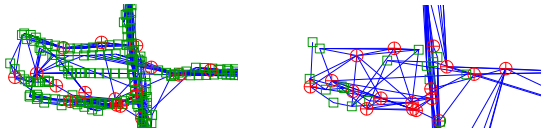

Fig. 7. Detail from middle of full and reduced graphs for SEQ2. View nodes are red circles, pose nodes are green squares, and edges are blue lines. Note the reduced density on the right

Error (cm)	SEQ1		SEQ2		SEQ3	
Odom. RMS	281		331		469	
Odom. Max	773		667		852	
Error (cm)	Full	Redu.	Full	Redu.	Full	Redu.
Traj. RMS	45	44	23	28	59	59
Traj. Max	109	105	81	74	138	149
Map RMS	24	18	21	20	43	47
Map Max	41	32	47	46	98	103
# Nodes	709	92	897	216	2491	290
# Edges	1471	155	1810	414	5154	501

TABLE III

METRICS FOR FULL AND REDUCED COMPLEXITY GRAPHS

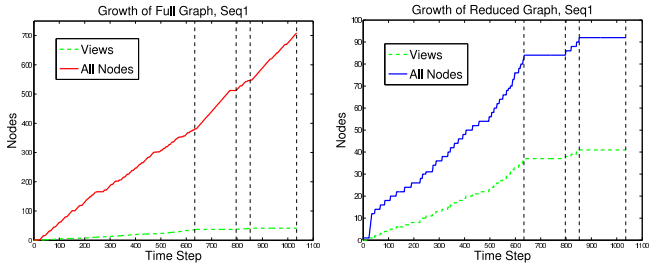

Fig. 8. Graph complexity over time for SEQ1, with and without reduction. The two regions bounded by vertical dotted lines are periods of revisitation, during which views are reobserved rather than created. The reduced graph complexity remains constant unless new views are created. Note the difference in vertical scale

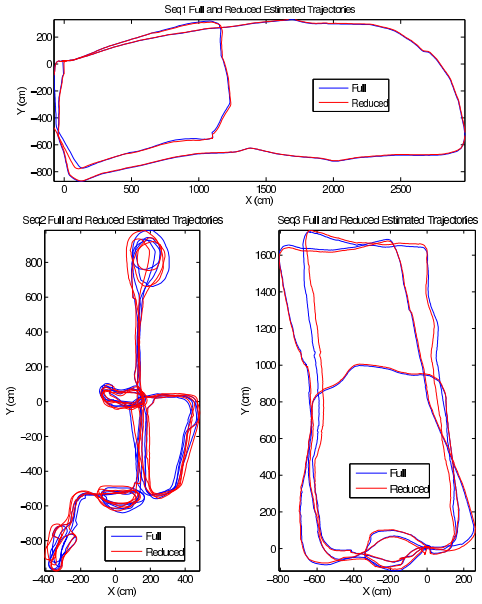

Fig. 9. Causally estimated trajectories: Graph reduction yields results similar to those computed with full-complexity graphs

X. CONCLUSION

We have presented a view-based monocular SLAM system that actively manages the complexity of the SLAM graph to permit operation on constrained computational platforms. Our results show that the complexity reduction methods significantly limit graph node and edge cardinality, while only negligibly affecting localization accuracy. Further experiments are required to determine the boundaries of applicability of these techniques, and to explore alternative reduction heuristics and approximations.

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