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Collaborative use of ground monitoring and GPR data for the control of ground settlement in shield tunnel in soft soil

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In recent years, China's construction demand for shield tunnel in soft soil continues to increase, and the control of ground settlement in tunnel boring process affects the safety of the tunnel itself and its superstructure directly. Paying close attention to controlling the strata loss and the ground settlement by multiple means is important to ensure construction safety. In this paper, the intelligent real-time monitoring system with dual-frequency ground penetrating radar (GPR) is used to detect the quality of back-fill grouting of shield tunnel, while monitoring points are arranged on the ground surface to acquire the settlement values in real time. The collaborative analysis of ground and underground monitoring results reveals the relationship between grouting and settlement values, and realizes the dynamic guidance on grouting operation, which helps to achieve the purpose of controlling ground settlement better. Last but not least, this paper proposes an outlook on a multiple-data fusion system based on cloud computing platform to adapt to more complex and multiple data in the future, so as to achieve the higher accuracy, efficiency and intelligence of monitoring data analysis.