While the genetic algorithm provides a robust framework for optimal sensor placement, several limitations of the model merit consideration. One notable constraint is the model's reliance on predefined sensor nodes, which might not accurately reflect all possible real-world scenarios, thereby limiting its applicability across diverse structural types (Lee et al., 2020). Additionally, the computational demands of genetic algorithms, particularly in complex systems with numerous potential sensor positions, can result in significant processing times and resource allocation challenges. This limitation underscores the need for future research focused on enhancing algorithm efficiency, potentially through hybrid approaches that integrate other optimization techniques (Lee et al., 2020). Furthermore, advancing adaptive algorithms that dynamically adjust to changing structural conditions could improve model resilience, offering promising avenues for future exploration and refinement in structural health monitoring applications (Lee et al., 2020).