

Appendix

Inference Time Analysis

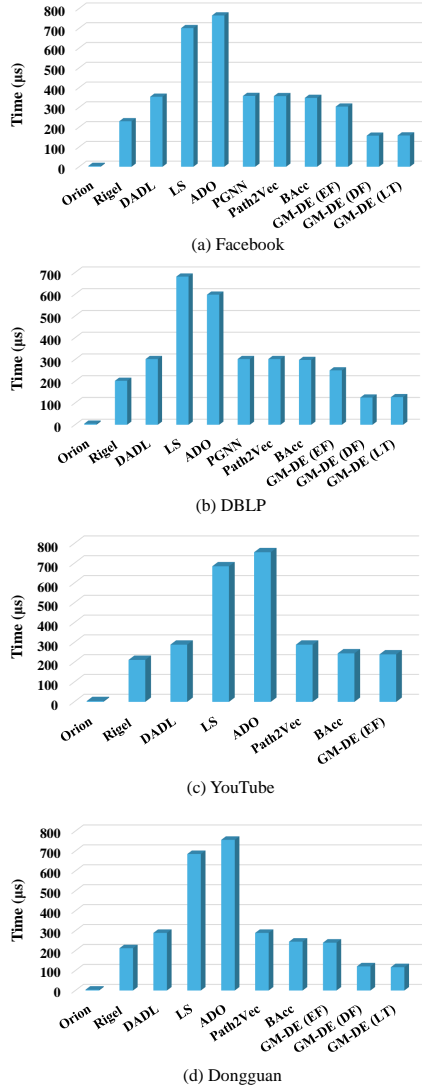


Figure 5: Comparison of the inference time.

In RQ2 of the experiment section, we compared the inference time between all baseline methods and GM-DE methods on the dataset Cora. To further evaluate the time efficiency of GM-DE, Figure 5 supplements the results for the remaining four datasets (i.e., Facebook, DBLP, YouTube, and Dongguan) using 100,000 pairs of nodes in the query set, respectively. From this figure, we can observe that across the four datasets with different scales, the three variants of GM-DE exhibit the second-lowest inference time compared to most baseline methods. Note that although the baseline Orion can achieve the lowest inference time, its prediction error is about ten times larger than that of our method (see Table 2 for more details), which is not acceptable in practice.

Furthermore, for the Dongguan road network, the infer-

ence time of GM-DE remains stable, confirming that its architecture is robust to different types of graphs. In conclusion, this experiment validates that the GM-DE’s embedding and fusion design ensures fast online prediction, making it suitable for large-scale graph scenarios.

Storage Cost Analysis

In RQ2 of the experiment section, we compared the storage cost to validate the space efficiency of GM-DE. Figure 6 supplements the results for the remaining three datasets (i.e., Facebook, DBLP, and Dongguan). For the Facebook dataset, the GM-DE variants require minimal storage (around 10^2 KB), much lower than the traditional methods that store the distance matrix and some learning-based methods. For large-scale graph DBLP, the storage cost of GM-DE remains low, avoiding the exponential space growth seen in methods that store full-distance information. For the Dongguan road network, GM-DE also maintains compact storage. In conclusion, this experiment validates that our pivot and anchor set selection strategies effectively control storage cost without sacrificing prediction accuracy, making GM-DE suitable for use in resource-constrained environments where both time and space efficiency are critical.

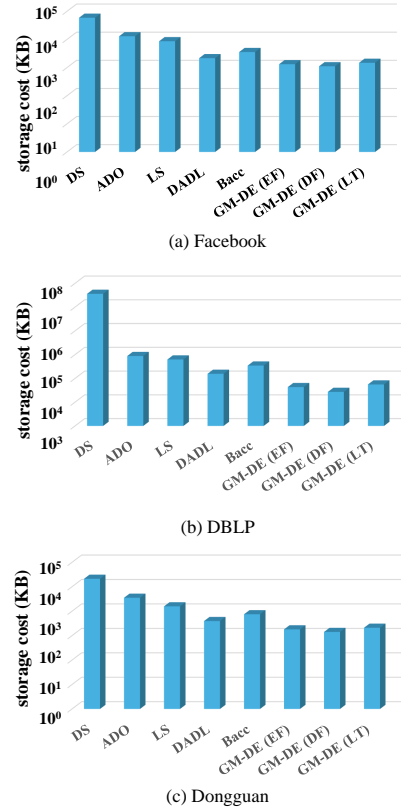


Figure 6: Comparison of the storage cost.