



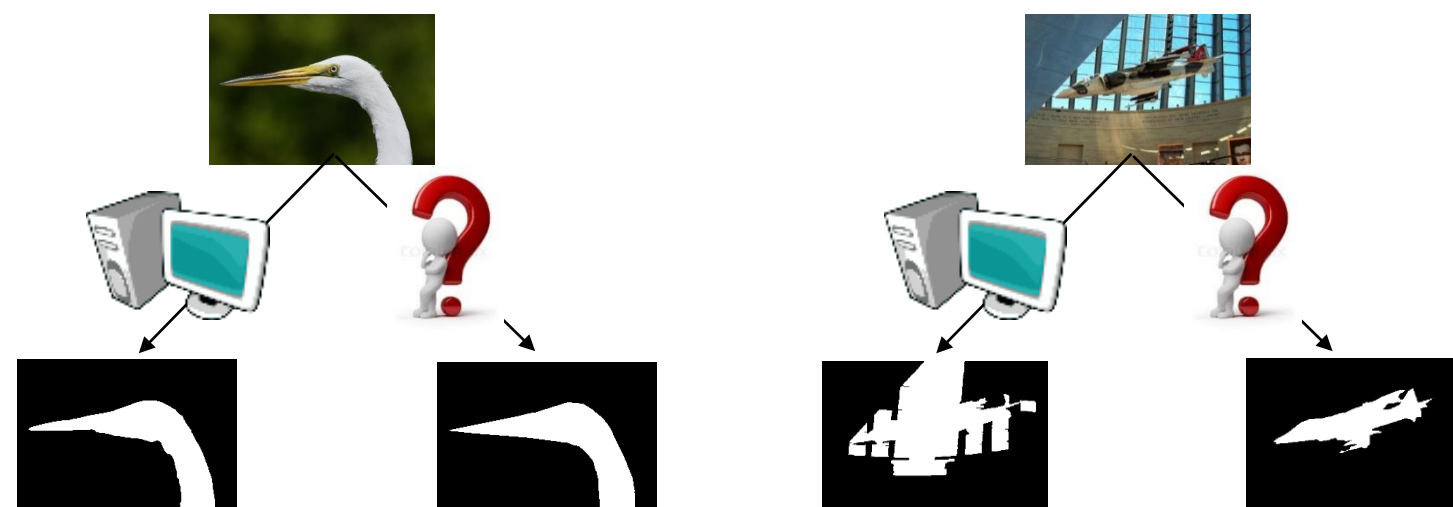
Pull the Plug? Predicting If Computers or Humans Should Segment Images

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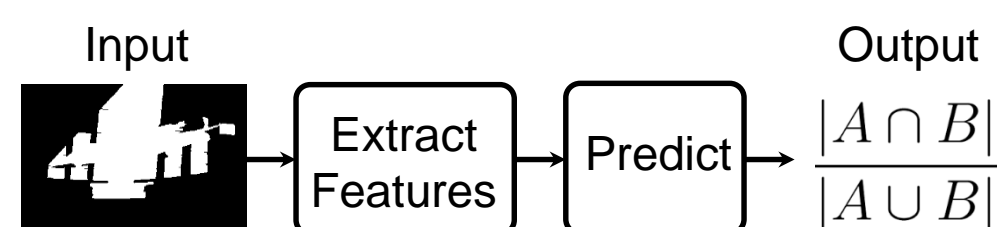
Foreground Object Segmentation



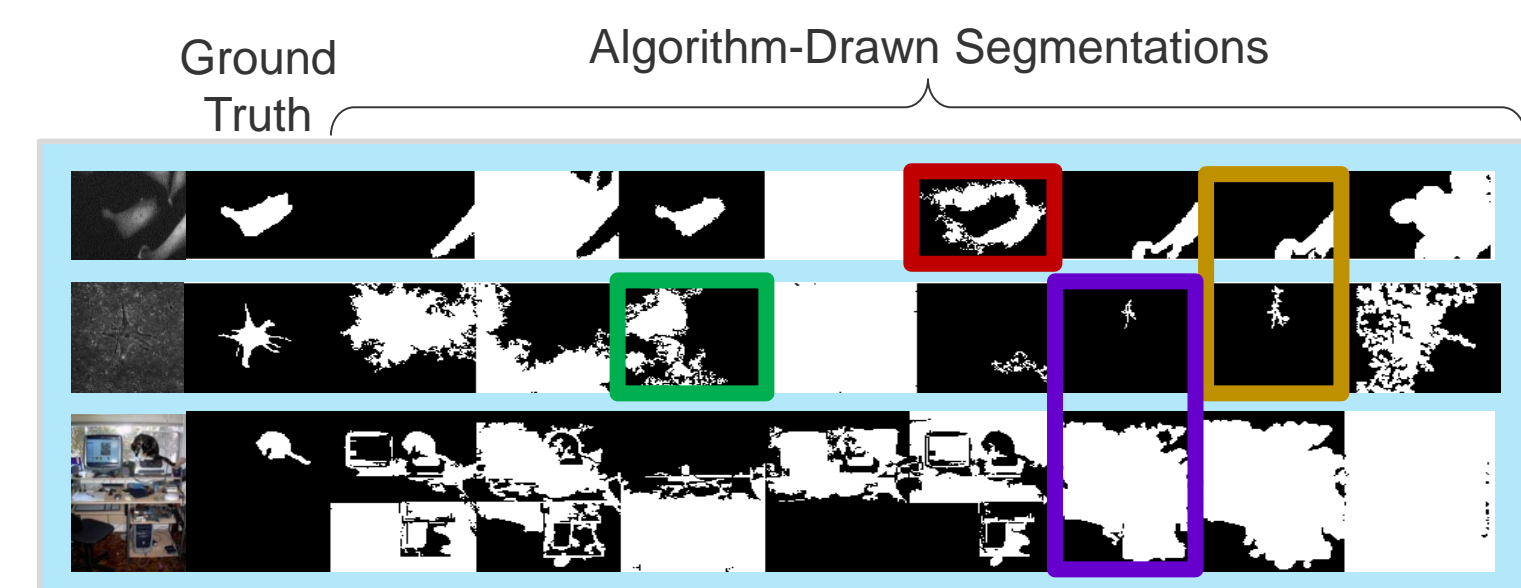
Previous Assumption: *always* or *never* involve humans.
Idea: predict if human or computer should segment image.

Predict Segmentation Quality

Linear Regression System: Predict similarity of algorithm-drawn segmentation to the unobserved ground truth.



Predictive Cues of Failures from 8 Algorithms:



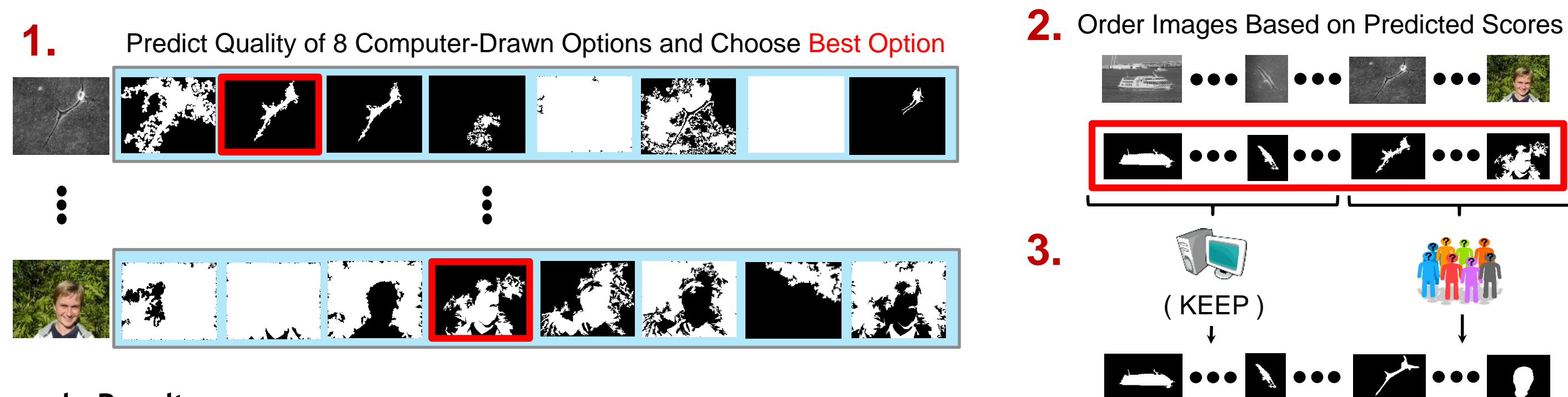
- Object **Boundary**, **Compactness**, & **Location**
- Image **Coverage**

Cross-Dataset Evaluation:	Weizmann		IIS		BU-BIL	
	CC	MAE	CC	MAE	CC	MAE
Ours:	0.64	0.24	0.68	0.22	0.61	0.31
CPMC [CVPR 2010]:	0.61	0.32	0.67	0.31	0.36	0.33
AlexNet features [NIPS 2012]:	-0.1	26.7	-0.01	45	-0.01	3.22

Top performance on everyday & biomedical images!

Task 1: Which Algorithm (or Human) Should Initialize Segmentation Tool?

Given a batch of images, create initial coarse segmentations that segmentation tools refine.



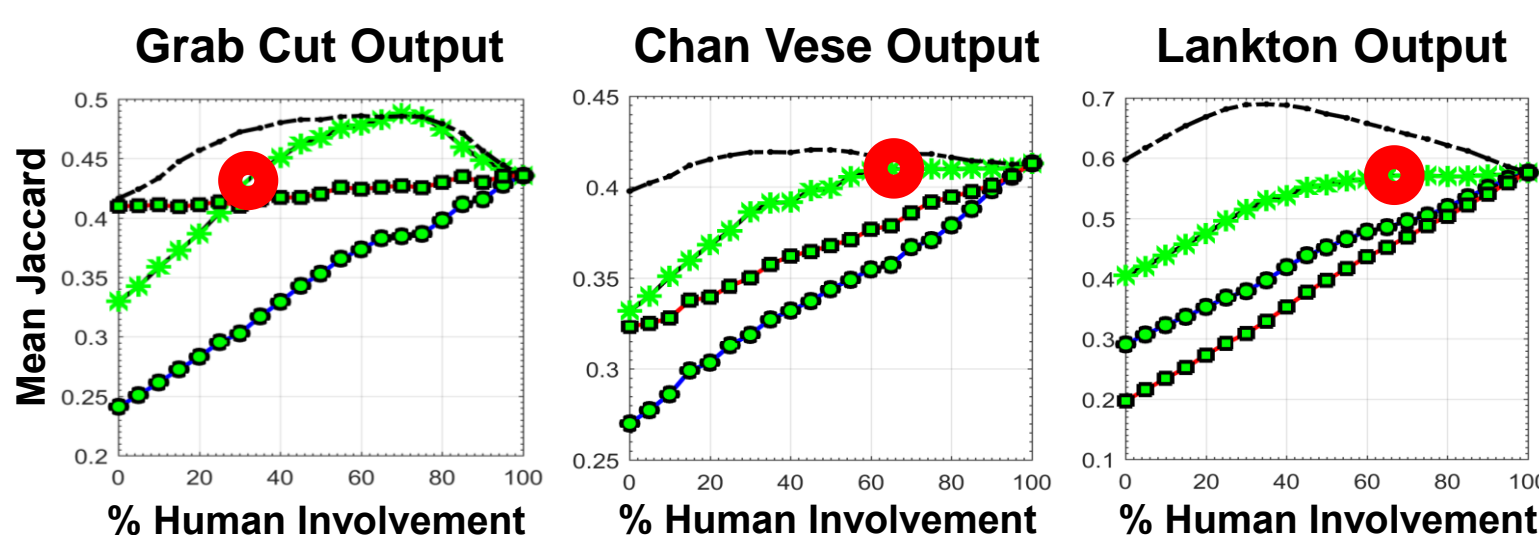
Example Results:



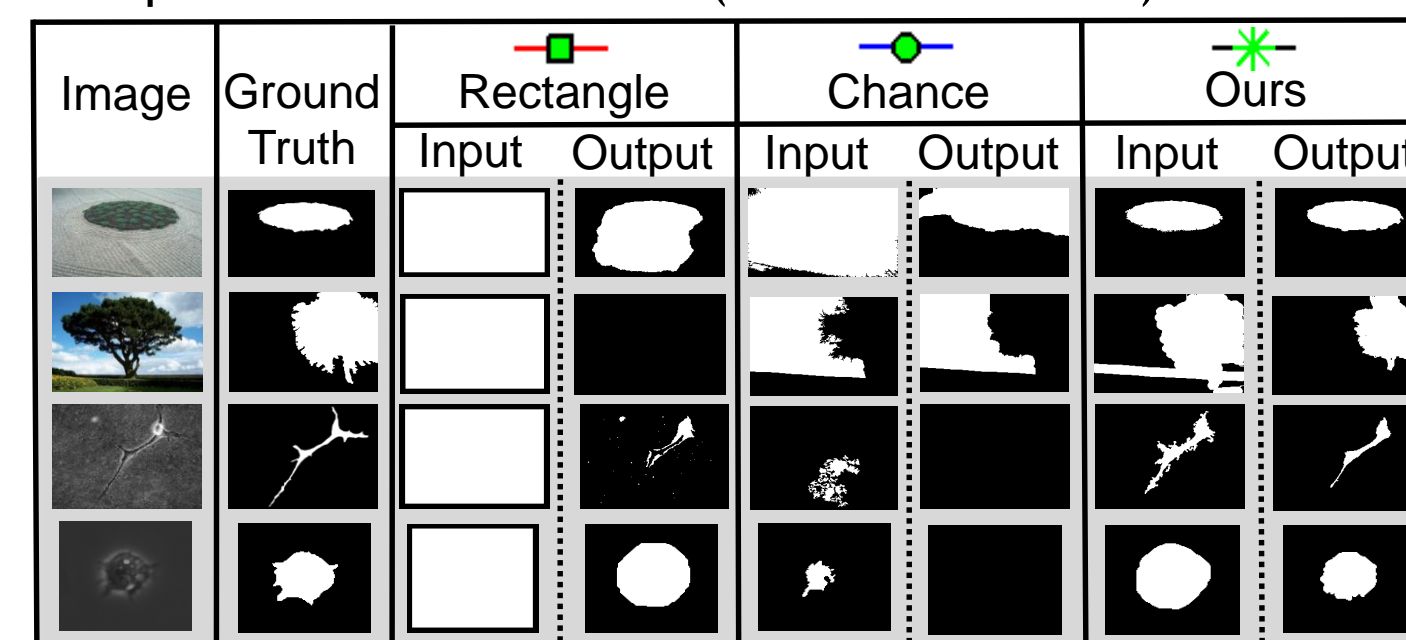
Novel Initialization System: Predicts which algorithm is best-suited for a given image and when to enlist human effort

Task 1: System Evaluation

Initialization for Three Segmentation Tools:



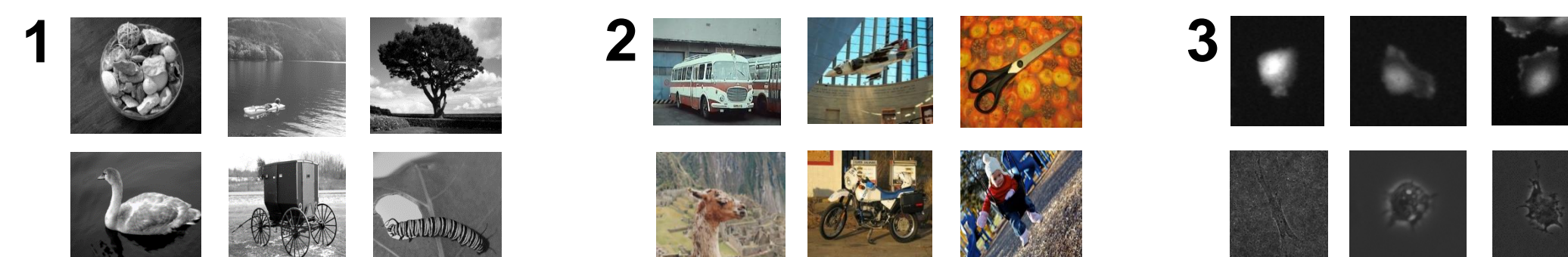
Comparison with Baselines (Grab Cut Results):



On average, for three tools, eliminates human involvement for 44% of images with no quality loss!

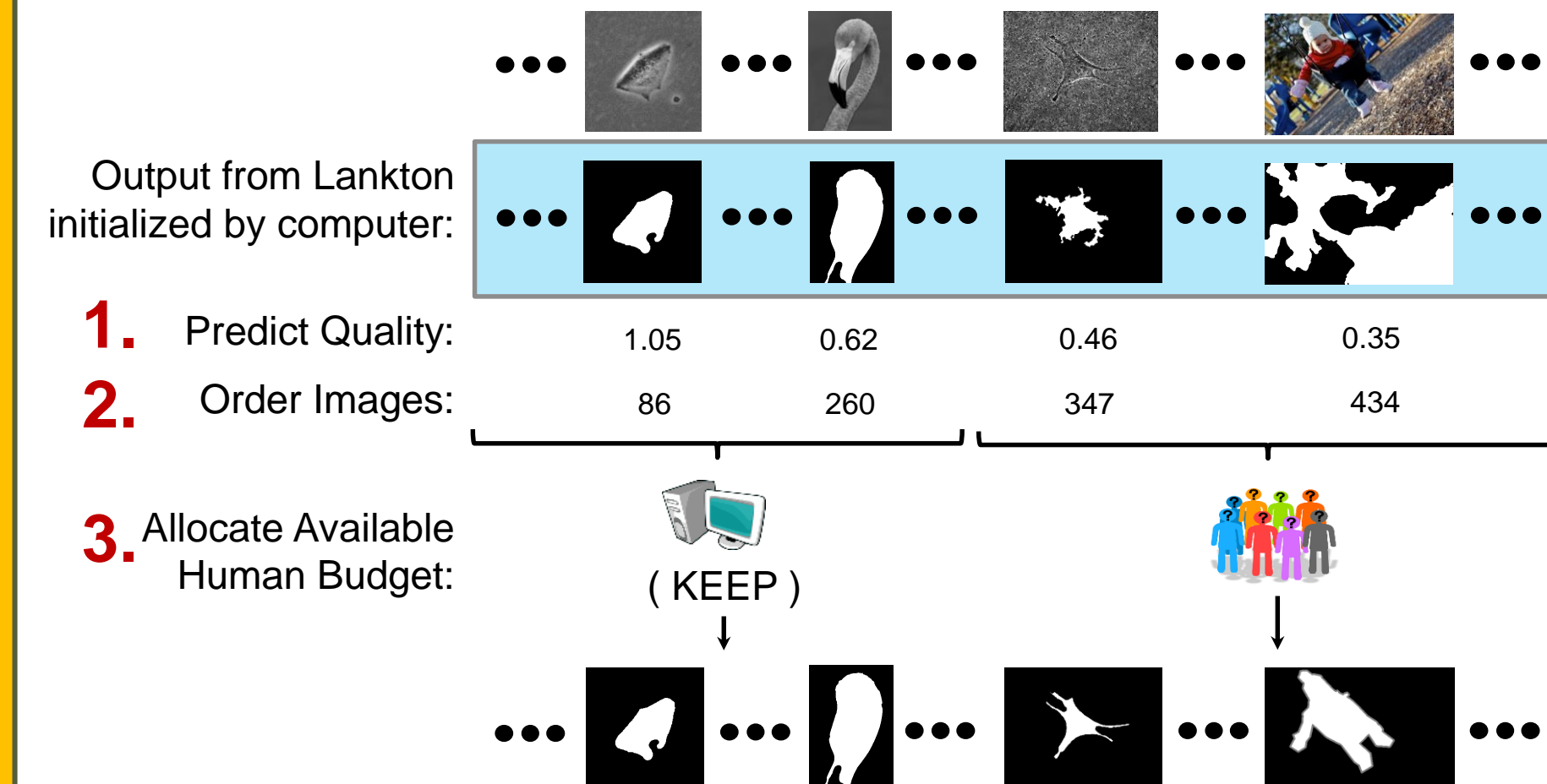
Datasets

1. Weizmann (100 Images)
2. IIS (151 Images)
3. BU-BIL (271 Images)



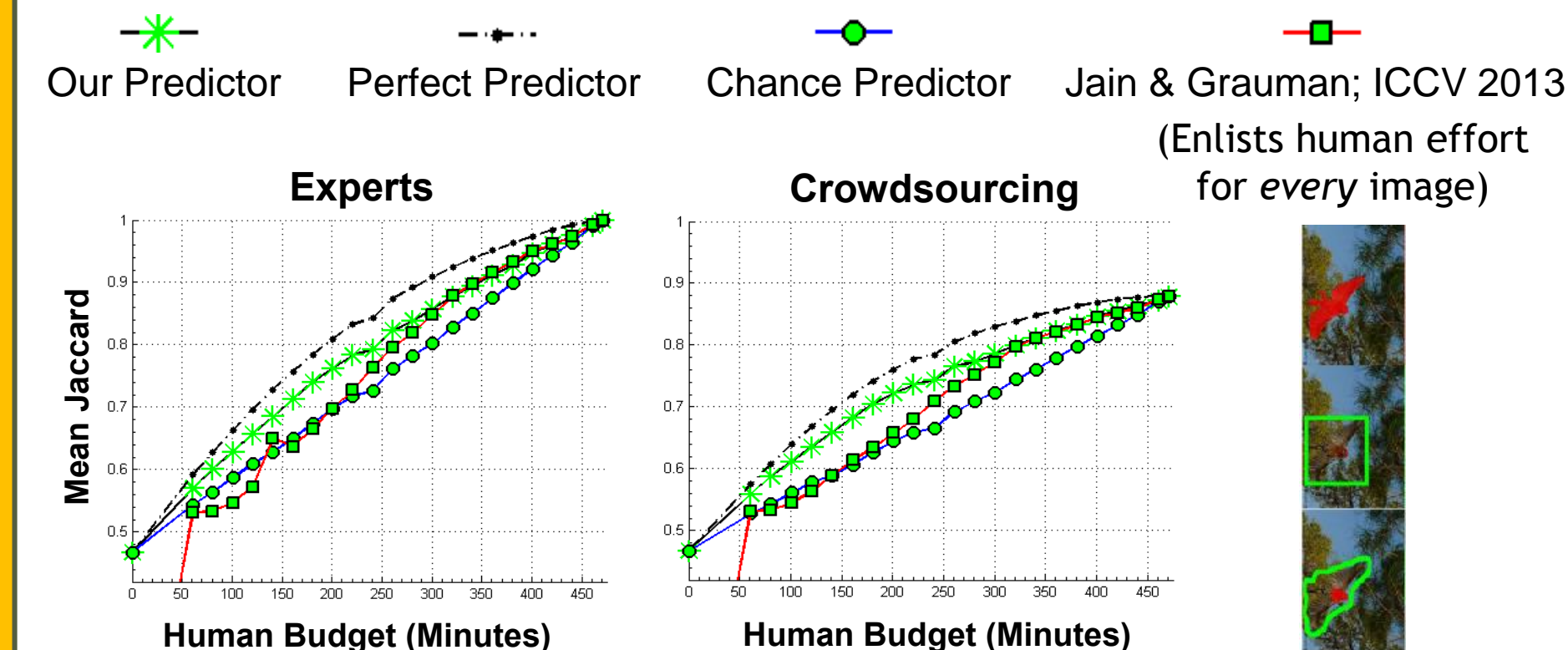
Task 2: Where is Human Effort Needed Most?

Given a batch of images, create high quality, final segmentations.



Interactive Segmentation: Predicts which images to enlist human effort

Task 2: System Evaluation



Our system typically achieves state-of-art performance (J & G) while saving up to 60 minutes of crowd effort!

Website & Code

<http://vision.cs.utexas.edu/HybridAlgorithmCrowdSystems/PullThePlug>