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Structural health monitoring meets data mining

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Stellingen behorend bij het proefschrift “Structural Health Monitoring Meets Data Mining” van Shengfa Miao

1. Temperature influences the natural frequencies of concrete bridges: when temperature increases, natural frequencies decrease, and vice versa. Different modes have different sensitivity to temperature changes, and generally speaking, high-frequency modes are more sensitive to temperature (*Chapter 7*).
2. The influence of vehicle mass on natural frequencies is less clear. According to our experimental results, torsional modes are more sensitive to vehicle mass than other modes (*Chapter 7*).
3. Dependencies exist between sensors of different types, but they are hidden in the raw data, and we need to go through a number of operations to obtain them (*Chapter 4*).
4. Strain signals, collected with strain gauges in the sensor network, are mainly composed of three frequency components: noise (high), traffic events (middle), and baselines (low). Based on probability theory, the *most-crossing* method can separate the low-frequency baseline from other frequency components (*Chapter 5*).
5. Taking landmarks and constraints as prior knowledge, the proposed predefined pattern detection method is capable of handling patterns with deformations in both temporal and amplitude dimensions (*Chapter 6*).
6. Damage and degradation will affect the physical properties of a structure, such as its mass and stiffness, and these fundamental changes can be observed from the structure’s dynamic response, such as natural frequencies, damping ratios and mode shapes.
7. We are living in the era of “Data Rich, but Information Poor”, and urgently need data mining to bridge the gap between data and information.
8. To rise abruptly, you must accumulate steadily, and quality is based on quantity.
9. To study and not contemplate the acquired knowledge is a waste of energy, while to contemplate but to not immerse in your studies is potentially dangerous (*The Analects of Confucius* , 540 - - 400 BC).
10. As heaven maintains vigor through movements, a gentle man should constantly strive for self-perfection; As earth’s condition is receptive devotion, a gentle man should hold the outer world with broad mind (*The book of Changes*, 1044–771 BC).