

Supplementary Material: Incremental Object Discovery in Time-Varying Image Collections

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1. Additional Quantitative Results

In the paper we evaluated the performance of online LH-IS compared to the offline/batch version LH-IS (Table 3, main paper). Additionally, we showed that the performance of batch LH-IS is very similar to the original IS [1] (Table 1, main paper). Here we will also compare online LH-IS to the original IS rather than offline LH-IS. The experiments show that the agreement of medoids between online and offline LH-IS (Table 3, main paper) is slightly better than between online LH-IS and the original IS (Table 1). At the same time, the difference in *Rank* shows an opposing trend: Even though more medoids disagree, the rank difference is smaller. This indicates that disagreeing medoids are closer to each other and more likely to depict a similar view of the same iconoid.

2. Additional Qualitative Results

In Figure 1 we provide additional result images comparing online LH-IS, offline LH-IS and original IS. Comparable to the results presented in the original paper, all three methods agree on the medoid in most cases. In the cases of disagreement (*e.g.* the first row where all online versions result to a different medoid) the chosen medoids are similar in appearance. The overlap distance of all proposed methods is based only on the region overlap and disregards differences *e.g.* in color (due to the used SIFT features). The example medoid in the second row of Figure 1, showing the complete Arc de Triomphe is a more favourable choice to many applications, than ones depicting a small detail.

Figure 2 shows instances where the algorithms disagree in the selection of the exact medoid while showing the same object. Figure 3 finally shows some of the rare cases where the medoids show different object instances. As can be observed, in these cases the medoids of both algorithms are rather unspecific. The clusters are still valid since they contain similar to the medoid images as seen from the cluster members in Figure 4 of the top left medoid of Figure 3.

References

- [1] T. Weyand and B. Leibe. Discovering Favorite Views of Popular Places with Iconoid Shift. In *ICCV*, 2011. 1

MST	Split		M	M _A	M _O	M _U	S	Rank	S _{sup}	DB cover
	100	-	324	-	-	-	90	-	380.42	73249
S1	90	10	327.33 ± 1.89	248.33 ± 3.86	59.67 ± 5.44	3.67 ± 1.89	90.0 ± 2.16	42.69 ± 11.11	424.04 ± 32.72	61716
S1	70	30	327.0 ± 7.79	246.0 ± 18.83	64.0 ± 19.3	2.33 ± 1.25	86.33 ± 0.94	34.33 ± 10.6	435.14 ± 28.13	69689
S1	50	50	325.33 ± 2.49	220.0 ± 5.72	92.33 ± 8.73	1.67 ± 0.47	91.0 ± 1.41	42.52 ± 28.95	445.94 ± 65.38	68570
S2	70	30	340.33 ± 2.49	212.67 ± 15.84	112.67 ± 13.3	4.67 ± 2.49	87.33 ± 10.87	44.2 ± 15.47	423.41 ± 31.73	69659
S2	50	50	338.0 ± 4.32	169.67 ± 9.29	149.0 ± 13.59	3.33 ± 1.25	83.33 ± 3.86	123.41 ± 82.06	390.75 ± 23.2	67246
S1	90	-	329.67 ± 0.47	240.33 ± 3.77	68.67 ± 4.64	4.0 ± 2.16	90.0 ± 2.16	37.76 ± 10.39	365.61 ± 24.18	55583
S1	70	-	352.33 ± 12.5	169.67 ± 15.33	120.67 ± 13.91	5.67 ± 2.49	126.0 ± 35.39	38.15 ± 13.88	277.42 ± 13.65	45980
S1	50	-	347.33 ± 4.64	80.33 ± 6.24	184.0 ± 13.06	4.0 ± 2.16	135.0 ± 5.72	116.68 ± 69.14	176.64 ± 22.28	31321

Table 1: Performance of the online version of the LH-MST compared to the offline version of the original IS algorithm that uses an MST.



Figure 1: Examples of cluster centers for different version of LH-MST compared to original IS.

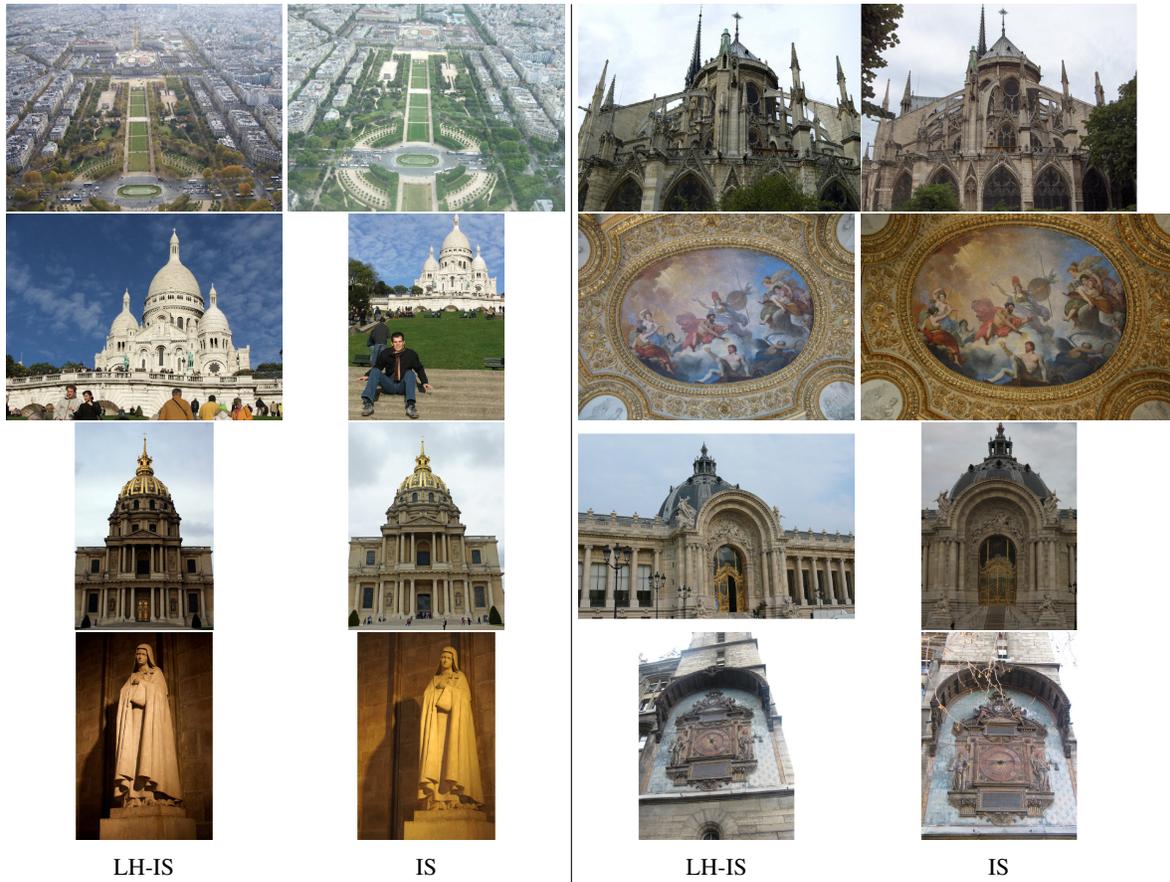


Figure 2: Examples of cluster centers where LH-MST converges to a different medoid than IS. As it can be seen the quality of the result is the rather the same. In most situations there is only minor color or camera pose differences.

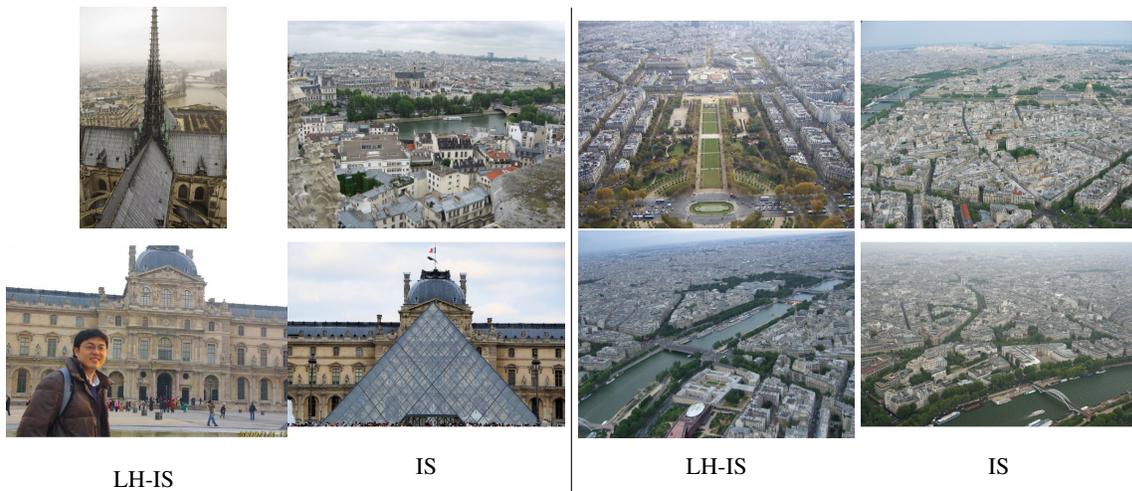


Figure 3: Examples of cluster centers where LH-MST converges to a different medoid than IS but the object depicted in the image is very different.

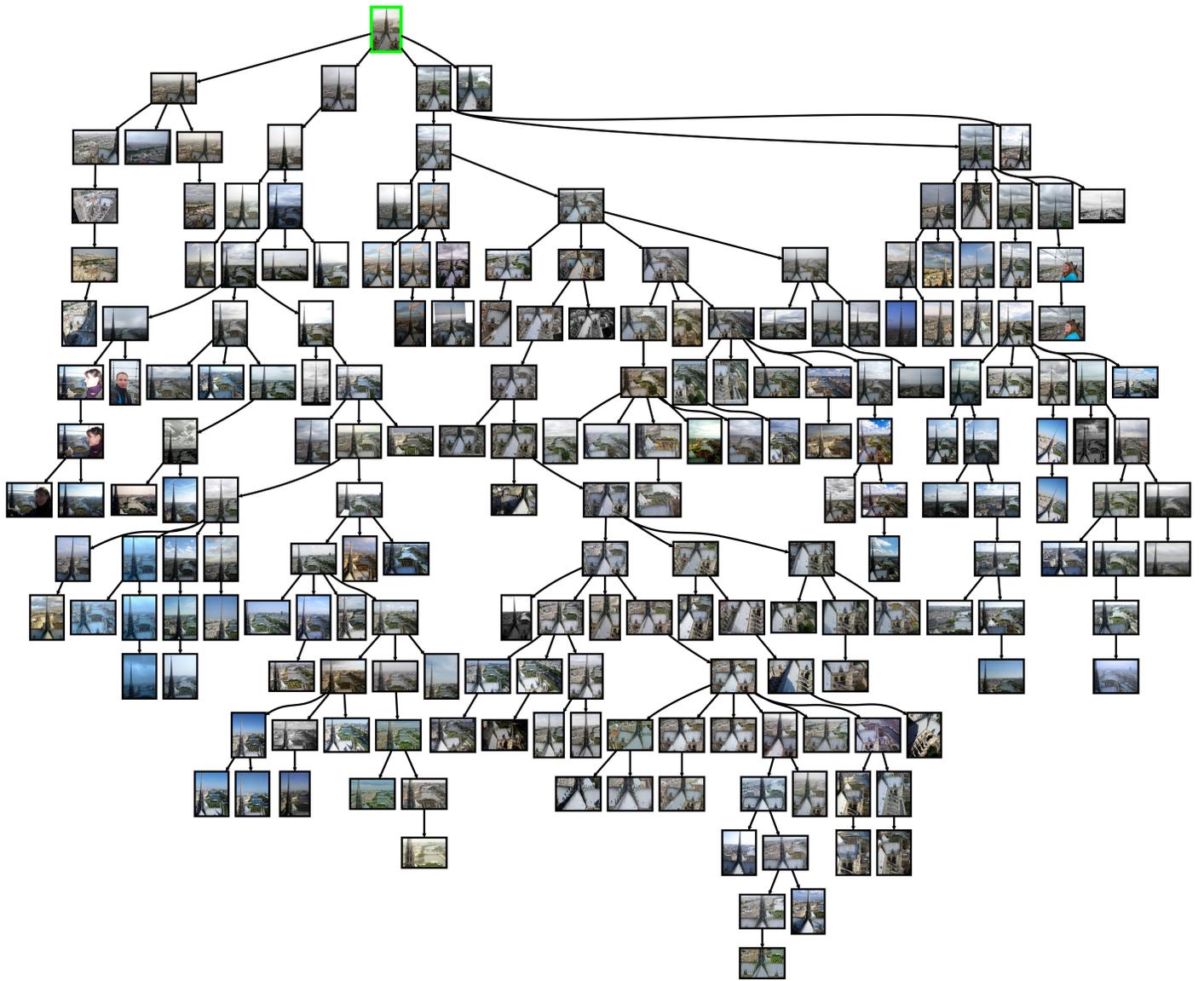


Figure 4: Example of cluster members of top left LH-MST medoid in Figure 3.