Development of visualization system of 3 dimensional multi-scale data by mago3D

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Abstract

In 2012 the Ministry of Land, Infrastructure and Transport announced the "CIM" diffusion promotion policy, construction in the civil engineering field Two-dimensional CAD data sharing operated by the structure of CALS / EC began to shift to share based on three-dimensional model data.

Construction The CALS / EC system is a standardization that uses two-dimensional data as delivery data, creation using a desktop environment is mainstream, and different data structures are developed based on own development and customization by construction companies and products, It was an obstacle to use.

When technicians who have been manipulating two-dimensional data so far handle three-dimensional model data, handling of three-dimensional data having more information amount than two-dimensional data becomes particularly important .

In the era of 3D data modeling, since review of CAD data up to that time was done and input cost increased, handling on the premise of mutual use became required.

Currently, in Japan domestic, active learning of input 3D model data, etc. are actively carried out to promote learning of operators and promotion of 3D model data construction promotion.

- Why is the cloud-based CAD API a trend?

In sharing 3D data, in the process of combining a precise 3-dimensional data model created by a desktop machine with a model of another construction site, work on a stand-alone desktop machine is very inefficient and the entire project Sharing the model space itself, it has evolved to change the model of responsibility while confirming each other. As a result, it is necessary to implement data I / O according to the operation of the user on the server side in manipulating the data, and most of the functions of the CAD became executable on the server side.

This is the reason why the cloud-based CAD API is now a trend.

- From product model to service model

Due to the shift of needs to sharing three dimensional data models, most CAD products with APIs implemented on the server side will be transitioning from the previous product model to the service model.

In the product model, only the user who possesses the package can perform the operation, but in the service model it is also possible to perform operations such as temporary use, browsing, searching, changing attributes only, including these Enlargement can be expected.

In this presentation, we conduct a technical investigation on two platforms "Autodesk Forge" and "mago3D" which are likely to become mainstream of 3-dimensional model data sharing of BIM / CIM i-Construction, and introduce a case study of AIST's 3D multi-block data sharing platform using "mago3D" open source which makes this environment reality realized.

National Institute of Advanced Industrial Science and Technology, National Institute of Advanced Industrial Science and Technology, Center for Artificial Intelligence is aiming at "next generation artificial intelligence and robot core technology development" entrusted by New Energy and Industrial Technology Development Organization (NEDO), indoor and outdoor seamless positioning, We are working on the development of highly accurate 3D geospatial information and the development of multi-scale 3D data processing system to enable navigation of wheelchairs and pedestrians and high frequency map update.

In this case, in order to make comprehensive use of diverse multi-scale geospatial data maintained at AIST, we developed an open source based visualization system that can visualize and edit various 3D GIS files on Web browser.

The platform to be developed has the following functions.

- 3D multi-block visualization function
- 3D multi block registration function
- 3-dimensional multi-block editing function

Administrator can register three-dimensional data of the following data format from the client on the server side. IFC, OBJ, DAE, OSG, PLY, CityGML and LAS.

Registered three-dimensional multi-block information is managed using the PostgreSQL database of the server.

Administrator can move, delete, and modify blocks of a part of the layer of the registered three-dimensional multi-block on the edit mode by mouse operation.

User create a new layer from selected blocks in a part of the three-dimensional multi-block displayed on the screen, and also create a new layer from merge two layers from the registered layer.

In order to realize such functions, we adopted mago3D's recommended nginx + tomcat + postgreSQL application configuration.

The data used as a three-dimensional multi-block uploaded to the server is converted into compact 3D tile data optimized by the "F4D converter".

Converted F4D data automatically register to the database and can be operated with a 3-dimensional multi-data viewer operating on the user's browser.

In this case, since various origin data are handled on the mago 3 D + Cesium platform, we got many new task that does not occur with a simple single model display.

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