Ablation Study

Number of Rays p. Figure **??** demonstrates that the quality of the Pareto front increases with the number of rays, but up to a certain point, adding more rays no longer significantly improves the results. That means our framework doesn't require too many sampling rays to get a good performance.

Partition. As shown in Figure **??**, partitioning algorithm makes it easier for the cosine similarity function and the HV function to cooperate and enhances PHN-HVI performance.

Cosine Similarity. The cosine similarity function is critical in the convergence of PHN-HVI and helps in the spread of the Pareto Front. In Figure **??**, if λ is very large ($\lambda = 100$), Pareto Front is very widely dispersed, but it is quite shallow. If λ is very small ($\lambda = 0.1$), PHN-HVI can't generate Pareto Front. Therefore, selecting a suitable lambda that balances the HV function and the cosine similarity function is critical for the PHN-HVI to work effectively.

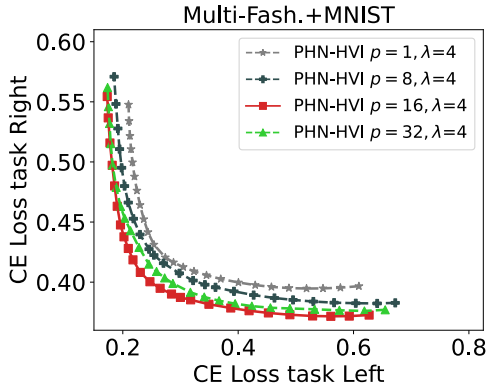

Figure 6: Performance of PHN-HVI when p varies

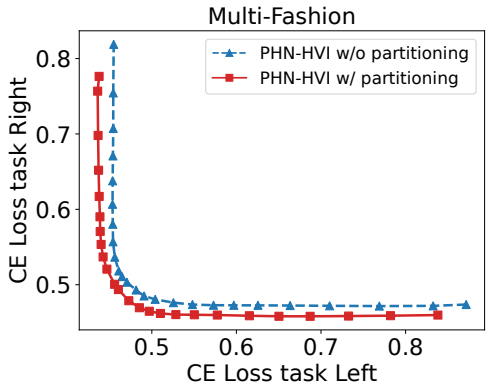

Figure 7: The effect of loss space partitioning

6 Conclusion and Future Work

In this paper, we propose PHN-HVI with Multi-Sample Hypernetwork, which utilizes a variety of trade-off vectors simultaneously, followed by hypervolume maximization to improve the PFL problem. This approach also opens up a wide range of potential research directions. On one hand,

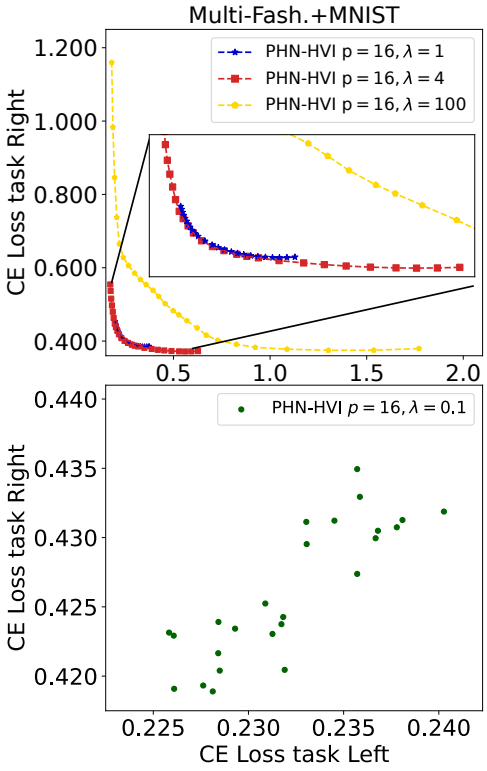

Figure 8: The impact of hyperpareter λ

it is necessary to investigate theoretically for which objective functions the hypernetwork-based PFL methods will guarantee the convergence. On the other hand, it is shown that hypernetwork-based PFL can not approximate well disconnected-Pareto fronts. Hence, the question of whether PFL may be solved effectively without hypernetwork is very crucial to consider.

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