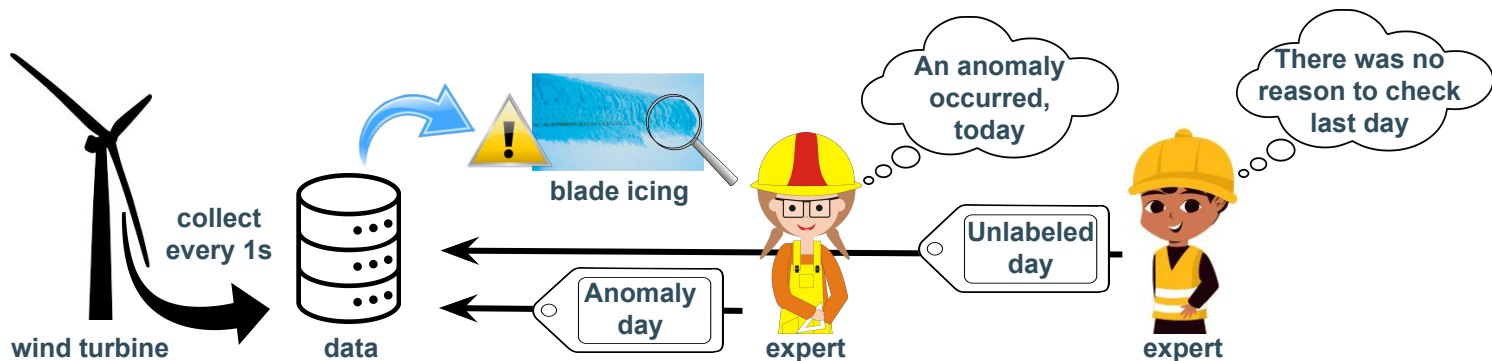


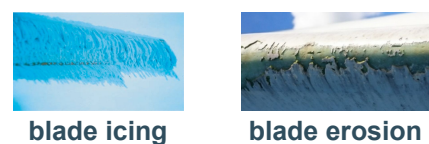
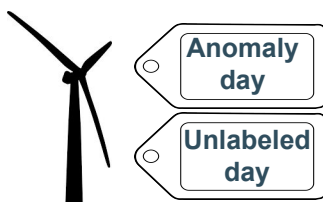
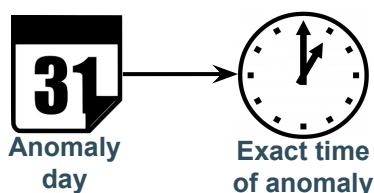
# Learning from Positive and Unlabeled Multi-Instance Bags in Anomaly Detection

**Problem:** experts provide coarse-grained labels by flagging anomalies on the level of a day (= bag level)

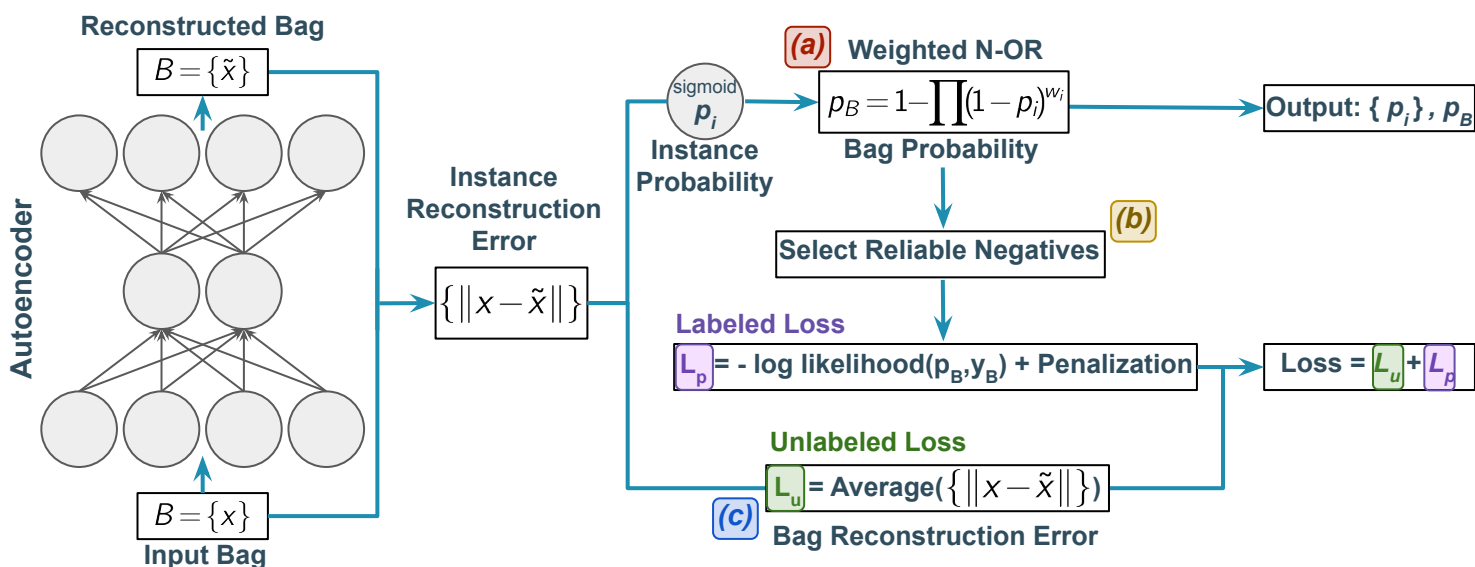


**Three main challenges:**

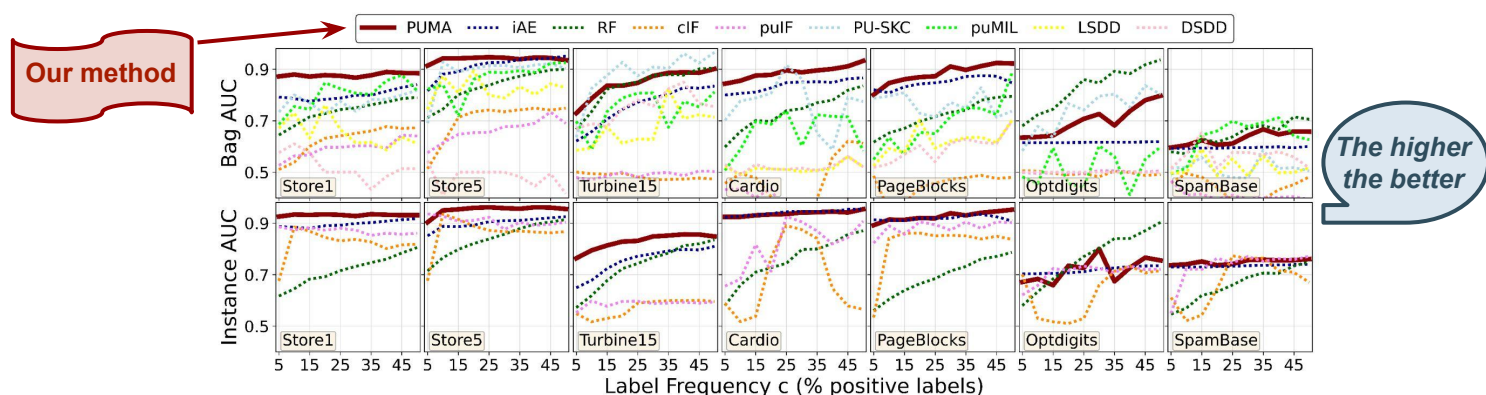
- 1 Link day labels to instance labels
- 2 Overcome the absence of normals
- 3 Anomalies may not follow patterns



**Insights:** (a) our Weighted Noisy-OR builds a bridge between bags and instances, (b) reliable negative bags can be used as pseudo labels, (c) the autoencoder loss captures out-of-distribution instances



**Experiments on 30 datasets show that PUMA performs well both on instance and on bag levels**



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