Supplementary Materials to: Modeling and Monitoring of Indoor Populations using Sparse Positioning Data

1 SUPPLEMENTARY EXPERIMENTS

The supplementary experiments consist of the experiments of the whole querying processing for BLD-2 (i.e., Figures 1–9 and Figures 13–17), and the experiments of η's effect for BLD-1 (i.e., Figures 10–12).

1.1 Evaluations of CMPP Processing

Query Instance. We generate query instances in the same way with that in the paper.
Performance Metrics. We use the same performance metrics with that in the paper.
Query Parameters. Besides the query parameters (i.e., r, θ, and `Validity`) in the paper, we supply the experimental results of η's effect.

Table 1: Query parameter settings.

Parameter	Value
r (meter)	20,40, **60**, 80
θ	**2**, 4, 6, 8
`Validity` (second)	60, **120**, 180, 240
η	**0.5**, 0.6, 0.7, 0.8

Effect of Query Range r. The query response time, F1-score, and memory usage for BLD-2 are reported in Figure 1, Figure 2, and Figure 3, respectively. They follow similar trendencies as that in BLD-1 (cf. Section 6.3.1 in the paper) and detailed interpretation could be found there.

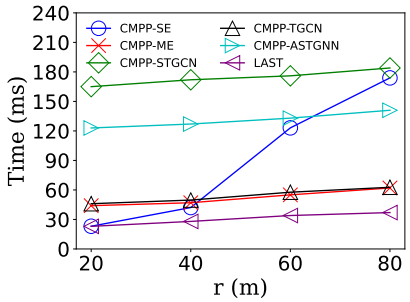

Figure 1: Time vs r (BLD-2).

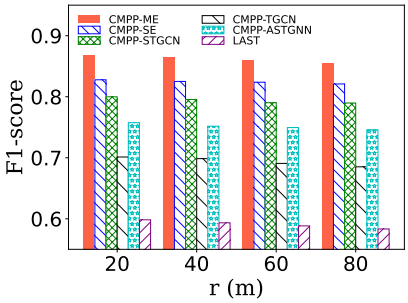

Figure 2: F1-score vs r (BLD-2).

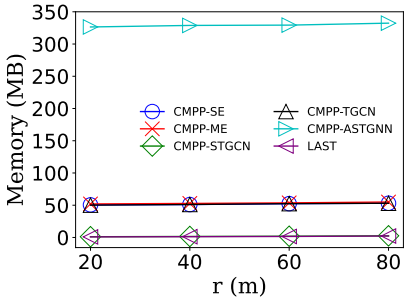

Figure 3: Memory vs r (BLD-2).

Effect of Population Threshold θ. The query response time, F1-score, and memory usage for BLD-2 are shown in Figure 4, Figure 5, and Figure 6 respectively. The trendencies are similar to that in BLD-1 and the explanations could be found in Section 6.3.2 in the paper.

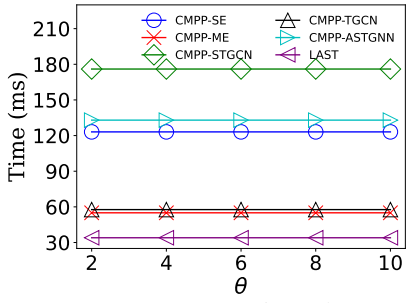

Figure 4: Time vs θ (BLD-2).

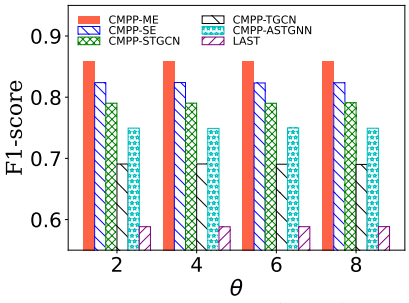

Figure 5: F1-score vs θ (BLD-2).

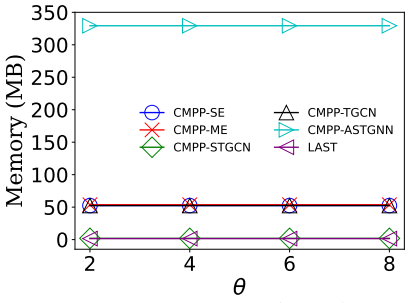

Figure 6: Memory vs θ (BLD-2).

Effect of Confidence Threshold η. The query response time, F1-score, and memory usage for BLD-2 are shown in Figure 7, Figure 8, and Figure 9 respectively. Besides, the similar results for BLD-1 are complemented and reported in Figure 10, Figure 11, and Figure 12 respectively. Similar to θ, η as a parameter to define a populated partition, has no effect on the query efficiency and effectiveness.

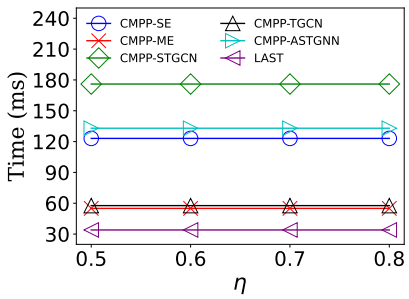

Figure 7: Time vs η (BLD-2).

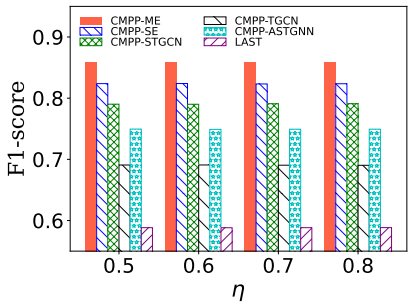

Figure 8: F1-score vs η (BLD-2).

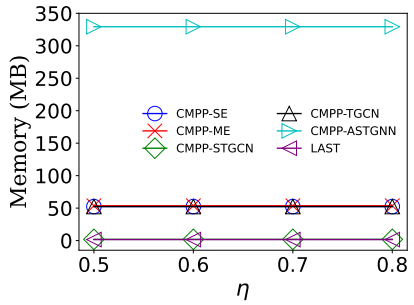

Figure 9: Memory vs η (BLD-2).

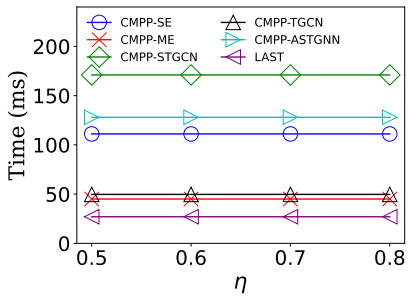

Figure 10: Time vs η (BLD-1).

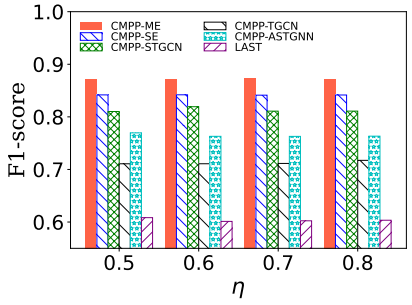

Figure 11: F1-Score vs η (BLD-1).

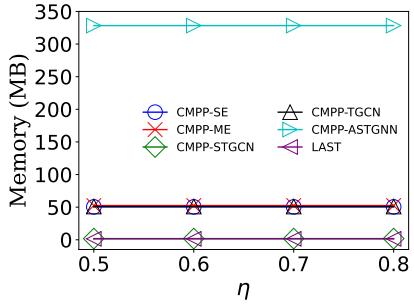

Figure 12: Memory vs η (BLD-1).

Effect of `Validity`. The query response time, F1-score, and memory usage for BLD-2 are shown in Figure 13, Figure 14, and Figure 15 respectively. The trendencies are similar to that of BLD-1 and detailed explanations are available in Section 6.3.3 in the paper.

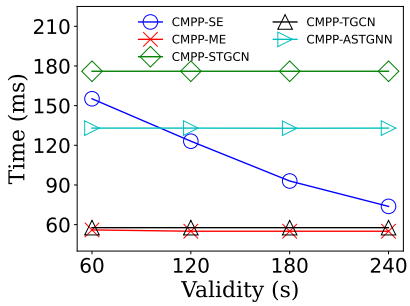

Figure 13: Time vs `Validity` (BLD-2).

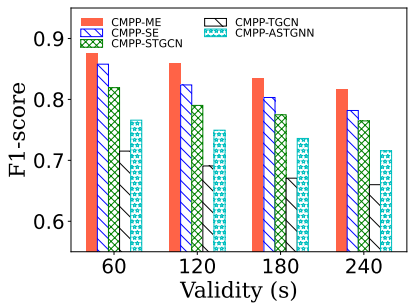

Figure 14: F1-score vs `Validity` (BLD-2).

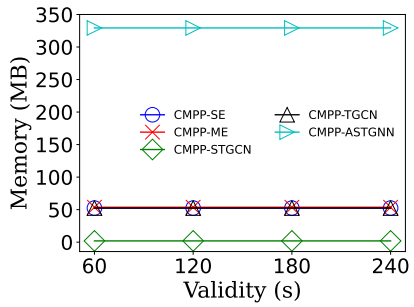

Figure 15: Memory vs `Validity` (BLD-2).

Effect of Caching Mechanism. The query response time and F1-score are reported in Figure 16 and Figure 17 respectively. Please refer to Section 6.3.4 in the paper for interpretations.

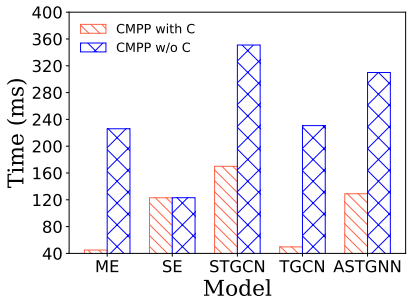

Figure 16: Time vs model (BLD-2).

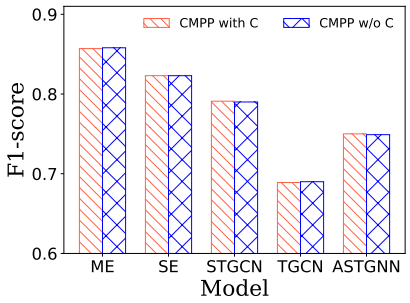

Figure 17: F1-score vs model (BLD-2).

Summary. Overall, the results in BLD-2 are similar to that in BLD-1 and this further demonstrates the effectiveness and efficiency of CMPP query processing framework. Besides, simlar to θ, varying η has almost no effect on the results of query processing. More detailed information are available in Section 6.3 in the paper.