IV. CONCLUSION

In this work, we proposed a hybrid itinerary planning model for WSN in BSHM. Our model integrates the benefits of utilizing a genetic algorithm for static route planning and making dynamic adjustments to ensure network functionality, even in the case of node failures during data transmission. This hybrid strategy guarantees the collection of data that is strong and dependable by overcoming the shortcomings of classic static approaches that are susceptible to interruptions when nodes become inaccessible. Furthermore, our model integrates a peak detection technique to selectively process incoming vibration data produced by the bridge. Ensuring the cleanliness and accuracy of the data processed by the FFT is a vital step that leads to more trustworthy analysis and monitoring findings. By using peak detection, the sensor network can effectively filter out noise and irrelevant data, thereby improving the quality and reliability of the provided structural health information. The experimental results showed that the hybrid itinerary planning model, although it takes slightly longer to process than the static method, greatly enhances the network's capacity to recover quickly and maintain consistent performance. The hybrid architecture effectively sustained data transmission and processing despite node failures, demonstrating its resilience in real-world circumstances where node failures resulting from physical damage or energy depletion are frequent. The decision to balance processing time and network robustness is supported by the improved performance and dependability of the WSN in BSHM applications.

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