Battery detection of XRay images using transfer learning

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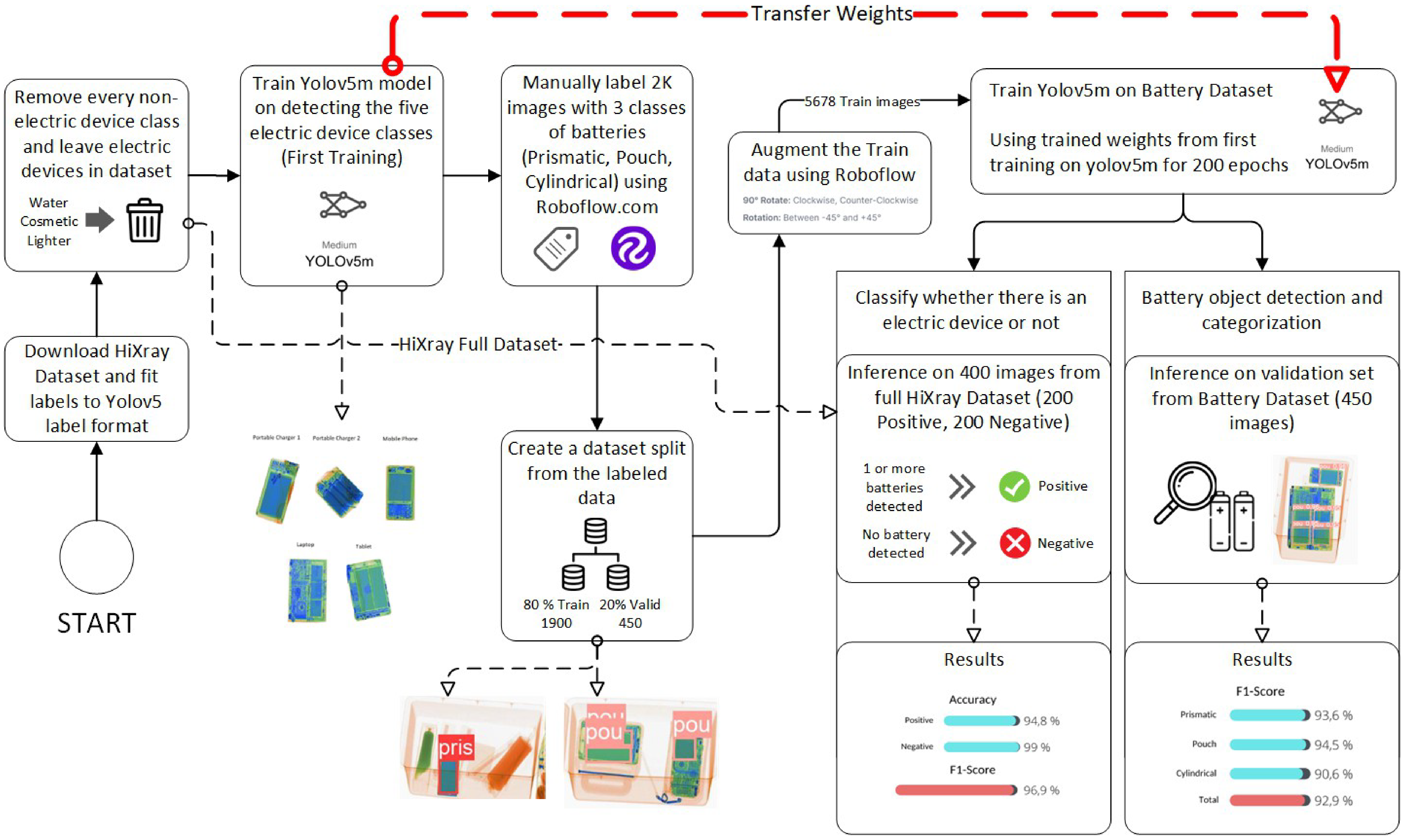
Can transfer learning predict whether the image contains a battery or not, the location and identifying battery types in XRay images?



Dataset Explanation

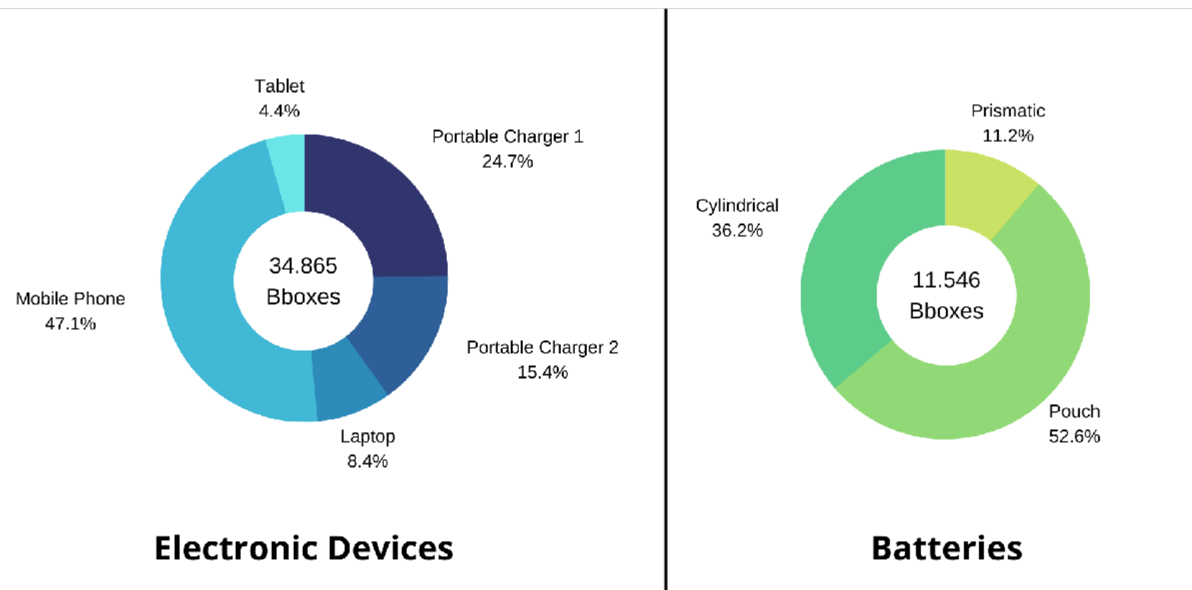


Figure 1. Label distributions for source and target datasets

Results

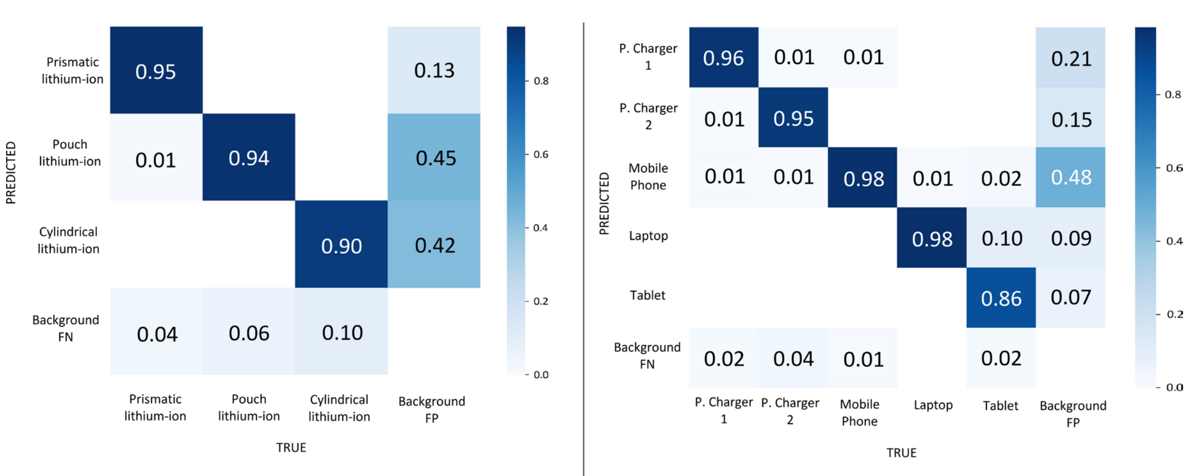
	PO1	PO2	Mobile phone	Laptop	Tablet	Total
Training	8610	5395	*16400*	2933	1527	34865
Validation	2161	1350	*4032*	686	414	8643
Precision on Val Data	**0.966**	0.96	0.939	0.899	0.936	**0.94**
Recall on Val Data	0.945	0.921	0.965	**0.99**	0.867	0.939
F1-Score	**0.955**	0.94	0.952	0.945	0.9	0.938

Table 1. Evaluation of electrical device detection.

	Prismatic LIB	Pouch LIB	Cylindrical LIB	Total
Training	1290	*6074*	4182	11546
Validation	86	*567*	426	1079
	With YOLOv5m weights			
Precision on Val Data	0.818	0.962	0.899	**0.893**
Recall on Val Data	0.812	0.901	0.772	0.828
F1-Score	0.815	0.931	0.831	0.859
	With the transferred weights			
Precision on Val Data	0.924	**0.961**	0.921	**0.935**
Recall on Val Data	**0.948**	0.929	0.892	0.923
F1-Score	0.936	**0.945**	0.906	0.929

Table 2. Evaluation of battery detection using the YOLOv5 weights and our transferred trained weights.

Confusion matrices of source and target tasks



Conclusion

Transfer learning was used in two experiments and show that it outperforms the results of using the YOLOv5m weights with a precision of 89%, running 22ms for each inference.