Exactly Sparse Memory Efficient SLAM using the Multi-Block Alternating Direction Method of Multipliers: Supplementary Material

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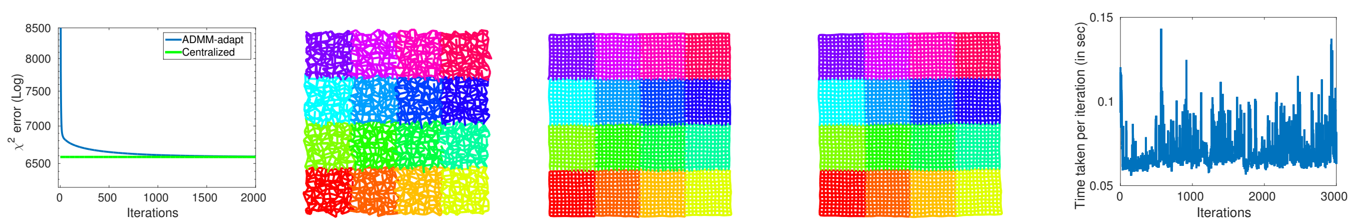
In the supplementary material, we present additional results on large synthetic grid graphs. We consider a manhattan world with poses arranged as a regular grid. Each node in the grid is connected to all of its four neighbors. We ran all approaches on a single thread on a desktop using Ubuntu 14.04 with Intel(R) Core(TM) i7-3770 CPU running at 3.40GHz.

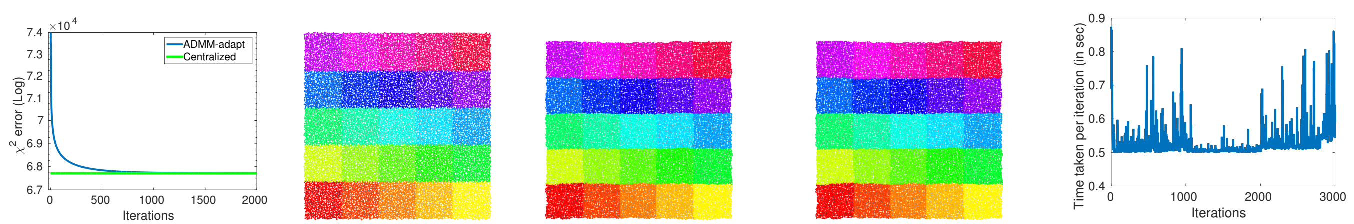
Figure 1 shows the results on 48×48 grid ($n = 2401,\ m = 4074$) which is divided into subgraphs of size 12×12 . Figure 2 shows the results on 150×150 grid ($n = 22801,\ m = 45300$) which is divided into subgraphs of size 30×30. Additionally the figures show the subgraph estimates after 20 and 100 iterations of ADMM-adapt algorithm and the time taken per iteration (in seconds).

Figure 3 shows the results on 210×210 grid ($n = 44521,\ m = 88620$), figure 4 shows the results on 270×270 grid ($n = 73441,\ m = 146340$) and figure 5 shows the results on 361×361 grid ($n = 130321,\ m = 259920$) which are divided into subgraphs of size 30×30.



(a) convergence (b) initial guess (c) After 20 iterations (d) After 100 iterations (e) time taken (per iteration)

Figure 1: (a) χ^2 error comparing the proposed approach (ADMM-adapt) against the final error of a centralized solver. (b) Initial guess, (c,d) ADMM-adapt estimate at different iterations (synthetic dataset), (e) time taken per iteration (in sec). Each subgraph is shown in a different color. The size of the graph is 48×48 ($n = 2401,\ m = 4074$) which is divided into subgraphs of size 12×12.



(a) convergence (b) initial guess (c) After 20 iterations (d) After 100 iterations (e) time taken (per iteration)

Figure 2: (a) χ^2 error comparing the proposed approach (ADMM-adapt) against the final error of a centralized solver. (b) Initial guess, (c,d) ADMM-adapt estimate at different iterations (synthetic dataset), (e) time taken per iteration (in sec). Each subgraph is shown in a different color. The size of the graph is 150×150 ($n = 22801,\ m = 45300$) which is divided into subgraphs of size 30×30.

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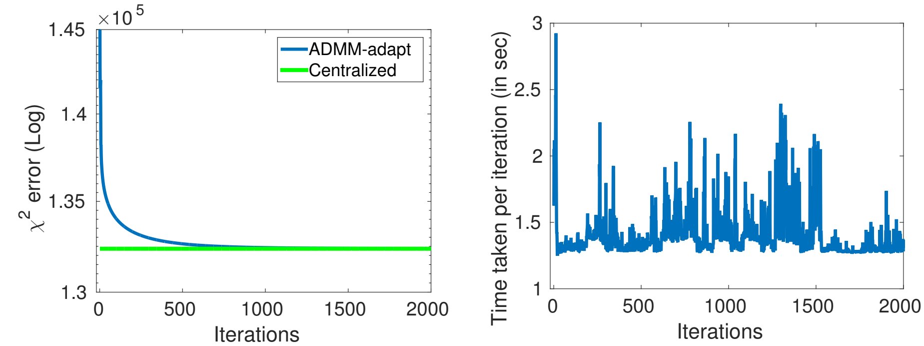
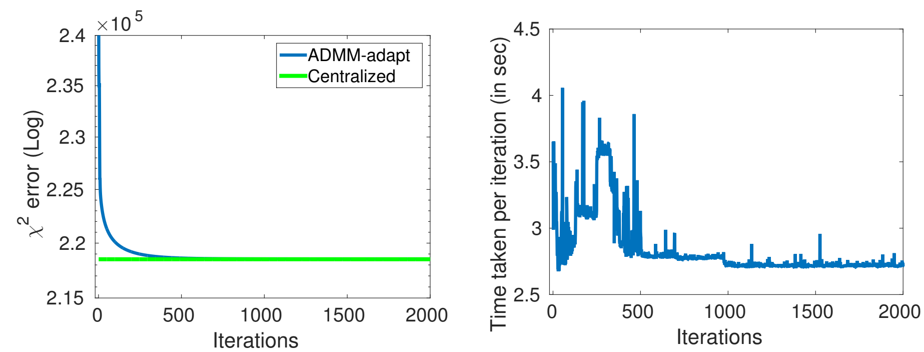


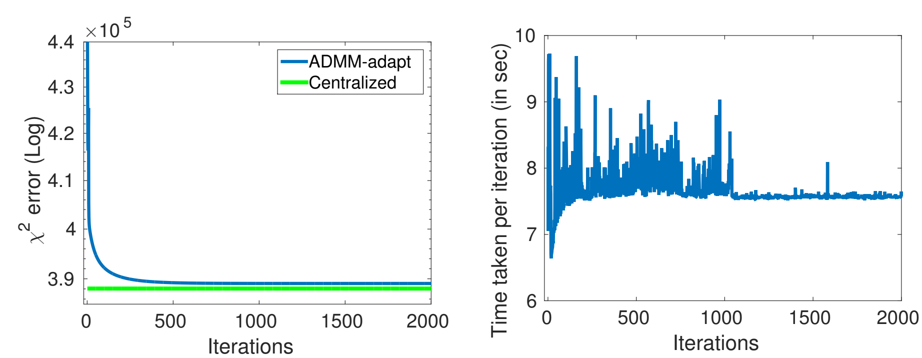
(a) convergence (b) time taken (per iteration)

Figure 3: (a) χ^2 error comparing the proposed approach (ADMM-adapt) against the final error of a centralized solver, (b) time taken per iteration (in sec) for the graph of size 210×210 ($n = 44521,\ m = 88620$) which is divided into subgraphs of size 30×30.



(a) convergence (b) time taken (per iteration)

Figure 4: χ^2 error comparing the proposed approach (ADMM-adapt) against the final error of a centralized solver, (b) time taken per iteration (in sec) for the graph of size 270×270 ($n = 73441,\ m = 146340$) which is divided into subgraphs of size 30×30.



(a) convergence (b) time taken (per iteration)

Figure 5: χ^2 error comparing the proposed approach (ADMM-adapt) against the final error of a centralized solver, (b) time taken per iteration (in sec) for the graph of size 360×360 ($n = 130321,\ m = 259920$) which is divided into subgraphs of size 30×30.