Incremental Object Model Learning from Multimodal Human-Robot Interactions SUPPLEMENTARY MATERIAL

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Additional experimental results

This supplementary material includes more detailed results from the experimentation performed to compare the proposed incremental learning approach with different variations and baselines (both incremental and offline), using *Manually cropped patches* (typically clean and less cluttered) in Table 1 and *Automatically segmented patches* in Table 2.

Table 1: Object recognition accuracy (22 Objects), *Manually Cropped* patches

(a) **Incremental k-NN**

	# of users processed to build the model								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
20-cluster limit per class									
BoW_{ORB}	7,6	7,2	8,0	8,3	9,0	9,6	10,4	10,3	11,3
HC_{RGB}	10,7	17,9	23,1	26,0	28,0	29,6	30,8	31,1	**31,4**
SIFT	6,1	5,5	5,2	5,4	6,4	8,5	8,9	7,3	6,8
$DenseNet_4$	9,92	12,28	13,90	15,16	18,28	20,04	20,78	21,62	21,17
No cluster limit per class (ALL)									
BoW_{ORB}	7,6	7,2	8,0	8,4	9,1	9,7	10,8	11,3	11,8
HC_{RGB}	10,7	17,9	23,1	25,8	27,6	28,4	29,2	30,3	30,2
SIFT	6,1	5,5	5,2	5,5	6,0	6,9	7,2	7,3	7,3
$DenseNet_4$	9,92	12,28	14,30	15,16	19,00	19,34	20,29	22,82	24,14

(b) **Offline** baselines

k-NN+BoW_{ORB}	11,8
k-NN+HC_{RGB}	30,2
k-NN+$SIFT$	7,3
k-NN+$FC7$	2,2
$SVM + HC_{RGB}$ [2]	34,8
$Inception\text{-}based$	**59,3**

32nd Conference on Neural Information Processing Systems (NIPS 2018), Montréal, Canada.

Table 2: Object recognition results using *Automatic Patches* (22 classes, random chance 4.45).

	Accuracy	**STD (10-fold cross val.)**
Previous Work (offline) [2]:		
$SVM + HC_{RGB}$ **(Automatic patches)**	7.95	6.6
$SVM + HC_{RGB}$ **(Automatic Inspected patches)**	11.45	10.53
Other offline baselines:		
Offline k-NN(HC_{RGB})	13.4	6.56
Inception-based	17.5	6.51
Incremental:		
Incremental-50 (HC_{RGB}**)***	9.0	6.35
Incremental-100 (HC_{RGB}**)****	**13.2**	6.30
Incremental-50 ($DenseNet_4$**)***	5.55	3.98
Incremental-100 ($DenseNet_4$**)****	5.64	3.53

* Performance after 50% of data processed by the incremental system

** Performance after 100% of data processed by the incremental system