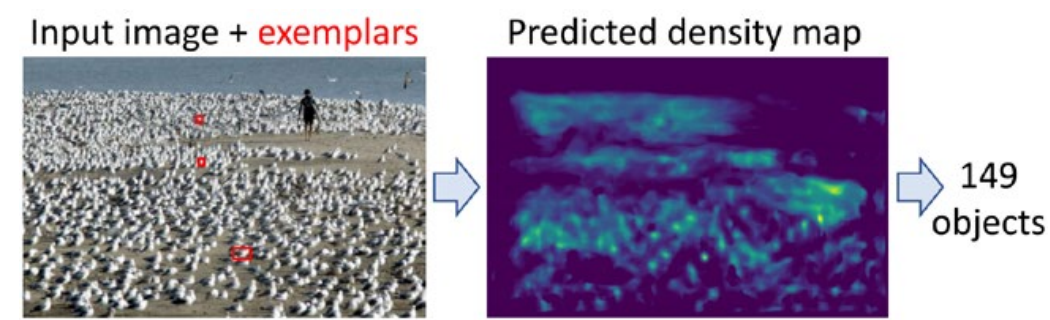


## Introduction

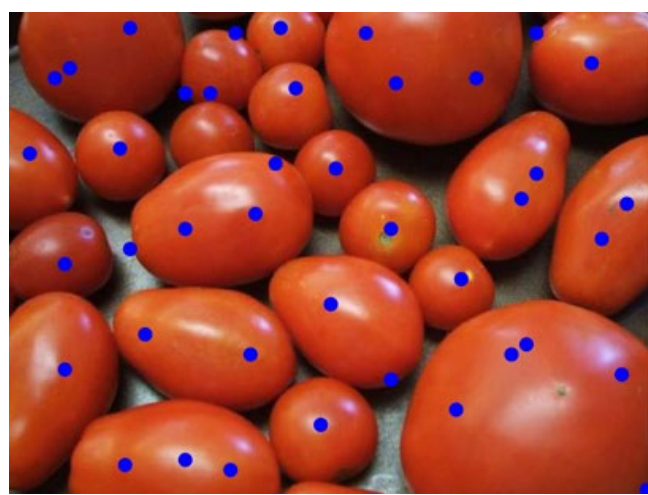
Class-agnostic counting count the number of objects with user-specified exemplars. This is crucial for applications like crowd control in public security and car counting in traffic management.



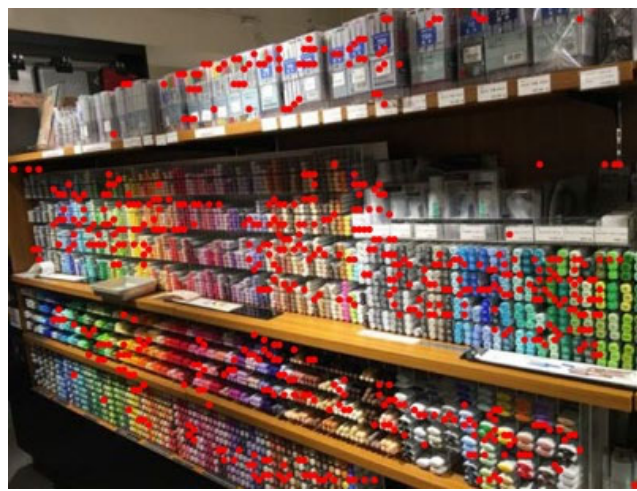
Applications of class-agnostic counting.

Class-agnostic counting count based on the input image and user-specified exemplars.

Motivation: Class-agnostic methods often err due to variations in object size, shape, and color, as well as high density and occlusion. To address this, we propose a framework that integrates human feedback to correct these errors.



Shape Variation



Large Density

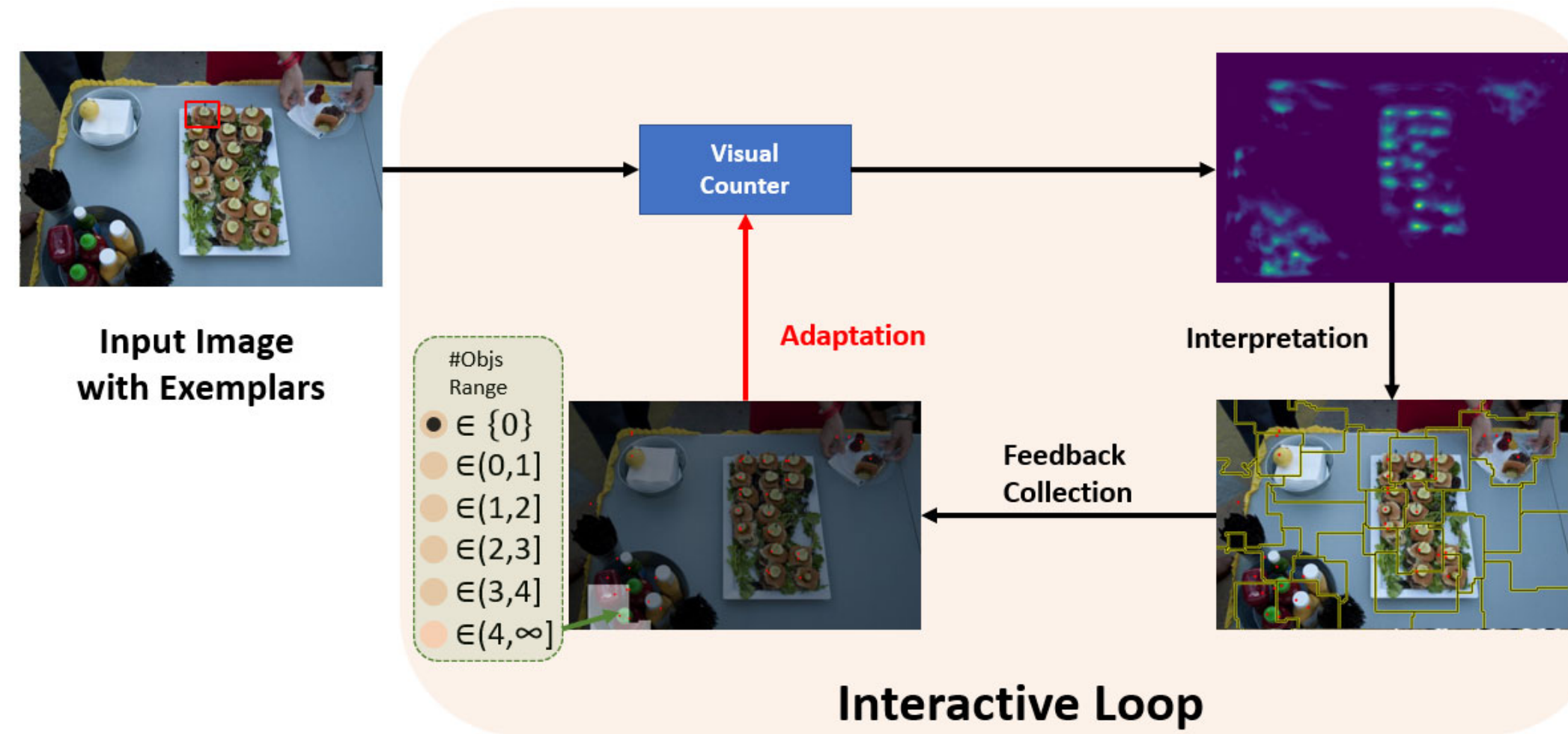


Occlusion

Main Contributions:

- Interpretation: interpret the predicted density map into an intuitive result.
- Feedback collection: A feedback collection scheme that requires minimal user effort.
- Adaptation: An effective adaptation approach that incorporates the user's feedback to improve the visual counter.

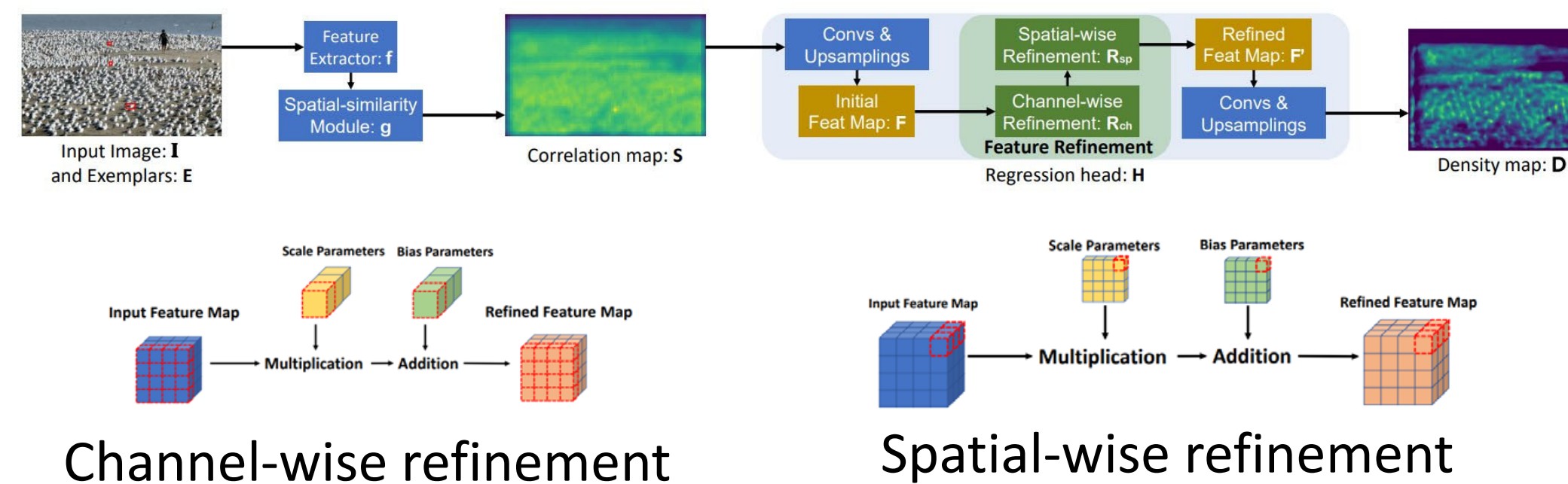
## Method Details



- Interpretation:** IPSE density map segmentation by iteratively select pick & expand to minimize:

$$h(R) = \frac{|R_s - \lceil R_s - \frac{1}{2} \rceil|}{\max(1, \lceil R_s - \frac{1}{2} \rceil)} + \frac{\max(0, T_l - R_a)}{T_l} + \lceil \max(0, R_s - C) \rceil$$

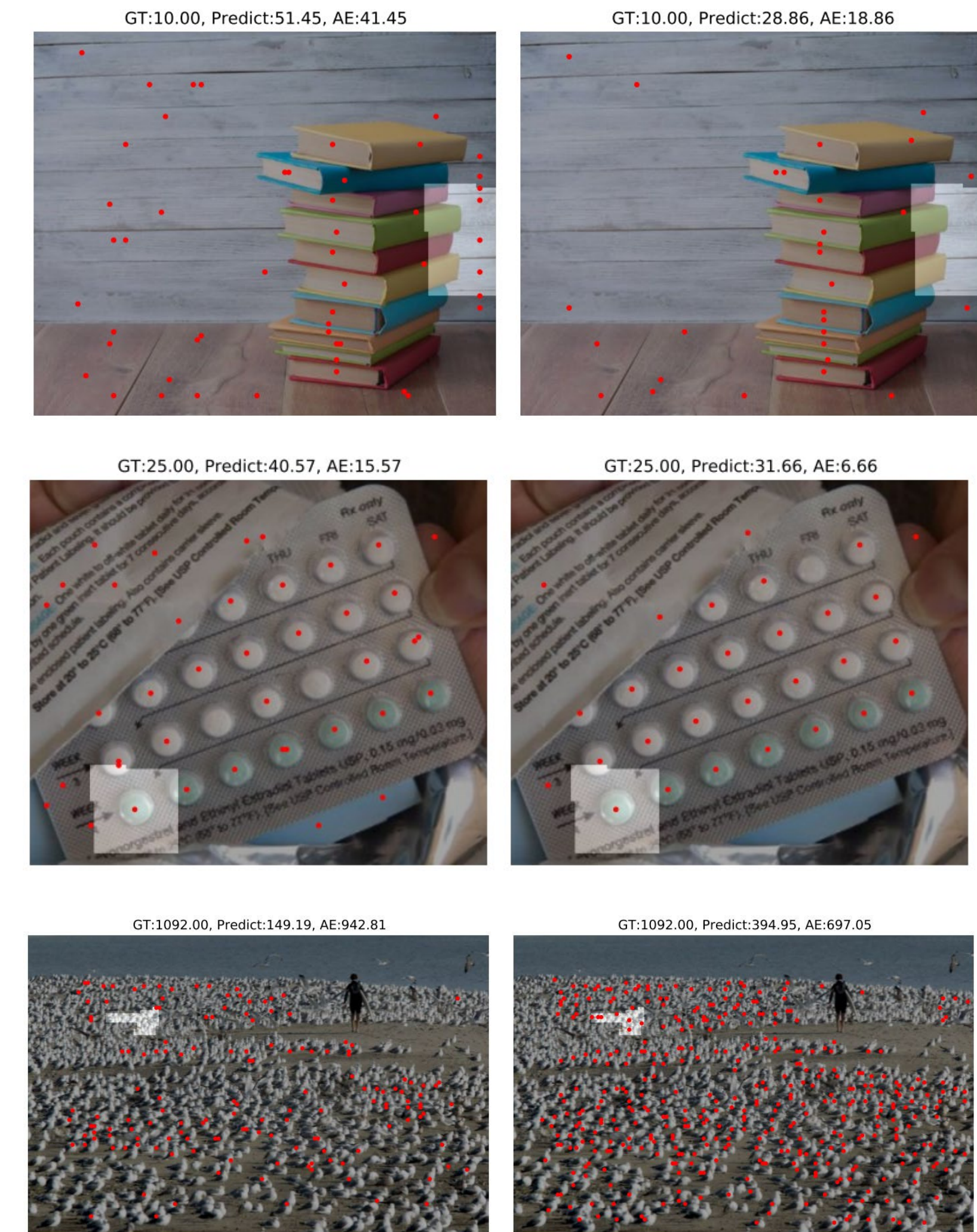
- Feedback collection:** User provide feedback by select a region then given the range of #Objects in the region.
- Adaptation:** We only update the parameters in feature refinement module. We also adjust learning rate and adaptation steps with the confidence in feedback.



Adaptation Loss:  $\mathcal{L}(\Omega) = \mathcal{L}_L(\Omega) + \mathcal{L}_G(\Omega) + \eta(\|\theta^{scale} - 1\| + \|\theta^{bias}\|)$

## Result

Qualitive result: the left is before interaction. The highlighted region is the selected region.



	FSC-147 Test Set		FSCD-LVIS Test Set	
	MAE	RMSE	MAE	RMSE
FamNet	22.08	99.54	41.26	57.87
+5 Exemplar	21.52↓2%	98.10↓1%	40.36↓2%	57.85↓0%
+5 Our feedback	11.75↓47%	75.37↓24%	21.18↓49%	34.13↓41%
SAFECount	13.56	91.31	15.45	28.73
+5 Exemplar	13.01↓4%	99.42↑3%	14.83↓4%	29.01↓2%
+5 Our feedback	9.42↓31%	80.69↓12%	10.45↓32%	18.42↓36%
BMNet+	14.62	91.83	17.49	29.76
+5 Exemplar	14.40↓2%	91.56↓0%	17.27↓1%	29.60↓1%
+5 Our feedback	9.51↓35%	84.66↓8%	13.43↓23%	22.39↓25%

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