Chapter 8
Intelligent Engineering Construction Management:
Long-Distance Construction Management

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ABSTRACT

Urban infrastructure has a large regional span and long cycle, so it has the significant characteristics of large amounts of engineering data, strong surrounding environment uncertainty, and high engineering risk. This chapter explains how to fuse the heterogeneous information of BIM and GIS models to realize smooth roaming through the lightweight and hierarchical processing of the model. Aiming at multi-

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dimensional and high-frequency time series data, this chapter introduces the MFAD-URP abnormal event diagnosis model based on the meta-feature extraction and self-encoding recursive map technology, which is used for early warning of emergency events, and introduces the method of comprehensive engineering emergency management information system and disposal process design after emergencies. The chapter takes the remote intelligent management of the shield tunnel engineering as an example and describes how to build a platform-level multi-engineering information management system to provide effective remote guidance on issues such as progress and safety.

INTRODUCTION

Urban infrastructure is often linear, such as rail transit, roads (tunnels, bridges) and pipe gallery. These projects are characterized by large span, complex surrounding geological and environment conditions, and long construction duration. Compared with single site projects, these projects have higher risks, more prominent safety problems and create more difficulties for emergency rescue. From the perspective of smart city, long-distance projects should be managed more effectively in accordance with their engineering attributes in order to ensure the city safety. This part discusses the following four aspects: information organization, anomaly detection, emergency response and application cases.

Information Organization and Transfer based on GIS and BIM Fusion

Long-distance engineering construction has the characteristics of long span and long time. The collection of information should not only fit in with the details of design and construction, but also coordinate the rationality of the entire system globally and do a good job in information transfer and interoperability from micro to macro, and between different scales, granularities and stages. There are large amounts of heterogeneous data from multiple sources in long-distance engineering construction. These data are very important for intelligent construction management, so establishing a unified information integration model that contains massive data with different levels of fineness forms the basis for intelligent engineering management in long-distance construction projects.

Long-distance engineering, as a civil engineering integrated closely with the terrain, usually uses GIS (Geographic Information System) technology as the platform for overall information expression of the line to meet the needs of engineering integrity, globality and macroscopic expression. However, the details of the specific points of the project are complex and often need to be described by using the BIM (Building Information Modelling) model as a carrier. Because BIM and GIS information models are different in terms of storage and expression, it is necessary to use certain information mapping methods for the exchange of BIM information and GIS information.

Literature Review

For a long-distance engineering project,it covers up to hundreds of kilometers and usually cuts through a series of varying environment, so it is more difficult than common projects.