Response to Reviewer 1 Comments

Point 1: In Introduction Line 80-81 need to supported by references.

Response 1: Thanks for the reviewer's kind reminder. We apologize for the lack of literature related to the topic in the article. Based on the reviewers' comments, we have added some literature in the revision that is more relevant to the topic. The revised parts in this version of the manuscript can be found in line81 and added references are 16-18. I hope my response will be satisfactory.

Line80-81: The anomaly data diagnosis involves complex machine learning models and cluster-ing-related algorithms, and the types of data targeted are not limited to a single type of time series collected by road sensors[16-18].

References:

16 Yan, Q.; Lu, Z. Y.; Wang, P.; Ding, X. D.; Cheng, F. L.; Zhang, Y. F. In A New Method for Anomaly Detection and Diagnosis of Ocean Observation System based on Deep Learning, 40th Chinese Control Conference (CCC), Shanghai, PEOPLES R CHINA, Jul 26-28, 2021; Ieee: Shanghai, PEOPLES R CHINA, 2021; pp 7088-7093.

17 Xu, J.; Liu, M.; Ma, Q.; Han, Q. H., Temperature-based anomaly diagnosis of truss structure using Markov chain-Monte Carlo method. J. Civ. Struct. Health Monit. 2022, 12, (3), 705-724.

18 Jing, W.; Wang, P.; Zhang, N. C., Study on Temperature Sensor Data Anomaly Diagnosis Method Based on Deep Neural Network. Sci. Program. 2022, 2022, 8.

Point 2: In Introduction Line 100-105 need to support by references

Response 2: Thanks for the reviewer's kind reminder. We apologize for the lack of literature related to the topic in the article. Based on the reviewers' comments, we have added some literature in the revision that is more relevant to the topic. The revised parts in this version of the manuscript can be found in line100-105 and added references are 23-26. I hope my response will be satisfactory.

Line100: Research on signal peak extraction is primarily conducted using image processing techniques and signal data decomposition and reconstruction[23,24].

Line102: The accuracy of signal peaks may be difficult to guarantee due to significant differences in data format re-quirements and algorithm complexity[25].

Line106: However, the algorithm requires improvement for peak detection in complex signal data environments[26].

References:

23 Lin, X. M.; Liang, T. Z.; Cao, L.; Ieee In Extraction of Chromatographic Characteristics Based on Wavelet Ridge and Morphology, 4th IEEE International Conference on Big Data Analytics (ICBDA), Suzhou, PEOPLES R CHINA, Mar 15-18, 2019; Ieee: Suzhou, PEOPLES R CHINA, 2019; pp 297-302.

24 Jang, S. W.; Lee, S. H., Detection of Epileptic Seizures Using Wavelet Transform, Peak Extraction and PSR from EEG Signals. Symmetry-Basel 2020, 12, (8), 10.

25 Rasid, M. H. M.; Simon, N. L.; Adam, A., Using Neural Network with Random Weights and Mutual Information for Systolic Peaks Classification of PPG Signals. ICBET 2020: Proceedings of the 2020 10th International Conference on Biomedical Engineering and Technology 2020, 276-283.
26 Zhou, Y. J.; Ma, J.; Li, F.; Chen, B. H.; Xian, T.; Wei, X. G., An Improved Algorithm for Peak Detection Based on Weighted Continuous Wavelet Transform. IEEE Access 2022, 10, 118779-118788.

Point 3: In Line 122 you did mention Fig1A.

Response 3: Thanks for the reviewer's kind reminder. We apologise that the image is not reflected in the text. We've revised it in the manuscript. The revised parts in this version of the manuscript can be found in line132. I hope my response will be satisfactory.
Lin132: The road is constructed with a 4 cm SMA-13 surface course, a 6 cm AC-20C middle course, and an 8 cm AC-25C base course, as shown in Figure 1 (a).

Point 4: Line 135 need to mention Fig2a and 2b, with more details.
Response 4: Thanks for the reviewer's kind reminder. We apologise that the image is not reflected in the text. We've revised it in the manuscript. The revised parts in this version of the manuscript can be found in line146-147,148-149. I hope my response will be satisfactory.
Line146-147: Prior to the test, the exact location of the buried sensors was verified and marked by the rear wheels of the truck, as shown in Figure 2(a).
Lin148-149: The axle load of the rear axle (single axle dual wheel set) is controlled at 10t by loading and unloading yellow sand, as shown in Figure 2(b), while the axle load of the front axle (single axle single wheel set) is 2.8t.

Point 5: You mention (The inflation pressure of each tire is maintained at 1.2 MPa throughout the test. The axle load of the rear axle (single axle dual wheel set) is controlled at 10t by loading and unloading yellow sand, while the axle load of the front axle (single axle single wheel set) is 2.8t. During the calibration test, the vehicle passes a control point at different speeds (10, 20, 30, 40 km/h) to apply a dynamic load. At the same time, a high-frequency data acquisition system collects the road dynamics signals provided by the sensors.) Why select these testing condition? Need to add more details.
Response 5: Thanks for the reviewer's good question. We appreciate the reviewer's deep insight into the topic. According to the Chinese standard JTG D50-2017, the standard axle load of the vehicle is specified in the asphalt pavement design, in which the rear axle weighs 10t and the front axle records. As for the determination of the vehicle tyre pressure, the team after research, in the actual situation, the vast majority of truck drivers in the actual transport will set the tyre pressure to 1.2MPa. For the choice of speed, according to the actual situation and safety needs to determine the maximum speed of 40Km/h, gradient of 10km/h. In addition, where clarification is needed we have added it to the manuscript. The revised parts in this version of the manuscript can be found in line150-152. I hope my response will be satisfactory.
Lin150-152: The air pressure and axle load mass of the above truck tyres were in accordance with the Chinese norms JTG D50-2017 and the actual situation.

Point 6: In Line 150-151 (These results suggest that the temperature difference within the layers of the pavement structure was minimal, likely due to the cloudy weather.) How the result can suggest ? Is there any stand for temperature level?

Response 6: Thanks for the reviewer's good question. We appreciate the reviewer's deep insight into the topic. In general, due to the strong solar radiation in summer, coupled with the strong heat absorption capacity of asphalt pavement, in sunny conditions, the pavement temperature can reach 50 ℃. The temperature at the bottom of the pavement is lower, and the temperature difference between the bottom of the pavement and the bottom is more than 20 ℃. This situation has a large impact on the deformation of the sensor. It is necessary to correct the temperature of the collected data, and the correction coefficient is in accordance with the Chinese standard JDG D50-2017. so the road surface temperature is measured, and at the same time, the temperature of the bottom of the pavement is determined according to the temperature sensor at the bottom of the pavement.

Point 7: Fig.3 You need to discuss which method use to remove this noise.

Response 7: Thanks for the reviewer's kind reminder. We apologise that the noise reduction method is not reflected in the text. The noise in Fig. 3(a) was removed by wavelet de-noising method. The revised parts in this version of the manuscript can be found in line170. I hope my response will be satisfactory.

Line170: Figure 3(b) represents the data after wavelet de-noising, where the three peaks are clearly visible.

Point 8: I found few result in Section two and some part of Method in result and discussion

Response 8: Thanks for the reviewer's comment on this. We have enrich the results in the revised manuscript.

Point 9: Still need to clear show how you collect these data and noise reduction which can led for abnormal data

Response 9: Thanks for the reviewer's kind reminder**.** Thanks for the reviewer's kind reminder. We apologise that related content is not reflected in the text. Based on the reviewers' comments, more information about the data sources has been added to the manuscript. The revised parts in this version of the manuscript can be found in line123-126. I hope my response will be satisfactory.

line123-126: The sensors used are strain sensors, which undergo a recoverable change in their internal structure when subjected to stress. The structural change leads to a change in the electrical signal output from the sensor, which reflects the deformation of the sensor and thus characterises the deformed condition of the pavement. The signal output of the sensor is collected in real time by a data collector when a vehicle passes over the pavement, thus obtaining a large number of signal values that reflect the deformation of the pavement.