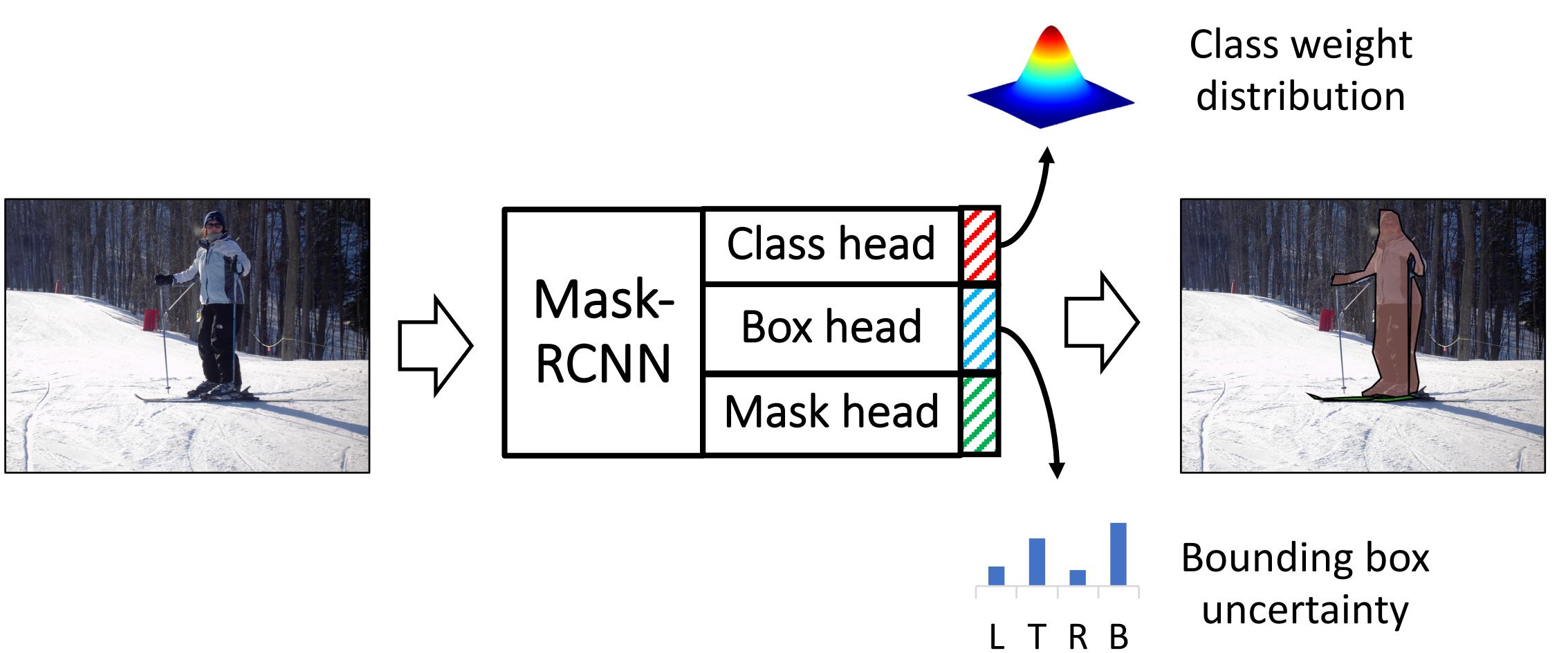
- Problem statement:** In training, a large training set of base classes (i.e., images + instance mask annotations) is provided. In testing, given a few annotated examples of new classes **without the access to the training examples** of the base classes, our goal is to segment both new and base classes
- Key challenges:** how to address a paucity of data for new classes, and how to train on the new classes such that the base classes are not “forgotten”
- Applications** where access to the old training data becomes unavailable due to, e.g., privacy and security issues or new legal regulations of data access; or limited time budgets prohibit retraining on both base and new classes.

## Training

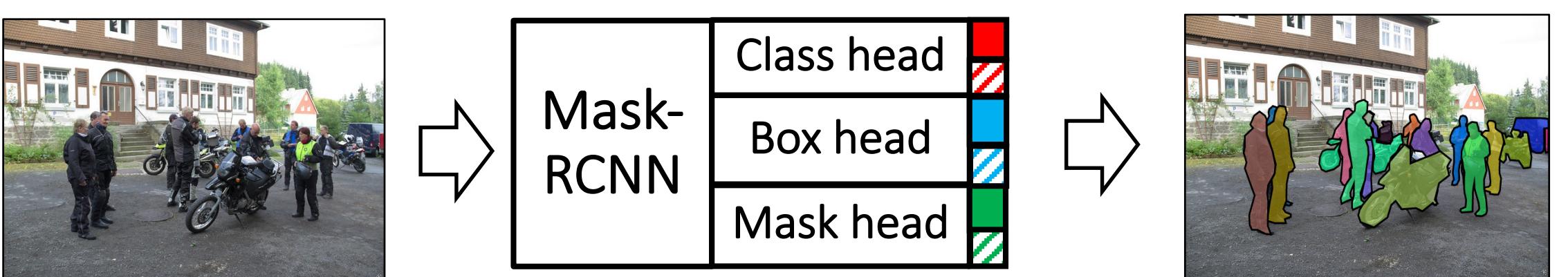
### Pre-training on the base classes



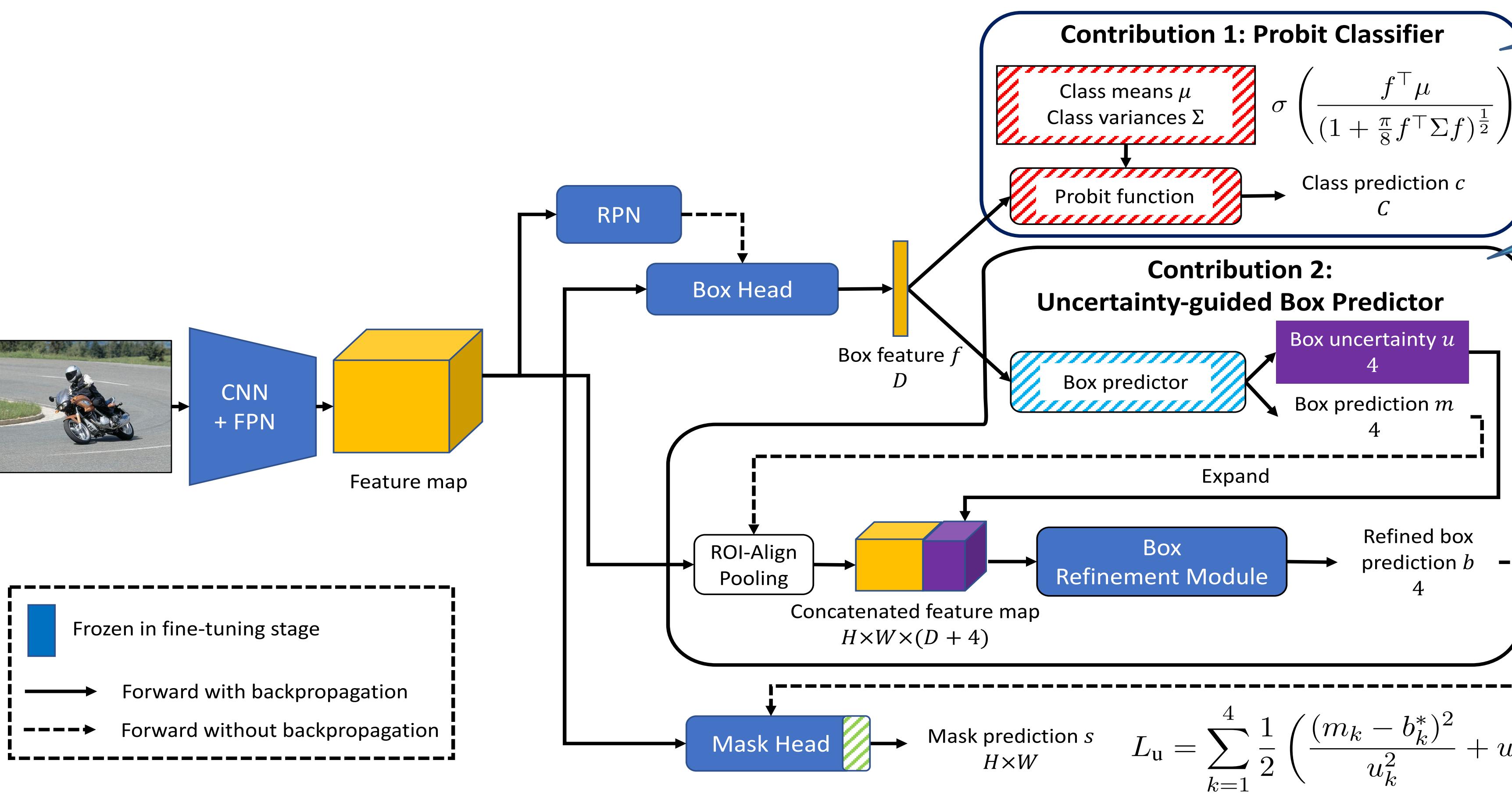
### Fine-tuning on the new classes



### Testing on the base and new classes



## Our Approach



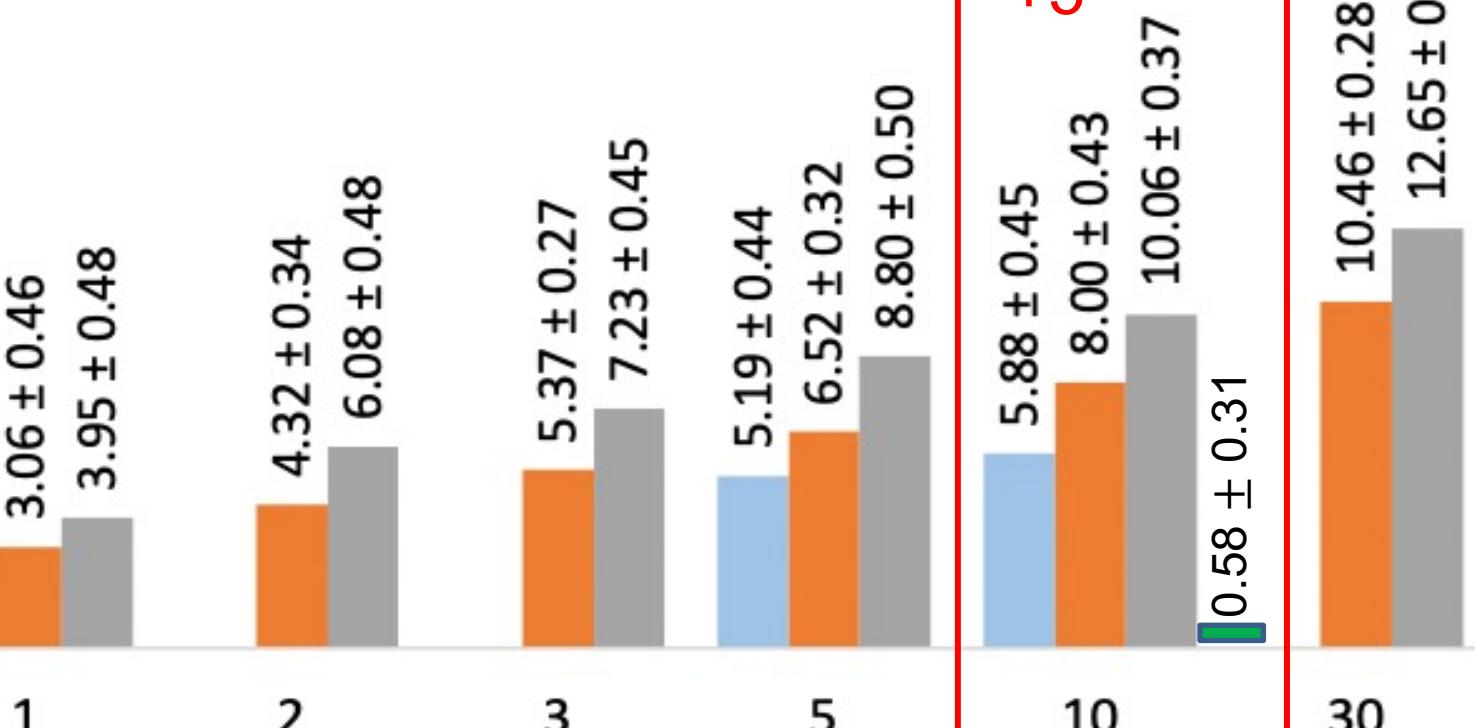
## Quantitative Results

Table 1. Ablation Study with FSIS

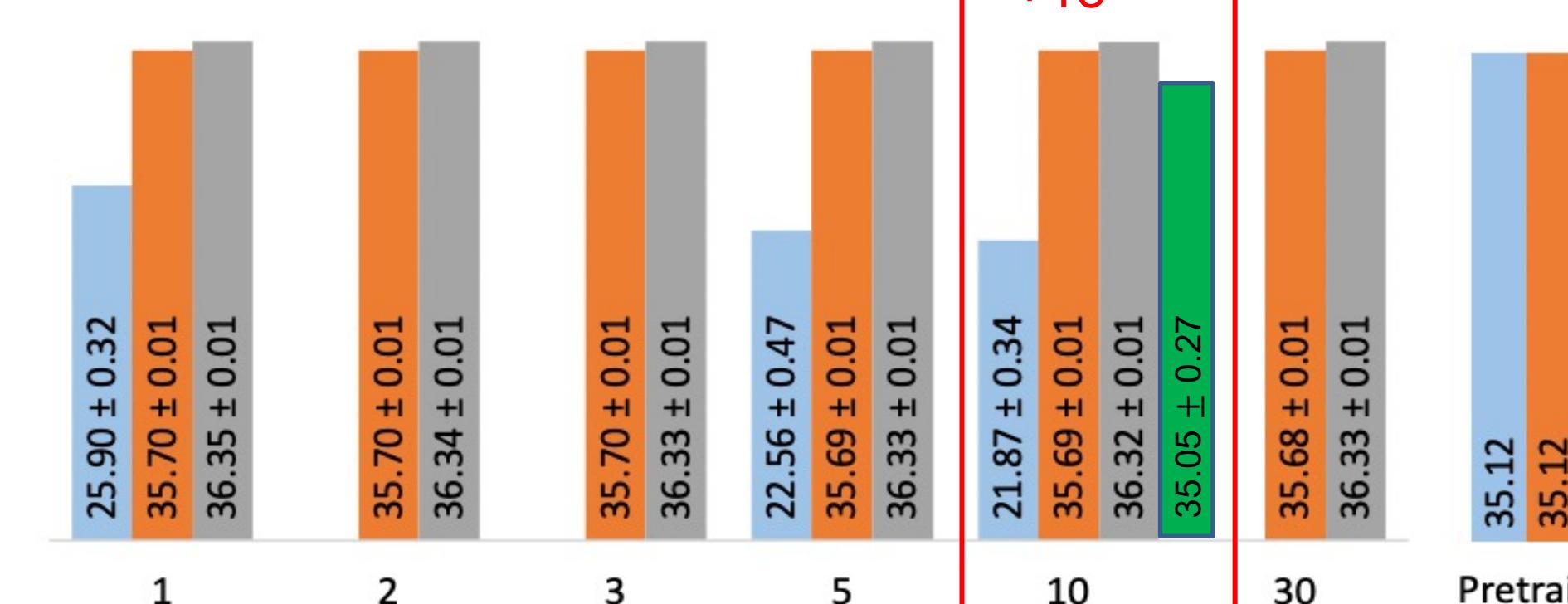
	Contrib. 1	Contrib. 2	1	2	3	5	10	30
Mask-RCNN	X	X	3.71	5.24	5.29	7.66	8.46	11.09
Mask+Sigmoid	X	X	3.92	4.63	5.63	7.15	7.67	10.94
	✓	X	5.15	6.03	7.67	9.34	9.52	12.07
	X	✓	4.84	5.88	7.00	8.62	9.22	11.98
iFS-RCNN	✓	✓	<b>5.54</b>	<b>6.33</b>	<b>7.80</b>	<b>9.41</b>	<b>10.23</b>	<b>13.08</b>

Figure 3. Comparison to SOTA with iFSIS

New classes



Base classes



Probit classifier based on Bayesian Learning to learn distribution of weights instead of a point estimate

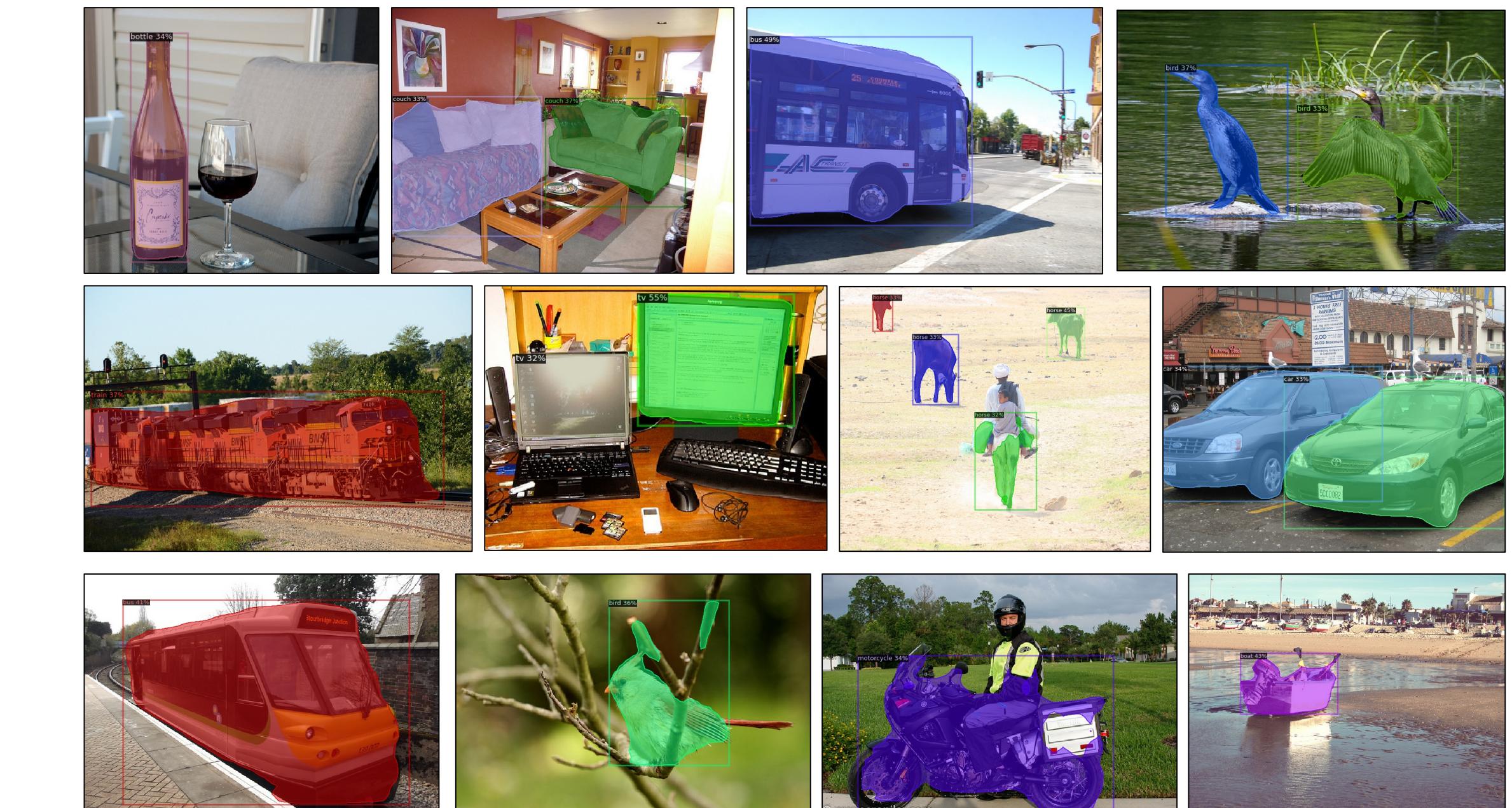
Uncertainty-guided box predictor estimates the uncertainty of predicting object bounding box to regularize the training with a few examples and refine the initial box prediction

## Qualitative Results

Figure 1. Bounding-box refinement. Left: initial, Right: refined



Figure 2. Qualitative results on COCO



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