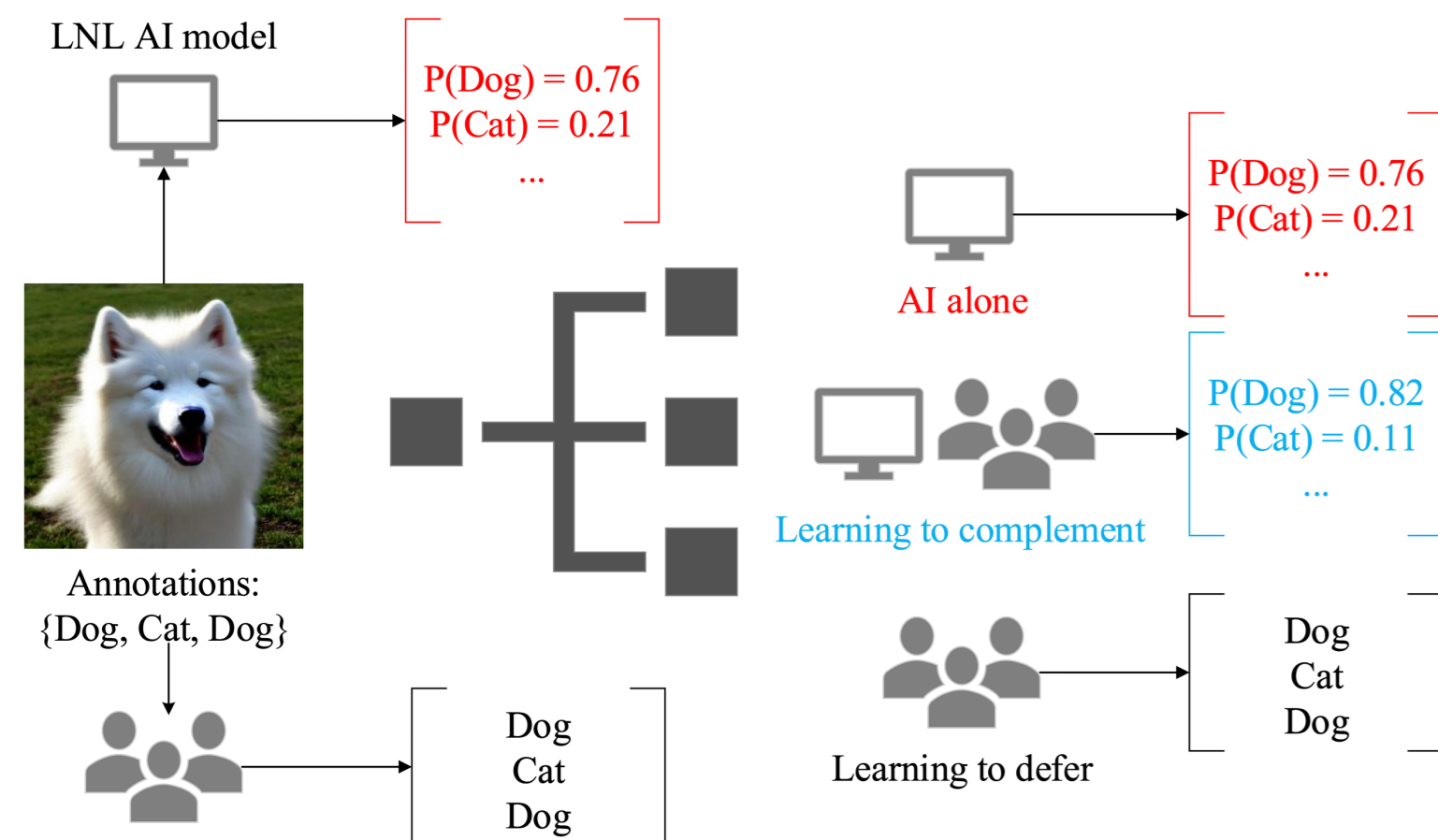


Motivation

Human-AI Collaboration in Classification (**HAI-CC**) has three options:

- ❖ AI autonomously classifies
- ❖ AI collaborates with users
- ❖ AI defers to users

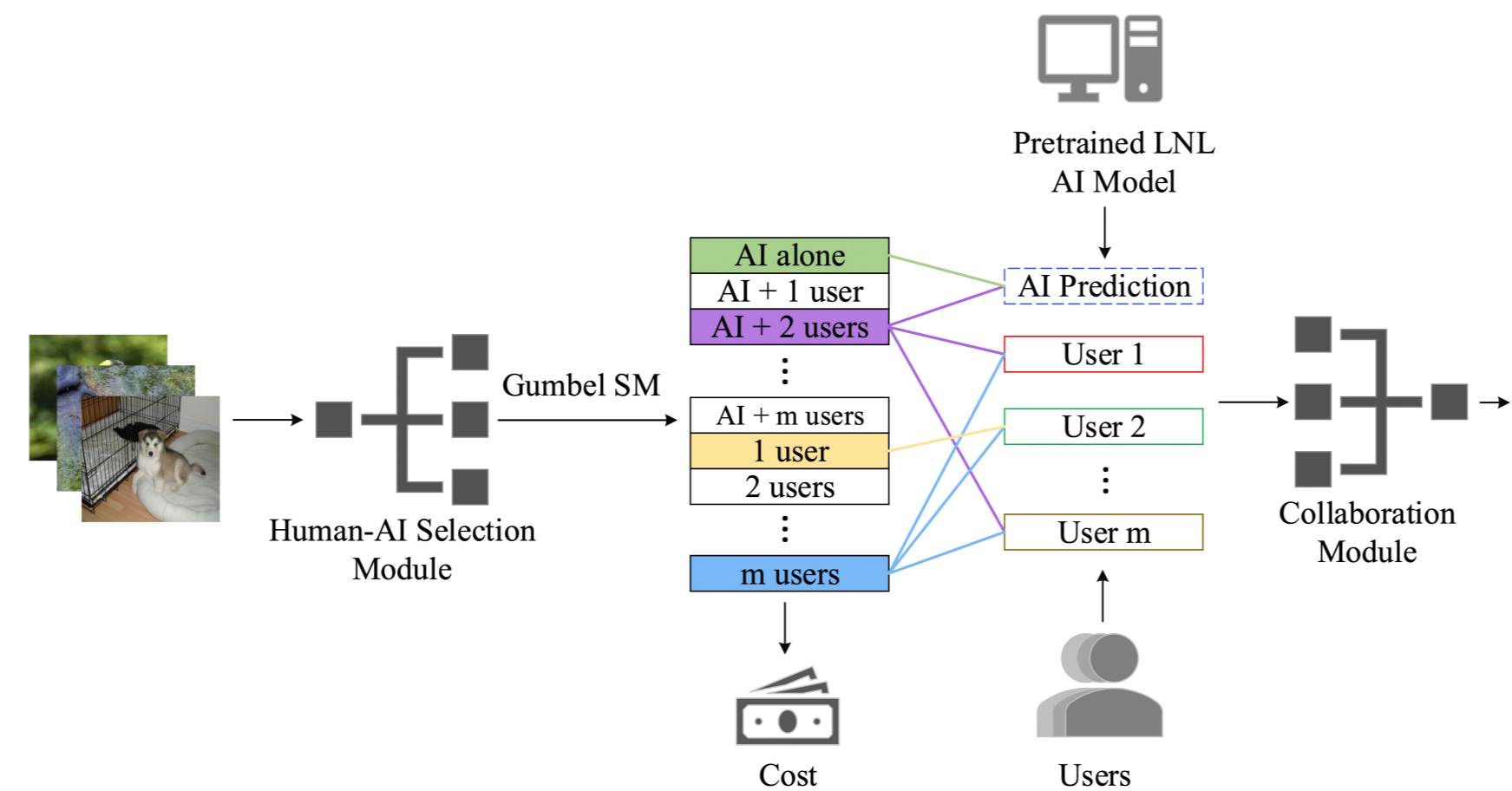
These options have been studied isolation rather than as components of a unified system.



Methodology

LECODU is designed to make three decisions:

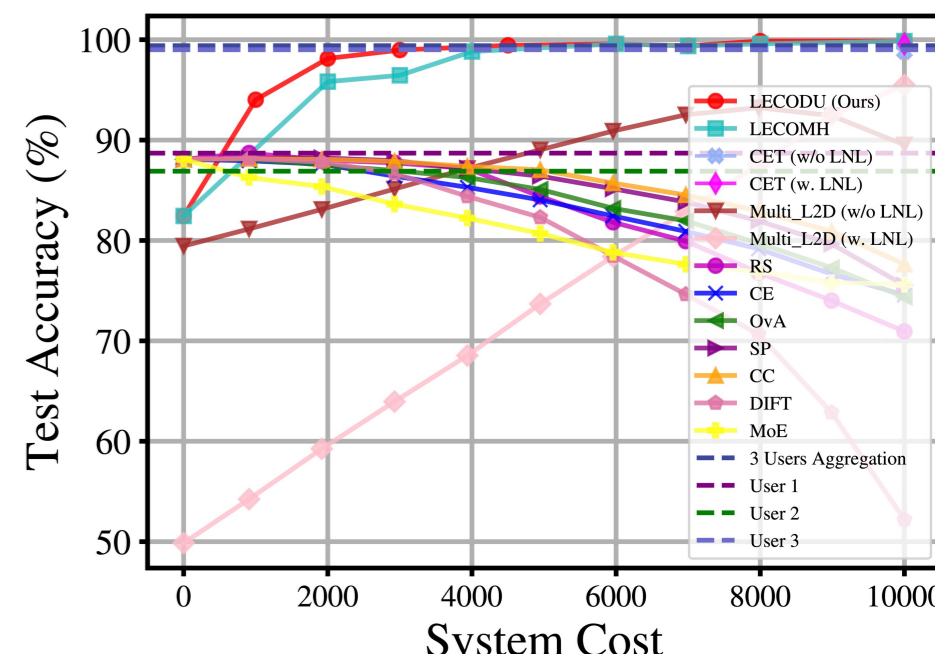
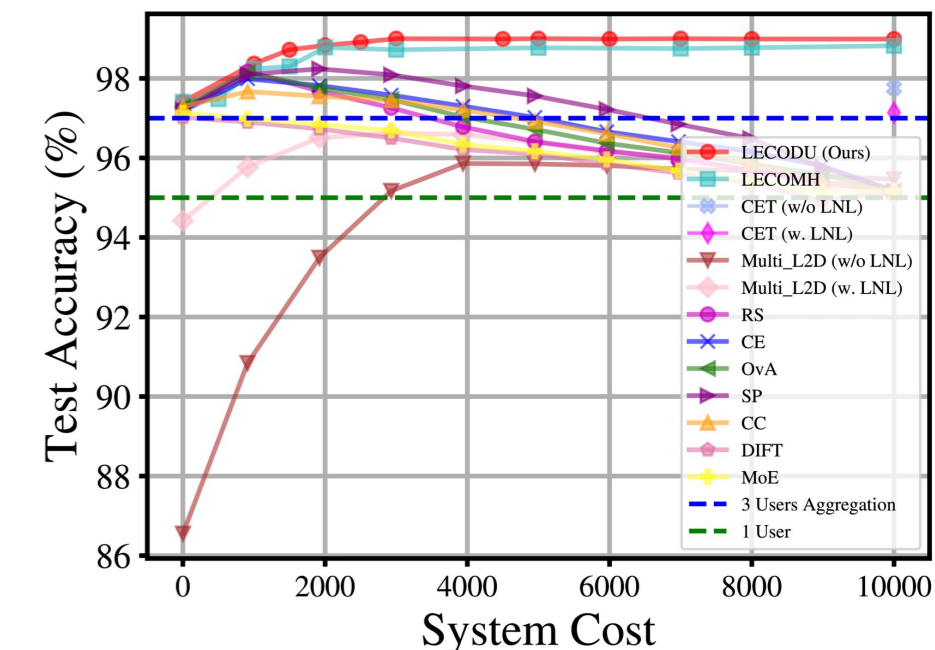
- ❖ When to collaborate with experts
- ❖ When to defer to experts
- ❖ How many experts should be engaged in the decision process



Experiments

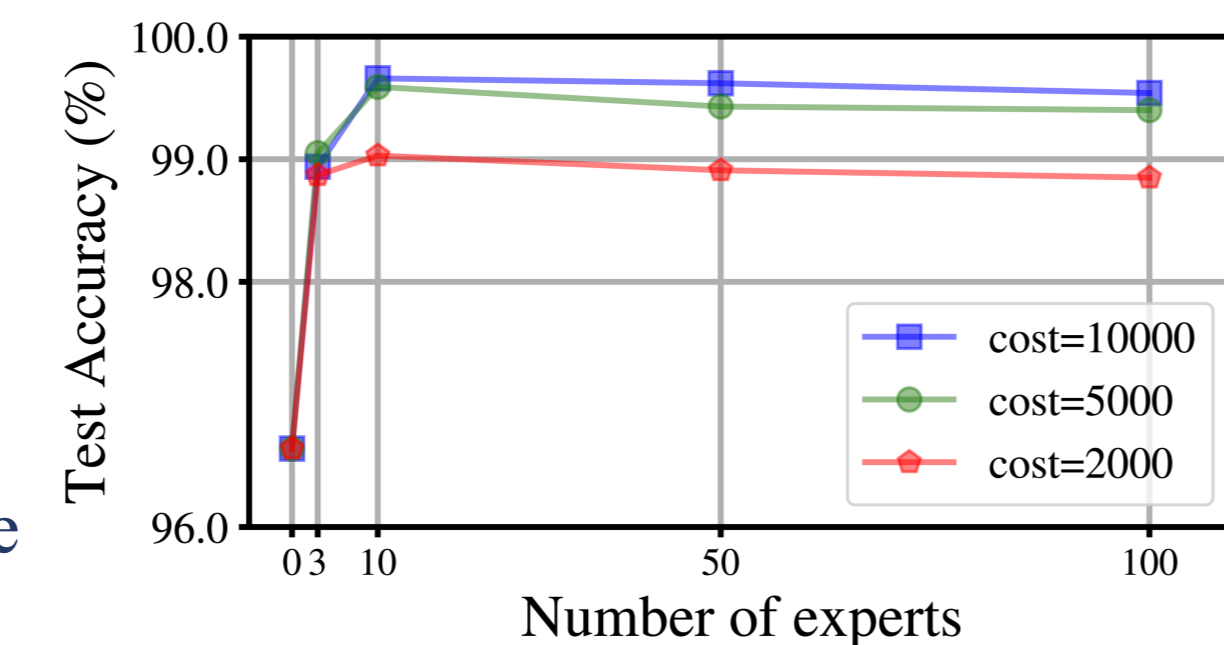
Table & Curve: Test accuracy (%) vs. collaboration cost

	Cost	Methods										
		RS	MoE	LCE	OvA	SP	CC	DIFT	CET	Multi	L2D	LECOMH
CIFAR-10H	2000	97.68	96.84	97.82	97.76	98.24	97.55	96.82	-	96.51	98.78	98.83
	4000	96.78	96.34	97.33	97.03	97.81	97.21	96.38	-	96.59	98.72	99.00
	6000	96.18	95.96	96.90	96.37	97.22	96.78	96.11	-	96.14	98.77	99.00
	10000	95.17	95.17	95.17	95.17	95.17	95.17	95.17	97.76	95.46	98.82	98.99
IDN20	2000	95.85	90.10	95.83	96.06	97.53	95.43	92.56	-	95.08	98.25	98.87
	4000	91.66	87.10	91.82	91.83	97.13	91.47	88.55	-	91.59	98.81	99.09
	6000	87.79	84.36	87.54	87.77	96.04	87.67	86.28	-	87.52	98.60	99.05
	10000	79.85	79.84	79.85	79.85	79.85	79.85	79.85	96.13	79.61	98.45	98.94
IDN30	2000	94.00	88.8	94.01	94.31	96.97	92.92	90.45	-	92.62	96.96	97.42
	4000	88.16	83.31	88.13	88.16	95.26	86.94	84.79	-	87.15	96.93	97.92
	6000	81.95	78.20	88.16	82.06	92.63	81.37	79.60	-	81.25	96.96	97.92
	10000	70.33	70.34	70.34	70.34	70.34	70.34	70.34	96.52	70.39	97.31	98.20
IDN40	2000	91.75	88.17	91.54	91.81	94.90	91.12	87.99	-	90.29	96.34	96.80
	4000	84.10	80.29	83.95	84.28	90.69	83.17	80.41	-	82.77	96.51	97.14
	6000	76.43	72.48	76.18	76.29	85.00	75.45	74.17	-	75.25	96.64	97.37
	10000	60.67	60.67	60.67	60.67	60.67	60.67	60.67	95.76	60.41	96.74	97.31
IDN50	2000	89.69	79.55	89.21	89.75	92.68	87.59	85.6	-	87.55	95.77	95.95
	4000	79.64	72.07	79.41	80.00	86.28	78.13	75.95	-	78.40	95.91	96.06
	6000	69.53	64.27	69.39	69.53	78.92	68.58	68.02	-	68.94	96.07	96.07
	10000	50.03	50.03	50.03	50.03	50.03	50.03	50.03	95.18	50.17	96.17	96.12
Chaoyang	2000	87.00	81.11	86.86	86.76	87.47	87.79	64.04	-	75.60	95.82	98.13
	4000	91.67	83.31	90.60	91.25	92.05	92.09	74.71	-	84.15	98.82	99.44
	6000	92.75	85.60	93.50	93.55	93.31	93.45	81.81	-	90.74	99.58	99.86
	10000	92.89	92.89	92.89	92.89	92.89	92.89	92.89	99.58	99.76	99.86	99.86

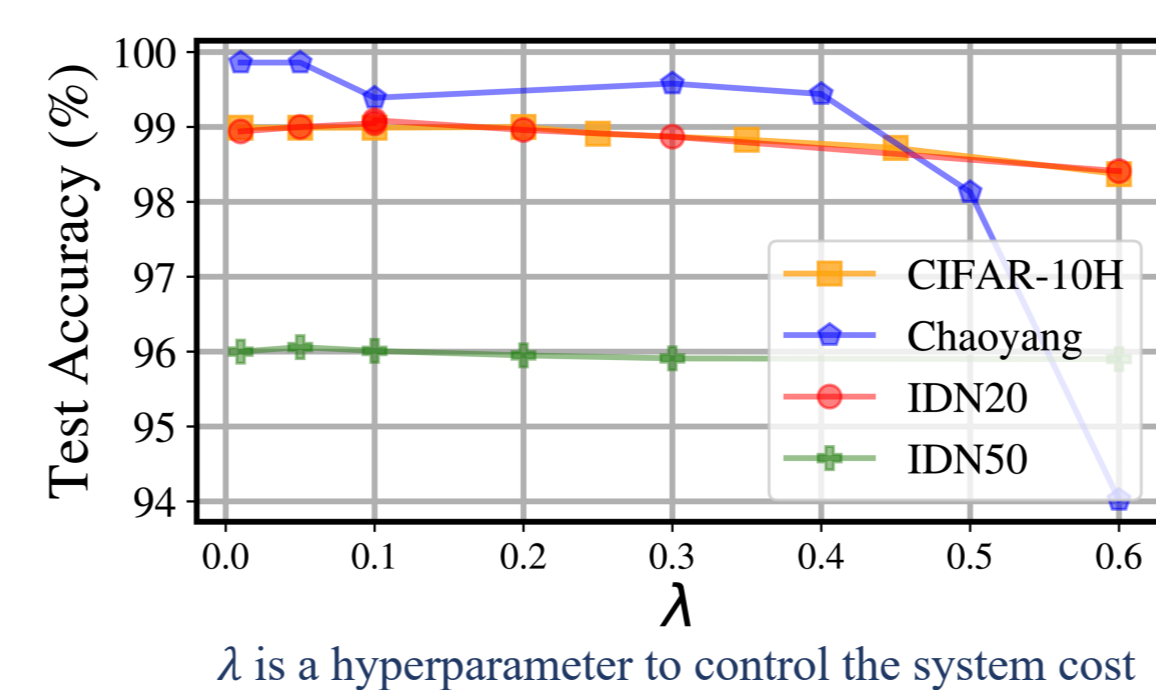


Ablation Studies

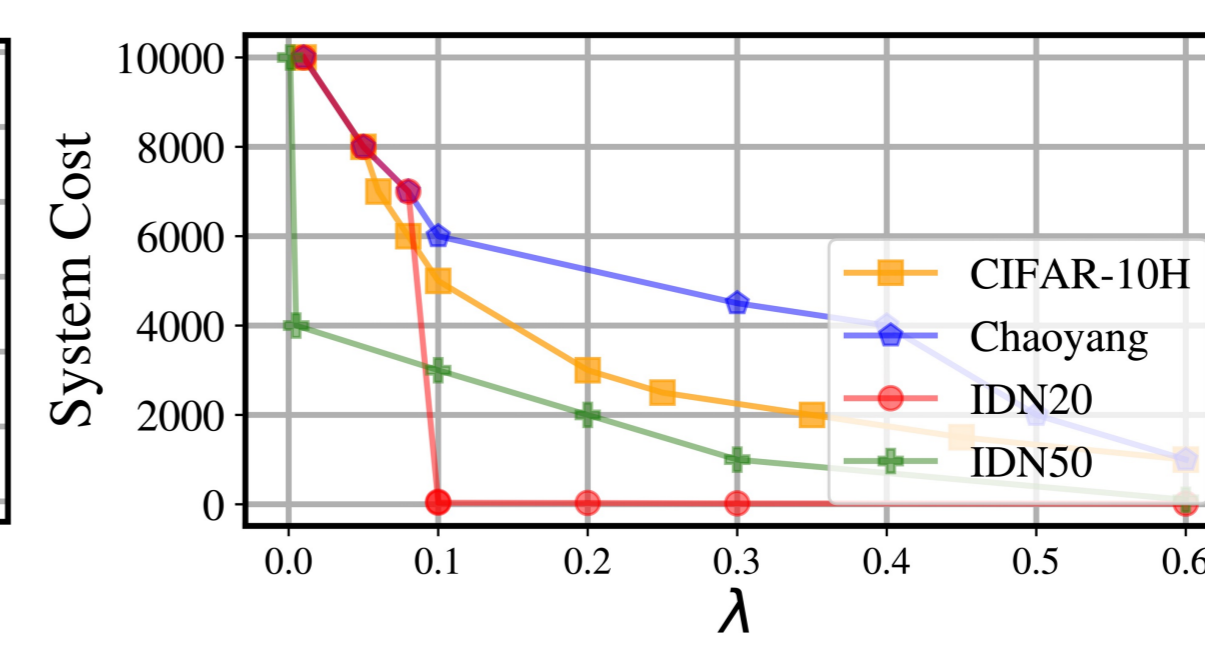
Curve: Test accuracy vs. number of experts



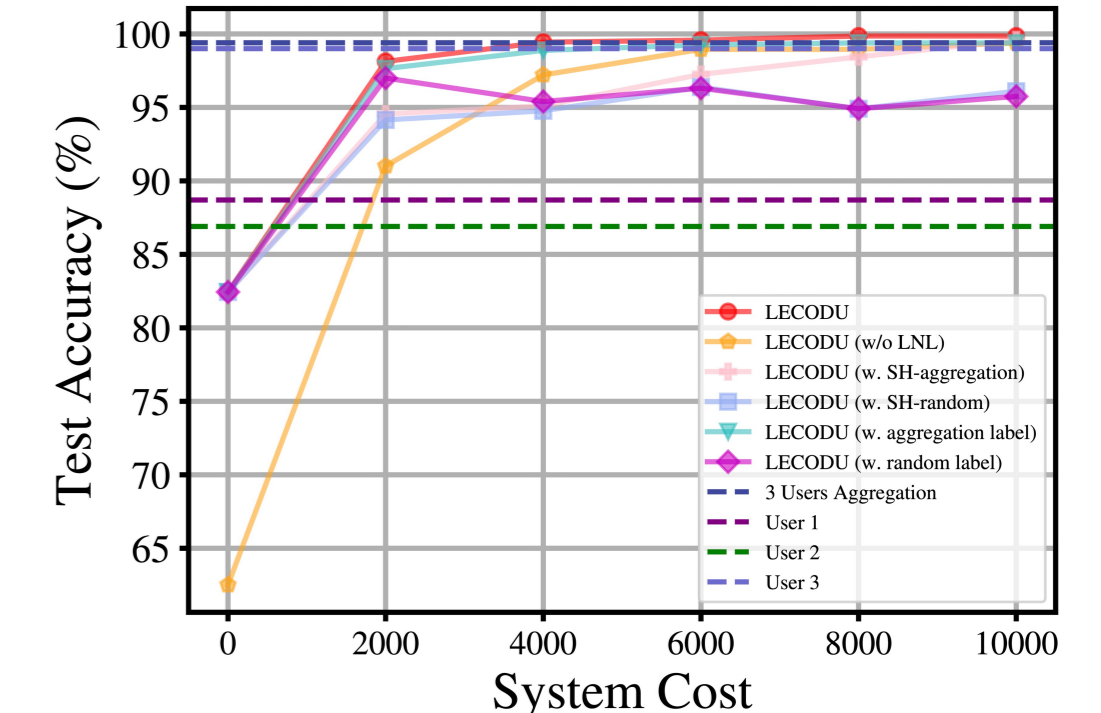
Curve: Test accuracy vs. λ



Curve: Cost vs. λ



Curve: ablation for LNL, MRL and HAI-CC



Contribution

- ❖ LECODU features a selection module and a collaboration module that combines learning-to-defer and learning-to-complement strategies
- ❖ A new training algorithm that leverages a training set containing multiple noisy labels per image to minimise the costs and maximise the accuracy