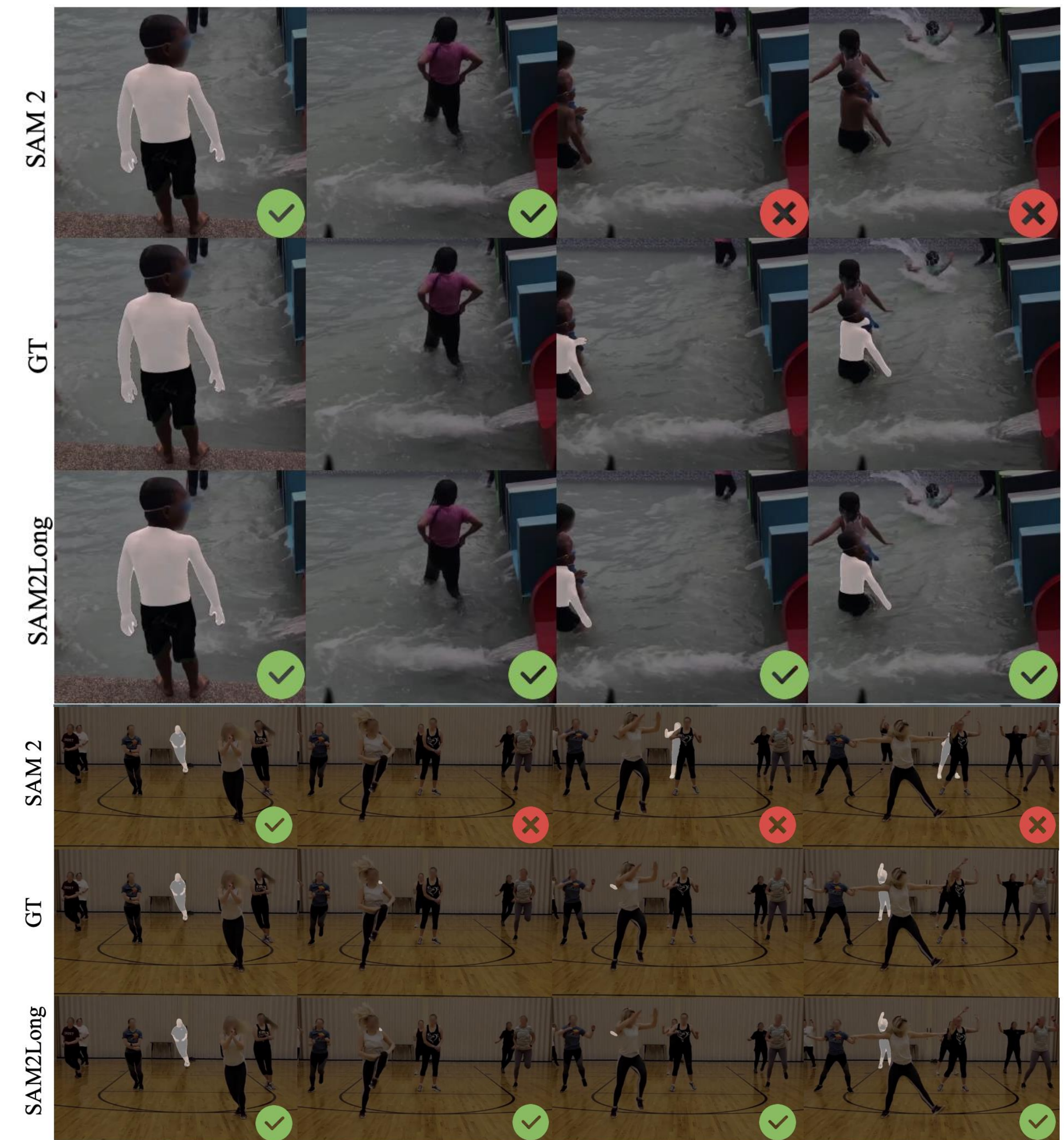
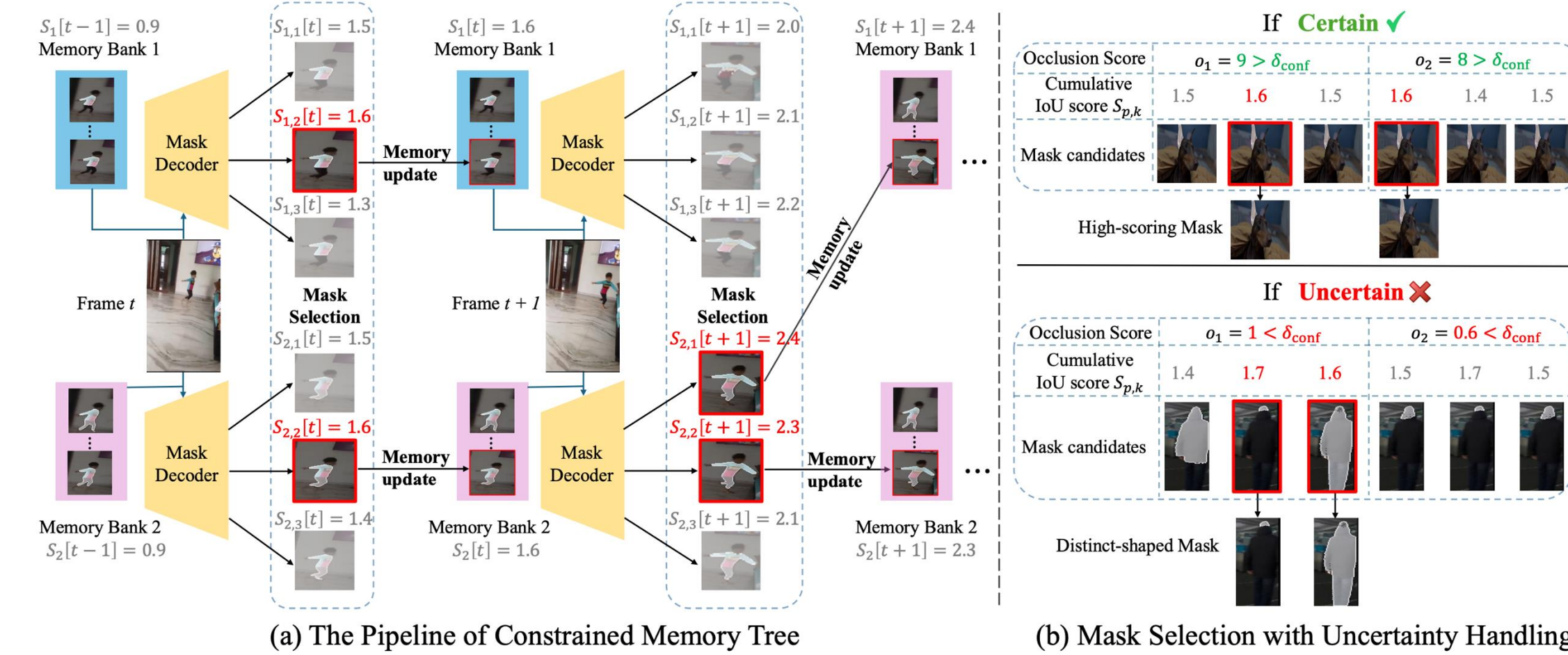
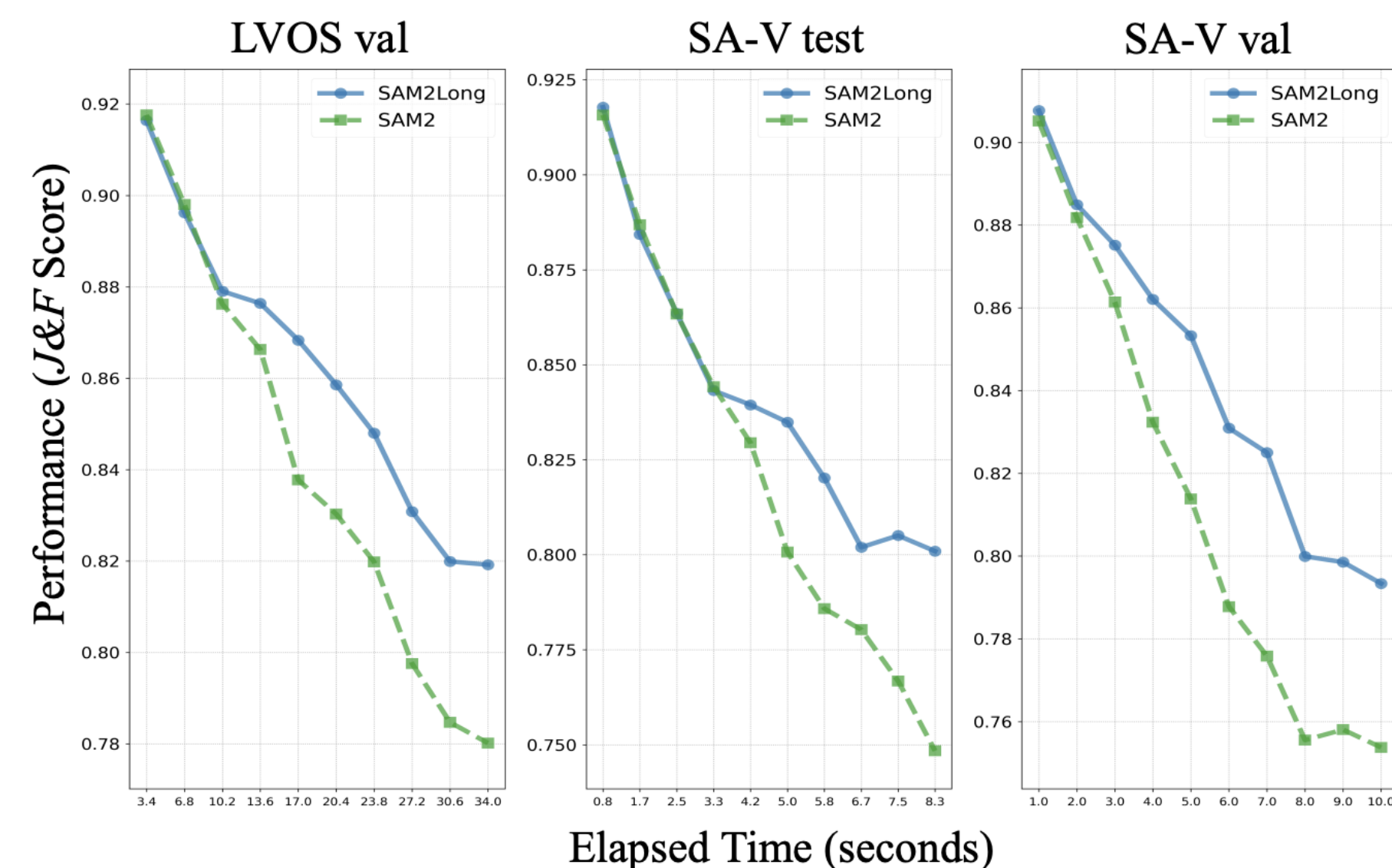
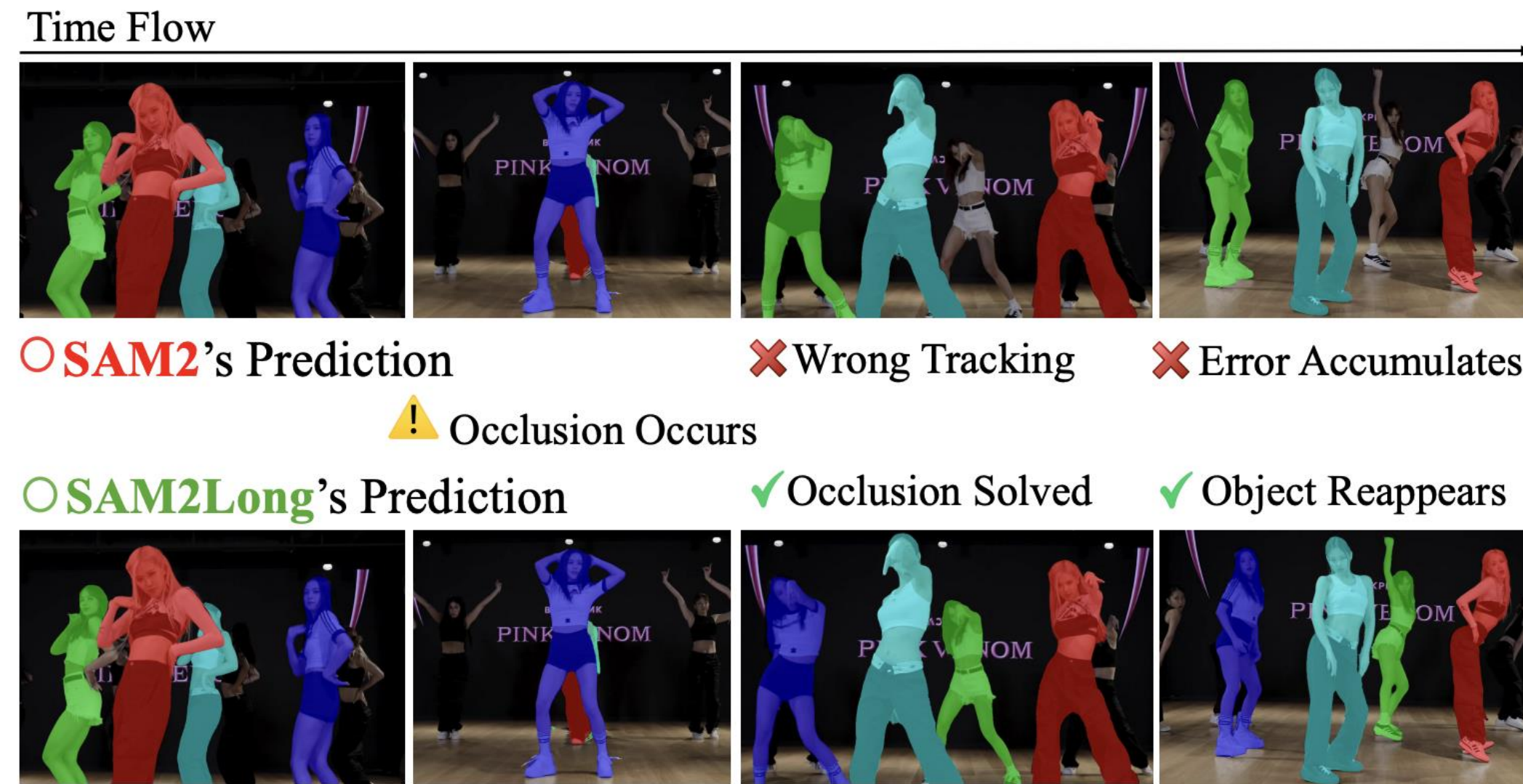


TLDR: Improve SAM 2's memory for long-term videos without training.

- **Task: Semi-supervised Video Object Segmentation**
- **Challenge:** SAM 2 relies heavily on nearby frames, leading to long-term forgetting.
- **Our solution:** We introduce a training-free memory design for SAM2 that accounts for segmentation uncertainty within each frame and selects video-level optimal results through a constrained tree search across multiple segmentation pathways.

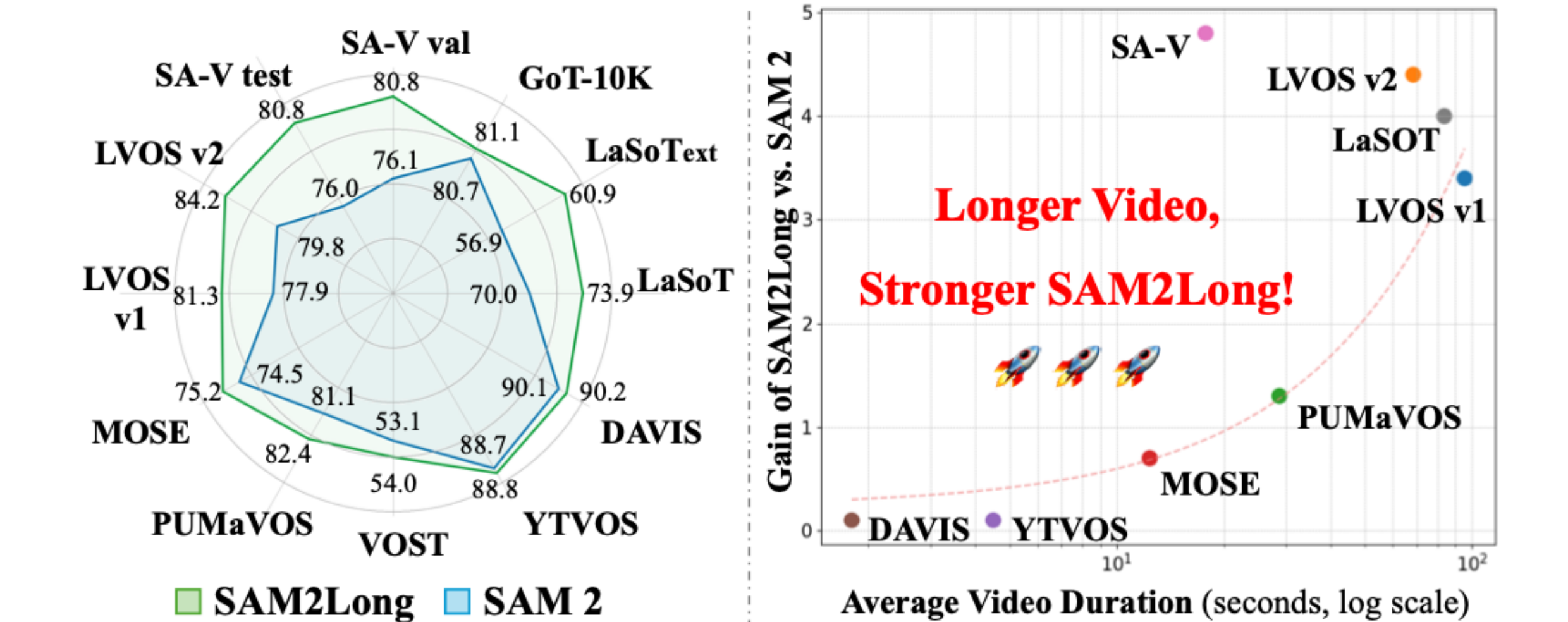


Experiment:

- SAM2Long delivers an average gain of **3.7** points across 12 direct comparisons.

Method	SA-V val			SA-V test			LVOS v2 val		
	J&F	J	F	J&F	J	F	J&F	J	F
SAM2-T [†]	73.5	70.1	76.9	74.6	71.1	78.0	77.8	74.5	81.2
SAM2Long-T	77.0 (3.5↑)	73.2	80.7	78.7 (4.1↑)	74.6	82.7	81.4 (3.6↑)	77.7	85.0
SAM2.1-T [†]	75.1	71.6	78.6	76.3	72.7	79.8	81.6	77.9	85.2
SAM2.1Long-T	78.9 (3.8↑)	75.2	82.7	79.0 (2.7↑)	75.2	82.9	82.4 (0.8↑)	78.8	85.9
SAM2-S [†]	73.0	69.7	76.3	74.6	71.0	78.1	79.7	76.2	83.3
SAM2Long-S	77.7 (4.7↑)	73.9	81.5	78.1 (3.5↑)	74.1	82.0	83.2 (3.5↑)	79.5	86.8
SAM2.1-S [†]	76.9	73.5	80.3	76.9	73.3	80.5	82.1	78.6	85.6
SAM2.1Long-S	79.6 (2.7↑)	75.9	83.3	80.4 (3.5↑)	76.6	84.1	84.3 (2.2↑)	80.7	88.0
SAM2-B+ [†]	75.4	71.9	78.8	74.6	71.2	78.1	80.2	76.8	83.6
SAM2Long-B+	78.4 (3.0↑)	74.7	82.1	78.5 (3.9↑)	74.7	82.2	82.3 (2.1↑)	78.8	85.9
SAM2.1-B+ [†]	78.0	74.6	81.5	77.7	74.2	81.2	83.1	79.6	86.5
SAM2.1Long-B+	80.5 (2.5↑)	76.8	84.2	80.8 (3.1↑)	77.1	84.5	85.2 (2.1↑)	81.5	88.9
SAM2-L [†]	76.3	73.0	79.5	75.5	72.2	78.9	83.0	79.6	86.4
SAM2Long-L	80.8 (4.5↑)	77.1	84.5	80.8 (5.3↑)	76.8	84.7	85.4 (2.4↑)	81.8	88.7
SAM2.1-L [†]	78.6	75.1	82.0	79.6	76.1	83.2	84.0	80.7	87.4
SAM2.1Long-L	81.1 (2.5↑)	77.5	84.7	81.2 (1.6↑)	77.6	84.9	85.3 (1.3↑)	81.9	88.8

- Performance gains increase with longer video durations.



Conclusion and Future work:

- SAM2Long enhances SAM2's robustness to occlusions and object reappearances.
- Follow-up work SeC (Segment Concept) boost the SAM2 by concept guidance from MLLMs.