A Brief Overview of 3D Real Scene Construction in China

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SUMMARY

As a digital space of reflection and expression to human production, life and ecological space in a realistic, stereo, and time sequential way, 3D real scene of China(3DRS) is a new type of fundamental surveying and mapping product together with a new type of national infrastructures. 3D real scene can provide the universal spatial foundation for all industries of social-economic development. The characteristics of 3D Real Scene mainly include five aspects, which are as follows: from abstract to realistic, from static to sequential, object-oriented, from interpretation to understanding and whole-space, as shown in Figure 1. In order to meet the needs of 3D real scene construction, we have built a full-process technical system including data collection, production, database construction and services. First, a set of light-weight mobile laser scanning system supports integrating data collection from indoor to outdoor, from ground to underground. The main features of the system are: based on RTK+IMU+SLAM method; good quality of point cloud, well distributed, with high precision; solving the problem of obtaining spatial data in indoor or other hidden areas in cities (cost, reliability, etc.). Secondly, we also have developed a software of intellectual data processing for 3D real scene. It can generate DEM, DOM and DSM, it is also designed for semantic automatic modeling of indoor and outdoor. In particular, the software can have the capability of automated joint modeling of aerial and ground imagery. It uses aerial and ground images as multi-source data, automatic coarse registration and fine registration are performed using aerial and ground images with large scale differences to ensure the dense matching of subsequent aerial-ground images and the accuracy of the reconstruction model, as shown in Figure 2. Thirdly, we have broken through technical difficulties such as geometric information compensation, semantic information conversion, reconstruction and integration, and entity relationship processing, we have developed an intelligent transformation production software for geographic entities, to achieve the conversion of existing geographic information and geographic entities. In addition, we are studying Geo-entity MA identification to facilitate the unified

management of geographical entities; and based on cloud native technology, we also build a computing and storage support environment for elastic expansion, high-performance computing, and domestic innovation to meet the needs of large-scale and efficient computing and storage.