SUPERMAP COMMUNICATIONS

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SuperMap GIS 2024, evolution for stronger geospatial intelligence

Smart Angat, a pioneering solution by RASA and SuperMap in the Philippines

The Department of Land's initiative in Thailand: enhancing public access to land information

Who is SuperMap?

Founded in 1997, SuperMap is a platform software and application software manufacturer focusing on Geographic Information Software (generalized GIS) and Geospatial Intelligence (GI), and a key player in Information Technology Application Innovation Industry, Spatio-Temporal Big Data, Artificial Intelligence, and Virtual Reality. It consists of SuperMap Software (parent company, stock code: 300036), wholly-owned subsidiaries, and holding subsidiaries, as well as domestic branch offices and agencies. In 2022, the annual revenue reached 232 million USD (1.6 billion RMB).

1997
Founded

How has SuperMap performed so far?

Together with more than 3,000 Vendors and hundreds of thousands of developers, SuperMap empowers the informatization of governments and enterprises in nearly 100 industries. It has developed distributors and partners in over 50 countries and SuperMap GIS end users in over 100 countries. Now, SuperMap ranks 1st in the GIS software market in Asia and 2nd globally.

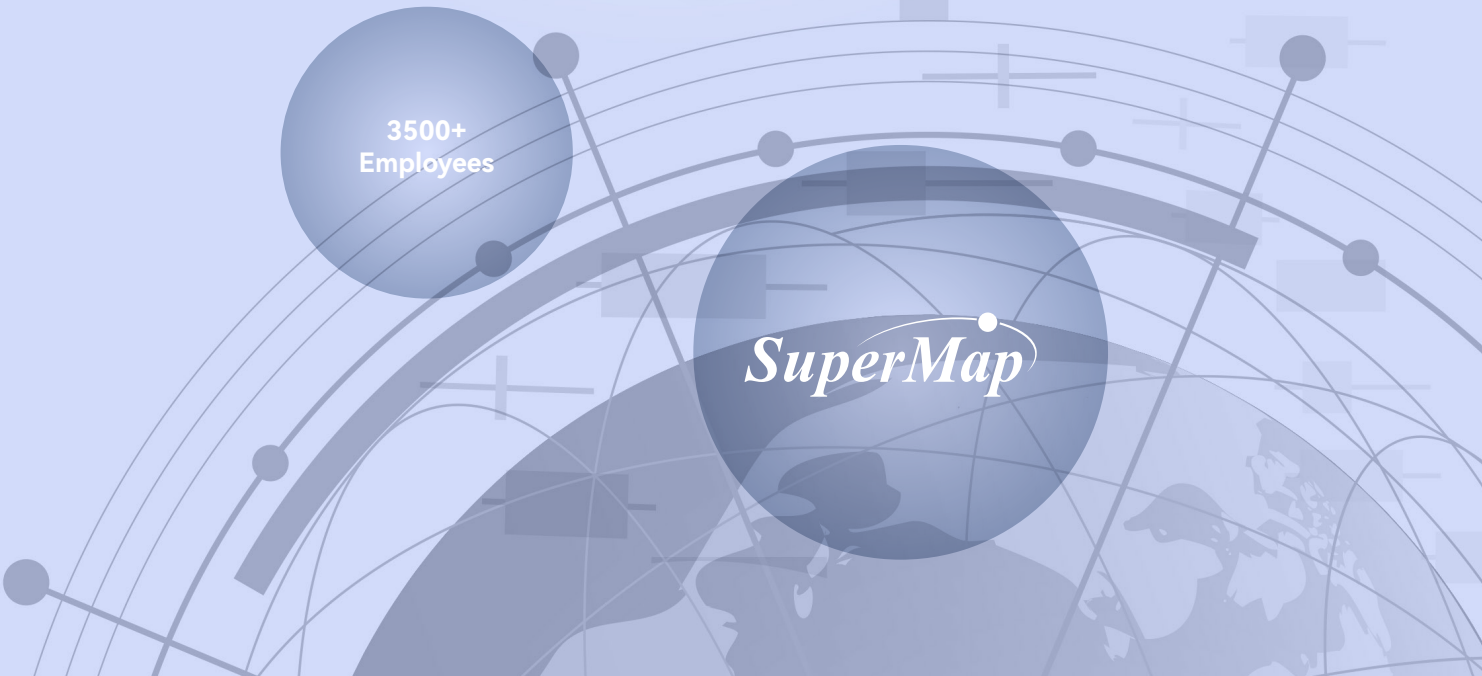
100+
Countries'
Users

What will SuperMap be?

With “Innovate Geospatial Intelligence, Elevate IT Value” as the mission and “Light up Every Corner of the World with Geospatial Intelligence” as the vision, SuperMap will keep providing advanced GIS technologies and products to more global users.

1000+
Partners

3500+
Employees



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FOCUS

CASE STUDY

Focus | SuperMap GIS 2024, evolution for stronger geospatial intelligence

SuperMap GIS is a large-scale package of GIS platform software for 2D and 3D integrated spatial data acquisition, storage, management, analysis, processing, mapping and visualization, as well as a development platform for various industries. After more than 20 years of technological advancement, SuperMap has developed a cloud-edge-terminal integrated SuperMap GIS product architecture, including cloud GIS server, edge GIS server, terminal GIS, and SuperMap Online for online GIS services.

This year, with the geospatial intelligence widely applied to natural resource governance, urban operation management, social governance and other fields, SuperMap GIS 2024 has been further updated based on SuperMap GIS 2023 to provide stronger intelligence. The integration with artificial intelligence (AI) has further expanded the capabilities for users to process data, manage businesses and make informed decisions.

Another main upgrade is the release new remote sensing image processing server software product, which has enhanced image fusion, true color output, image color leveling and other capabilities, and added new tools such as image quality inspection, and tensile deformation detection.

In this issue, we'll explore together parts of the new features of SuperMap GIS 2024. Welcome to download the software and have a trial.

AI image generation, a new productivity of geographic space design

The rapid development of AI has brought about continuous breakthroughs in the multi-modal development of large models. Among them, the multi-modal technology of generative tasks represented by AI image generation has gradually matured, promoting the development of the geographic spatial planning and design industry. It also indicates the new development stage of intelligent design.

Geospatial design adopts advanced concepts of spatial design and combines geographic spatial information to complete the design of two- and three-dimensional urban space, urban environment, building layout and buildings image.

In the traditional geospatial design process, there are many time-consuming manual tasks such as the generation of initial concept maps, the implementation of preliminary plans, and the modification of following designs. Using traditional design software to carry out geospatial design means incurring huge manpower, time and budget costs.

Based on large models and multimodal technologies, SuperMap has developed an industry application of AI image generation, which can generate high-quality renderings in batches within seconds, helping designers shorten the design process and solve problems in inefficiency and time consumption. It will produce form new quality productivity and empower geographic spatial design.

Typical functions of AI image generation application

The AI image generation application is the application of multimodal technology in vertical industries. Its main functions cover three major directions: AI image generation, secondary editing, and model management, which can help improve quality and efficiency. The following will introduce several typical functions in detail, including image generation by text, image generation by image, partial redrawing, super-resolution reconstruction, image generation by vector extraction, and generated image style fine-tuning.

- **Image generation by text**

As the most classic function of AI image

generation, image generation by text can help designers quickly implement their ideas. Designers only need to enter the text description of the desired image and wait for a few seconds to get multiple high-quality images with diverse design styles. SuperMap AI image generation application provides a massive prompt word library for planning, and you can generate high-quality concept images with a simple click.

As shown in the following examples, through the simple description like "commercial building, evening, glass curtain wall" combined with the "commercial building" style, conceptual maps of commercial blocks in the evening can be quickly generated in batches.

- **Image generation by images**

The controllability of image generation is a key requirement for industry applications. In scenarios where accurate image generation is required, the reference image constraints can meet the needs of both creativity and accuracy. Controlled image generation can simultaneously support single or multiple constraints based on the line draft, outline, depth, line segment, semantics, graffiti, color, and light and shadow of the reference image to achieve controllable output effects.

For example, the overall structure of the building is constrained by line drawings, and the ambient light and shadow are constrained by glass curtain wall buildings. The two are combined to generate an architectural design drawing that takes into account both structure and light and shadow.

- **Partial redrawing**

Partial redrawing is used for automatic image repair and intelligent image modification. The redrawing area can be customized. The AI algorithm automatically redraws according to the picture description, accurately repairs and optimizes the partial area in the picture so as to provides designers with a variety of repair results for reference, making creation easier.

Figure 1: Partial redrawing

In figure 1, the high-rise building to be modified is partially painted and redrawn to generate a new high-rise building that conforms to the picture structure of the original image.

- **Super-resolution reconstruction**

Super-resolution reconstruction technology converts low-resolution images into high-resolution versions through generative AI amplification algorithms and detail enhancement, significantly improving the clarity and detail of the image. It is an important post-design process.

In figure 2 below, the low-resolution, low-quality blurred image generated in the previous stage is processed using super-resolution reconstruction technology to generate a high-quality image after high-definition enlargement.

Figure 2: Examples of super-resolution images

- **Vector extracted image generation**

After the introduction of AI mapping technology, generating urban planning concept maps can be completed in only three steps. First, use the AI model to automatically extract the content that needs to be generated (such as buildings, etc.) from the floor plan, and then intelligently stretch the height of the building to obtain a three-dimensional image of white model at a certain perspective, and finally generate a three-dimensional scene image of a certain perspective and style through constrained rendering. The entire process does not require modeling expertise, thus the design threshold is lowered.

As shown in the figure 3, the building roof vectors are extracted from the master plan, and then the 3D white model of the building is stretched. After the 3D white model image is intercepted, the 3D scene concept map of the area is generated through constrained image generation.

- **Image style fine-tuning**

How to generate pictures with exclusive styles for specific scenarios? For example, in the scenario of rural renovation design, more rural factors are needed; when planning the master plan design, a standard color scheme is needed, etc. AI image generation provides exclusive style fine-tuning capabilities, and just a small amount of picture materials can be used to create a fine-tuning model with user-customized styles.

In figure 4&5, a small number of commercial building images can be used to generate a unique commercial building style fine-tuning model to use in generating images after a short period of training with low threshold. At the same time, the product has built in 8 commonly used industry style fine-tuning models, and users can upload local style fine-tuning models for use.

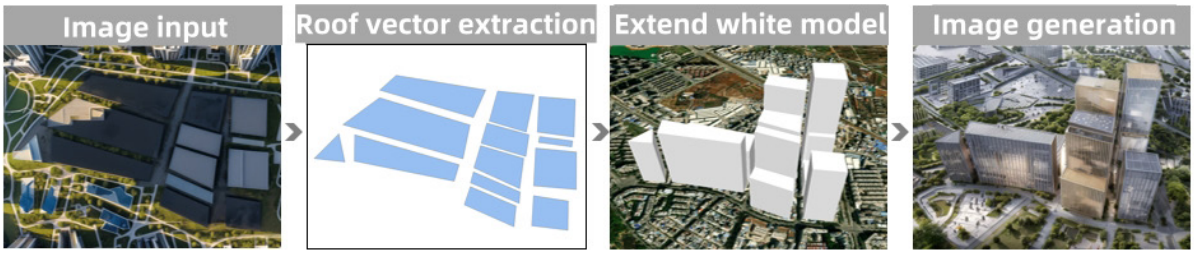


Figure 3: Example of image generation by vector extraction

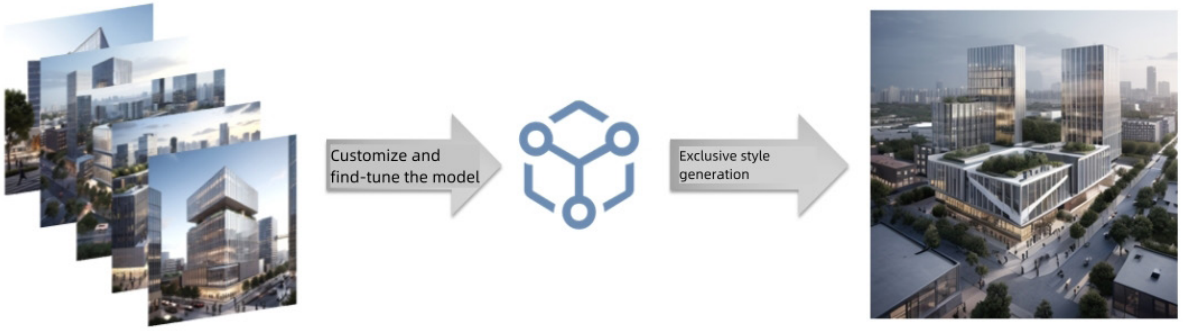


Figure 4: Customize your own image style

Figure 5: Examples of some built-in exclusive image style models

Application scenario display

The AI image generation application will help accelerate the spatial planning and design process. From concept generation to detail optimization, it provides a variety of image generation modes, covering most scenarios in the field of spatial planning and design, providing more efficient solutions for planning, urban design, spatial transformation and other scenarios. Its main application scenarios include:

- **Quick implementation of concept design**

The application can automatically generate planning and design concept drawings. It provides a variety of styles and options to choose, helping designers quickly determine the design direction and style in the early stages. It helps improve the efficiency at the early design stage, and accelerates the process of concept verification.

- **Precise design and intelligent planning**

AI image generation constraints generation results. Sketches can be converted to finished renderings with one click, and rendered in proportion. Architectural and landscape planning and design plans of different styles and functions can be intelligently generated to simulate building layouts, and optimize greening configurations.

- **Generation of high-quality concept maps for fixed-view 3D scenes**

AI generation can be used to generate high-precision and efficient 3D scene images. At the same time, spatial layouts under different environments and lighting conditions can be quickly simulated to display the overall design details and realistic effects of buildings and landscapes.

- **Spatial Planning style migration**

Customize your own style through the application. You can migrate the existing space planning and design style to the new plan to quickly generate design renderings with a unified style.

- **Optimization of details**

The application can improve the functionality and aesthetics of building images without changing the overall design. It can automatically handle tedious and repetitive design tasks through image redrawing, repair and fine-tuning.

The application of AI image generation for spatial planning can will only improve the design efficiency of geospatial designers, but also enhance the creativity and flexibility of design works. Designers can easily generate and optimize design plans, quickly respond to customer needs, give spatial planning and design more possibilities and room for innovation, bringing a new perspective and direction to the planning and design industry. In the future, with the continuous advancement of AI technology and cross-industry integration, AI image generation is expected to achieve image creation with higher precision, larger scale, and more professionality.

SuperMap 3D WebGIS evolves again to provide powerful data loading capabilities

Currently, the Web3D client in B/S (browser/server) mode is highly favored in the GIS (geographic information systems) market thanks to its low maintenance cost, easy access, cross-platform compatibility, high data sharing feature and real-time interaction. It is particularly suitable for scenarios that require rapid deployment, wide access and flexible application, such as 3D Real Scene China, a 3D map of natural resources, and smart parks.

Since SuperMap iClient3D launched in 2011, SuperMap has continued innovation in the field of 3D WebGIS. In 2015, SuperMap released SuperMap iClient3D, its first plug-in-free client based on CesiumJS. In 2022, in order to meet the strong demand for 3D GIS, SuperMap released a new plug-in-free client—SuperMap iClient3D based on WebGL.

In November 2023, to meet higher data rendering performance requirements, SuperMap adopted the latest Web technology and released the updated SuperMap iClient3D client based on WebGPU. The SuperMap iClient3D product provides a wealth of examples and APIs (application programming interfaces), allowing users to easily achieve high-performance loading of massive GIS data, comprehensive spatial analysis and query, and high-fidelity rendering of 3D scenes in a Web browser.

This year, SuperMap iClient3D for WebGL/WebGPU 2024 (hereinafter referred to as "iClient3D 2024") continues to upgrade spatial data loading, spatial analysis query, large-scale scene rendering and other capabilities to provide users with a more powerful, flexible and efficient Web3D rendering engine. In addition, SuperMap has further upgraded SuperMap iEarth 3D Earth WebApp which provides users with a more intuitive and easier-to-use 3D Web application experience.

More powerful: multi-source spatial data loading

The integration of multi-source spatial data is the key to building an efficient business application system. Bringing together spatial data from different sources/types/scales provides decision makers with a more comprehensive perspective of data. This year, iClient3D 2024 has further

enhanced the multi-source spatial data loading capability, with breakthroughs in multi-source data, data usability, data security, loading efficiency, and data sharing.

As an open vector data format, MVT (Mapbox Vector Tile) can be used to efficiently transmit and render vector data on the Web and mobile devices, and maintain the spatial query and editing capabilities of vector data.

MVT has become an important data source for various applications. iClient3D 2024 supports loading MVT data from more sources; it supports loading MVT data published in WMTS mode, direct loading of GeoJSON data in MVT layers, and the loading of MVT data released by SuperMap iServer in multi-subdomain mode. It also supports loading MVT data encrypted by AES (Advanced Encryption Standard), effectively improving data security through dynamic encryption capabilities.

In addition, iClient3D 2024 optimizes the display effect of MVT data and supports the display of MVT line annotations in 3D text format. It can randomly adjust the text direction according to the rotation of the camera to better conform to the 3D visual effect. When the MVT data is displayed on the model surface, the text label can be automatically displayed according to the model height, so that the text will not be blocked by the model and terrain.

Figure 1: Application effect of MVT data in iClient3D 2024

Point cloud data has become an indispensable data foundation for urban planning, digital power grid and other fields due to its high precision and rich information it represents. iClient3D 2024 supports data layering and coloring based on the characteristic values of point cloud data such as category, intensity, altitude, etc., which can not only highlight specific features in the point cloud, but also observe the point cloud data more intuitively.

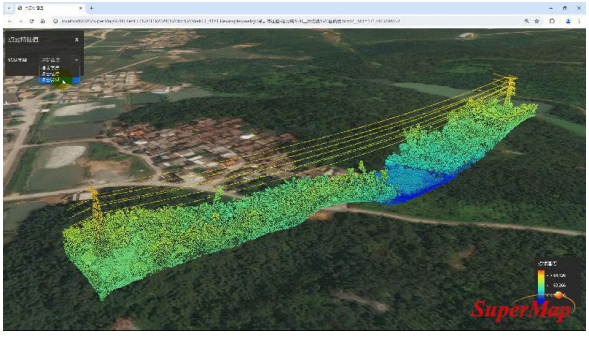


Figure 2: Point cloud visualization based on multi-factor characteristic values

In terms of data usability, iClient3D 2024 adds support for the layer directory tree function for point cloud visualization based on multi-factor eigenvalues. Through an intuitive hierarchical

structure, it clearly presents different parts and details of the data, greatly improving the visualization management and data organization efficiency of BIM component data, such as layer visibility control and positioning.

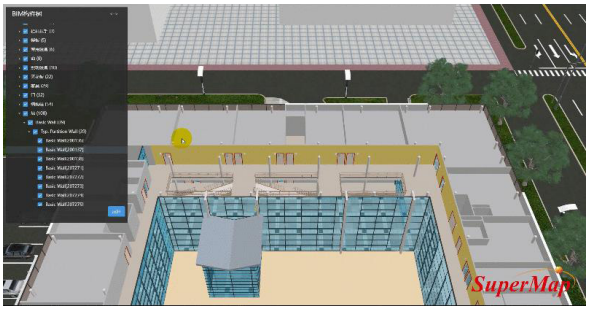


Figure 3: BIM component visualization and management based on layer directory tree

In terms of data sharing, iClient3D 2024 now supports loading S3M 3.01 data that complies with the CH/T 9040-2023 standard in surveying and mapping industry, as well as 3D Tiles 1.1 data and I3S 1.2 data specified by the OGC (Open Geospatial Consortium) community standard, thereby improving the accessibility and usability of geographic information.

More comprehensive: spatial analysis and query capabilities

This year, iClient3D 2024 further enhances spatial analysis and query capabilities to support more accurate and comprehensive decision-making. On the one hand, iClient3D 2024 adds MVT-fitted oblique photography 3D model display. It supports making thematic maps that meet business needs using the same set of data, and querying object attributes. It also meets the needs to display large volume. On the other hand, iClient3D 2024 adds support for the display of sunshine analysis and shadow analysis results superimposed on the model surface, so that the sunshine duration and shadow duration at any position on the model surface can be viewed in real-time and intuitively, providing more intuitive decision support for urban planning, etc.

Figure 4: Sunlight analysis and shadow analysis effects in iClient3D 2024

In addition, iClient3D 2024 adds support for directly querying model attribute information through S3M tile data. Compared with the original method of querying attributes through data services, this method is more convenient and simpler to operate. This will greatly simplify the process in querying user attribute, and shorten the time needed, effectively improving the attribute query performance of massive data. For example, using 200 million model objects as test data, when performing the same query operation, the query time of this method and the original method is 0.4 seconds and 2.2 seconds respectively.

More vivid: high-fidelity scene rendering

To meet the business needs of digital twin water conservancy, iClient3D 2024 has added support for presenting complex water field data (scientific calculation results) in an intuitive and vivid way to help users fully understand and analyze water field characteristics.

iClient3D 2024 can not only dynamically display water flow velocity and flow direction information in the water field through particle effects in the three-dimensional scene, but also realize the three-dimensional visualization of multi-time series and multi-attribute water field data. By switching to express the dynamic changes of business attributes such as water temperature and water depth over time, it helps users analyze and understand the water body change process from different angles.

To meet the requirements of various businesses for high-fidelity scene rendering, iClient3D 2024 comprehensively optimizes the water surface visualization effect, and newly supports setting flow rate, flow direction,

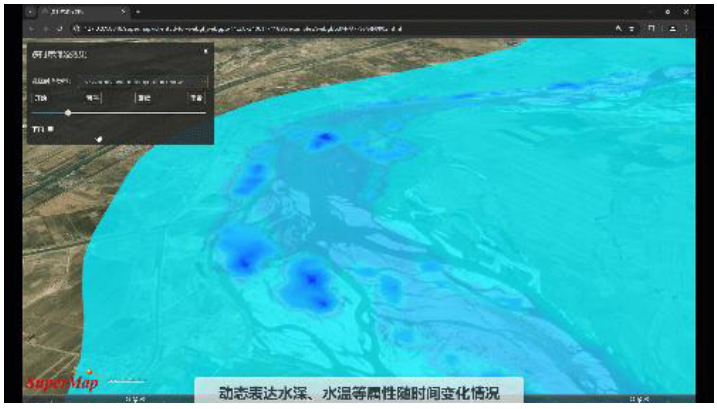


Figure 5: Intuitively displays complex water field data in iClient3D 2024

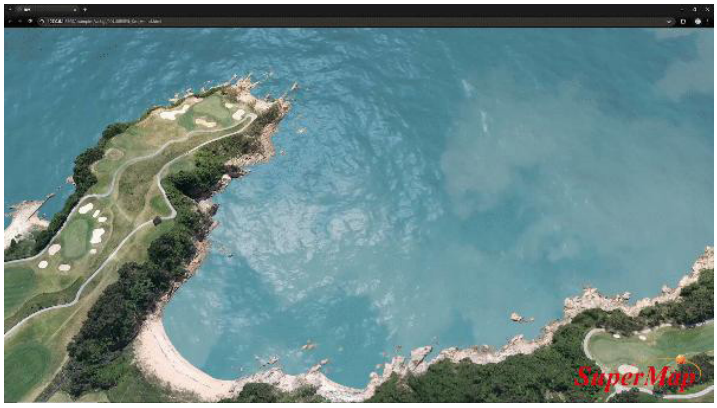


Figure 6: iClient3D 2024 supports expressing realistic water surface effects

range, and water surface color, which can be used to simulate lakes and other water surface effects.

In addition, iClient3D 2024 provides more realistic model lighting and PBR effects, making the light and dark transition of the model more natural, enhancing the three-dimensional sense and display effect of the model; it also simplifies the skybox usage process, supports simulating the sky through a JPG/HDR panorama, and can control the horizontal rotation angle of the skybox, thereby enhancing the realism of the scene.

As shown in the figure below, iClient3D 2024 not only uses model translucency, transparent sorting, floodlighting and custom light sources to simulate high-tech factories, but also uses lighting, PBR materials, dynamic layers and other means to create realistic city night scenes.

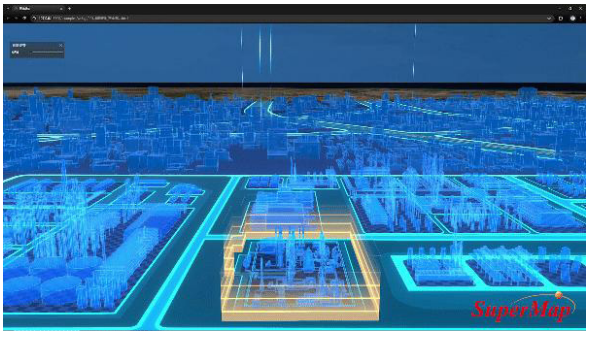


Figure 7: iClient3D 2024 supports the creation of high-tech factory scenes and realistic city night scenes

SuperMap iEarth WebApp is updated synchronously

SuperMap iEarth 3D is a full-featured 3D WebApp developed based on SuperMap iClient3D for WebGL. It has the characteristics of no plug-in and good compatibility. It provides the ability to efficiently load and manage multi-source heterogeneous 3D data, and can quickly build 3D visualization scenes, and browse, query, analyze and share scenes online. This year, SuperMap iEarth 2024 further enhances spatial query and scene management capabilities.

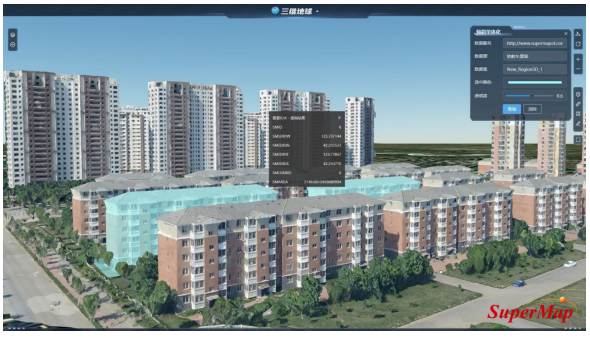


Figure 8: SuperMap iEarth 2024 supports single attribute query of oblique photography 3D models

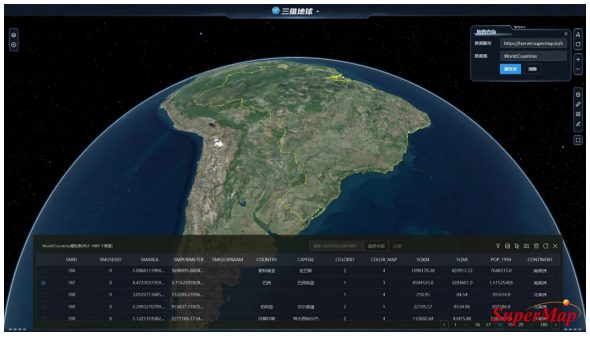


Figure 9: SuperMap iEarth 2024 supports viewing and paging the attribute table of data services, and the linkage display of data and attributes in two or three dimensions

SuperMap ImageX Pro improves both the quality and efficiency of remote sensing image production

At present, with the continuous upgrading of various satellites and sensors, the demand for data production volume and production accuracy is increasing. How to efficiently interpret, analyze and process images has become the focus of attention for various industries.

SuperMap ImageX Pro 2024 further innovates algorithms and deeply integrates AI technology to expand capabilities such as vegetation enhancement, image cloud removal, intelligent restoration of water elevation, and image quality inspection to improve the quality and efficiency of image data production.

Strengthened functions for easier image production

- **Access to multiple image sources**

To meet the access needs of more image sources, SuperMap ImageX Pro 2024 adds access to remote sensing images of BJ3N3, JL-GP, K3, or SuperView NEO-1 optical satellite sensor types; it supports using *.pix image files as reference images, expands the data source of reference images, and eliminates the need to convert image formats, thus simplifying the import process.

- **Automatic image filtering**

In the face of multi-source remote sensing images, due to differences in image acquisition time, resolution, cloud content, etc., it is necessary to screen the images to retain image data with similar time, high resolution, and less cloud content, thereby improving the quality of image production. SuperMap ImageX Pro 2024 provides an automatic screening tool that can quickly filter qualified images based on the specified time range, resolution range, cloud content, and whether there are duplicate names without the need for manual selection. This can significantly improve work efficiency when processing a large number of images.

- **More built-in processing automation**

To meet the diverse production needs, SuperMap ImageX Pro 2024 provides three major automatic processes: DOM production from panchromatic and multispectral images, DOM production from orthophotos, and DSM/DEM data production. These processes implement the T+1 mode of acquiring data on the same day and applying it the next day, greatly improving production efficiency and application speed. At the same time, the reusable nature of automatic processes is particularly suitable for regular data updates, ensuring the consistency and stability of the processing results, and bringing users a more convenient and efficient remote sensing image processing experience.

Improved processing capabilities for better image production

- **Clearer image fusion**

SuperMap ImageX Pro 2024 is based on image fusion algorithms such as Gram-Schmit and Pansharp, and supports custom sharpening coefficients to make the fusion results of panchromatic and multispectral images clearer. It also supports direct use of local files as data sources, and image fusion results can be obtained without relying on automated processing procedures.

- **Better true color output**

True color images can truly reflect the color characteristics of actual objects. However, when obtaining the original image, it may be affected by the weather, angle and other shooting conditions, and the display effect is not ideal. Therefore, in the true color output, image degradation and wave band order adjustment are supported to improve the display effect of image details; by enhancing vegetation, the display effect of vegetation areas in the image is improved; linear stretching display is provided, and automatic calculation of truncation percentage is supported. The threshold of highlight white spots is adjusted according to the image brightness, the overall brightness effect of the image is optimized, and the contrast of the image is supported.

- **More natural image color**

Affected by weather conditions, human factors, and sensor factors, the original images obtained have problems such as inconsistent color and brightness, which leads to errors or color aberrations during image splicing, affecting the visual effect of the entire image.

Image color equalization can correct the uneven distribution of image brightness, contrast, hue, and saturation based on specified color equalization processing methods to ensure that the display effect at each position of the image is basically consistent. In this version, the image color equalization algorithm has been upgraded,

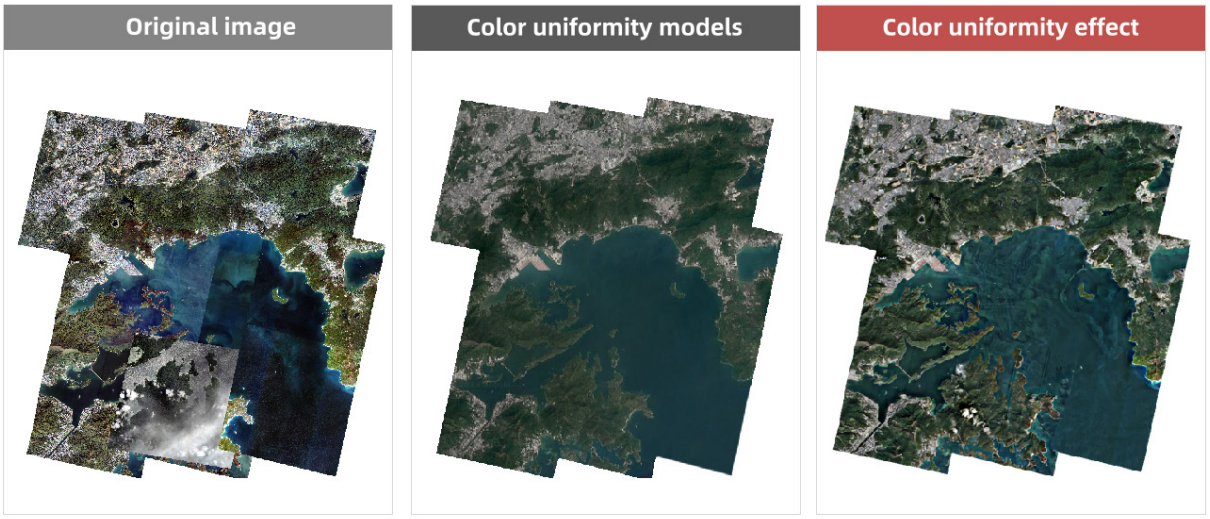


Figure 1: Image color uniformity

providing geographical color equalization templates, block color equalization and other methods, which not only ensures the uniformity of color of land objects, but also significantly improves the color uniformity of water body areas.

- **More thorough removal of fog and haze**

Affected by weather conditions such as haze, remote sensing satellites may experience color distortion, reduced contrast, and other problems. Removing haze from remote sensing images can enhance contrast and restore image detail information to a certain extent. SuperMap ImageX Pro 2024 uses an atmospheric scattering model to remove haze from images and improve image clarity overall.

Deep integration of AI makes image production smarter

SuperMap ImageX Pro 2024 also integrates AI technology to achieve intelligent upgrades in image production. The newly added cloud detection pre-trained model can automatically complete the image cloud filling work and improve the image quality. At the same time, based on AI intelligent terrain data production technology, it provides the ability to automatically repair water elevation to improve the quality of DSM results.

- **Image cloud removal automation**

Optical satellite sensors are easily disturbed by clouds in the atmosphere during imaging. Thin

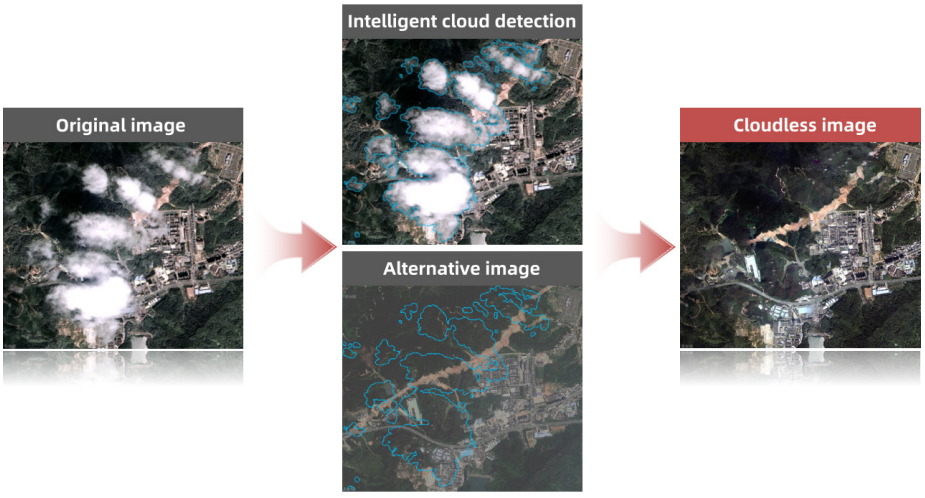


Figure 2: Image cloud removal

clouds can cause blurring of objects, while thick clouds can block objects, affecting the collection and interpretation of land data. SuperMap ImageX Pro 2024 has a built-in cloud detection model that can intelligently detect cloud areas and mosaic the images of the same area in the cloud-free image into the clouded area, while realizing automatic color uniformity processing to obtain image data without cloud obstruction, thereby improving the overall display effect of the image.

- **Water area elevation repair is more accurate**

When producing DSM data, it is difficult to match the correct points of the same name because the water area in the remote sensing image is a weak texture area, which will cause errors in the water area elevation value. Therefore, in conventional DSM production, the water area elevation value needs to be manually modified. When processing a large amount of data, manual repair work is inefficient.

To solve the above problems, SuperMap ImageX Pro 2024 has a built-in water area detection model that can automatically extract water areas in images and intelligently repair DSM water area elevation values based on specified elevation values or automatically acquired elevation values, thereby improving the smoothness of the DSM surface, significantly reducing valueless areas, and improving the efficiency of water area repair and the quality of the result data.

New quality inspection tools make image production more efficient

In daily image production, it is necessary to test the correction accuracy and edge accuracy of the orthorectified images to understand the error distribution of image correction. However, after orthorectification or image fusion, large mountains, buildings, overpasses and other objects often appear distorted. These problems used to require manual investigation and processing, which was a cumbersome process and a long production cycle.

To this end, SuperMap ImageX Pro 2024 provides image plane quality inspection and fine plane quality inspection tools to quickly locate high-risk areas and improve quality inspection efficiency; it also supports automatic inspection of deformed areas such as mountains, buildings, and road markings without manual intervention.

- **More precise image quality inspection**

Image quality inspection includes image plane quality inspection and fine plane quality inspection. Image plane quality inspection can detect the plane accuracy and edge accuracy of each image, so as to quickly understand the overall quality, single image quality and edge quality of the image; while fine plane quality inspection divides the inspection area into grids of specified size, detects the image plane accuracy of each

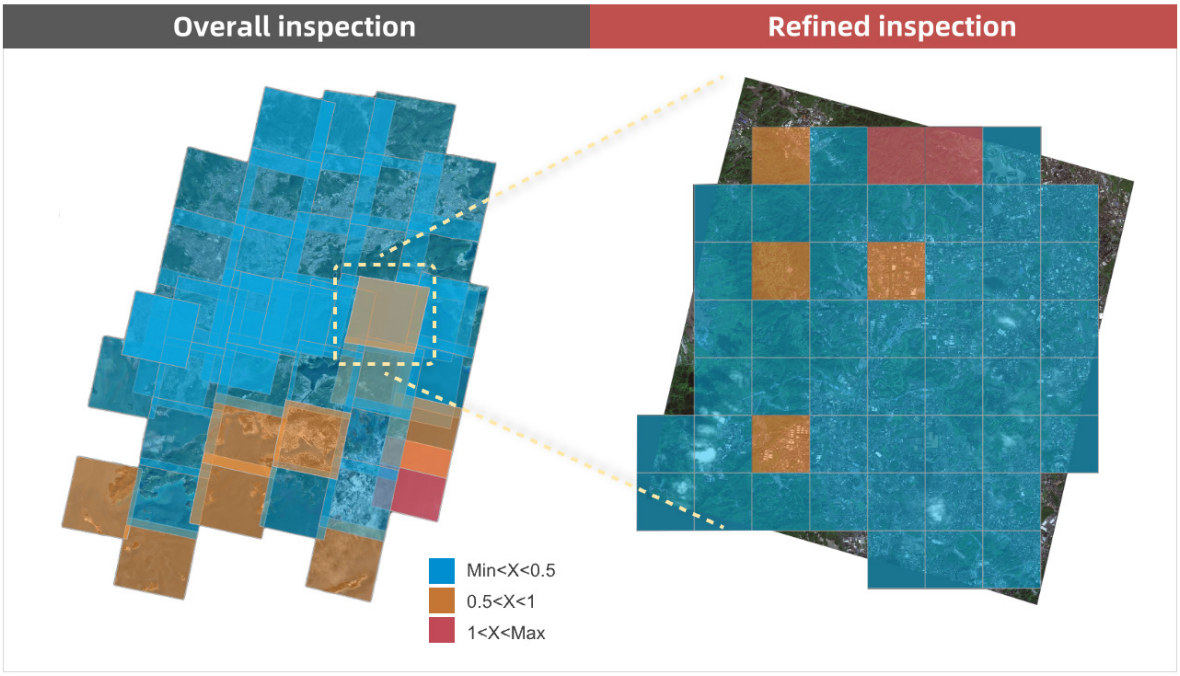


Figure 3: Image quality inspection

block, so as to understand the distribution of orthorectification errors of blocks smaller than each image area.

At the same time, during quality inspection, checkpoints can be automatically generated, and management operations such as hierarchical display, addition, deletion and modification of checkpoints are supported to obtain clearer and more accurate reports.

- **Grating deformation detection saves time and improves work efficiency**

For a long time, the inspection and repair of deformed areas have relied on manual processing. However, with the explosive growth of satellite image data and the increase in the workload, manual inspection and repair can no longer meet the needs of production operations, and more efficient automatic detection and repair methods are urgently needed. Therefore, the pattern deformation detection tool came into being, which can automatically detect the areas of mountain, building, and road pattern deformation, greatly improving work efficiency.

Algorithm upgrade to achieve high computing performance

In the process of image data production, a large amount of intermediate data will be generated. This data will not only take up a lot of storage space, but also affect processing efficiency. In actual production applications, some businesses only need to focus on the final results. To solve these problems, SuperMap ImageX Pro 2024 further improves production performance based on raster function chains. Experimental tests show that data production that originally took 372 minutes can be completed in just 73 minutes through raster function chains.

Conclusion

SuperMap ImageX Pro 2024 continues to explore and research algorithms, keeping up with the latest developments in AI technology, and is committed to making remote sensing image production more powerful and more stable. For more details, please visit SuperMap's official website to download and have a trial.

SuperMap iDesktopX 2024 achieves breakthrough in both data management and productivity

Currently, various industries are facing multiple challenges such as the surge in data volume, diversification of data types, and escalation of data security requirements. In order to effectively cope with these challenges, SuperMap iDesktopX 2024 has been comprehensively upgraded based on the original functions, including upgrading data management capabilities, improving data production professionalism, introducing new high-precision spatialization technologies, etc., to provide GIS professionals with more professional and reliable tools.

More efficient and safer, the data management capabilities are upgraded

Efficient and secure data management capabilities are crucial to the development of various industries. SuperMap iDesktopX 2024 has achieved significant breakthroughs in data management, supporting access to more types of data, improving database management and data organization efficiency, and bringing users a new data management experience.

• Multi- source data access broadens the boundaries of data management

SuperMap iDesktopX 2024 supports directly opening commonly used external vector data and image data, and further enhances the ability to directly open third-party vector data on this basis; it also supports directly opening *.gdb, *.mdb, *.json, *.geojson, *.gpkg, *.vct, *.000 vector format files; and supports using directly-opened vector files as source data for analysis tools, and outputting analysis results into common data formats.

In addition, SuperMap iDesktopX 2024 also integrates cloud storage service capabilities, seamlessly connecting to mainstream cloud storage platforms such as Alibaba Cloud, Huawei Cloud, MinIO, SeaweedFS, and AWS S3. Users can conveniently access massive data in cloud storage space in SuperMap iDesktopX 2024, or generates tiles and stores them in the cloud and shares them with other users.

• Advanced database management to build a safe and efficient data management model

In order to promote the safe and efficient operation of GIS projects, SuperMap iDesktopX 2024 adds database user management and database transaction management capabilities, taking database management capabilities to a new level.

Database user management can create multiple users/roles, among which super users can manage the permissions of users/roles to use data, effectively preventing unauthorized access and data leakage, and avoiding data conflicts and misoperations when different members use data, which will greatly improve team collaboration efficiency. In addition, SuperMap iDesktopX 2024 also adds a database transaction management function, which can avoid data corruption or inconsistency caused by failures (such as sudden power outages, operating system crashes, etc.) when importing external data into the GIS database, thereby ensuring data integrity.

• Added new data set grouping to improve data organization and management efficiency

When there is a large amount of data in the data source, it is often inconvenient to retrieve and classify the target data, and the integrity of the original grouping structure cannot be maintained during the data migration process. Based on this, SuperMap iDesktopX 2024 has a new data set grouping function. For example, multiple data sets can be grouped and managed by category. Accurate search can be achieved during use, which greatly saves time and cost. At the same time, it also supports retaining the grouping structure when importing/exporting data, which significantly improves the efficiency of data organization and management.

Efficient high-quality data production

In addition to efficient and secure data management capabilities, the production of high-quality data is particularly important. SuperMap iDesktopX 2024 has made a number of upgrades in data editing and processing analysis, further enhancing the professionalism of data production capabilities.

• Data editing is easier to use, improving production efficiency

SuperMap iDesktopX 2024 adds a new parallel copy function, which allows users to copy new line objects parallel to existing lines according to the preset distance and direction. In application scenarios where parallel line features need to be created, such as roads, railways or pipeline networks, it can greatly improve drawing efficiency. At the same time, the object drawing function is optimized to support adsorption of existing surface

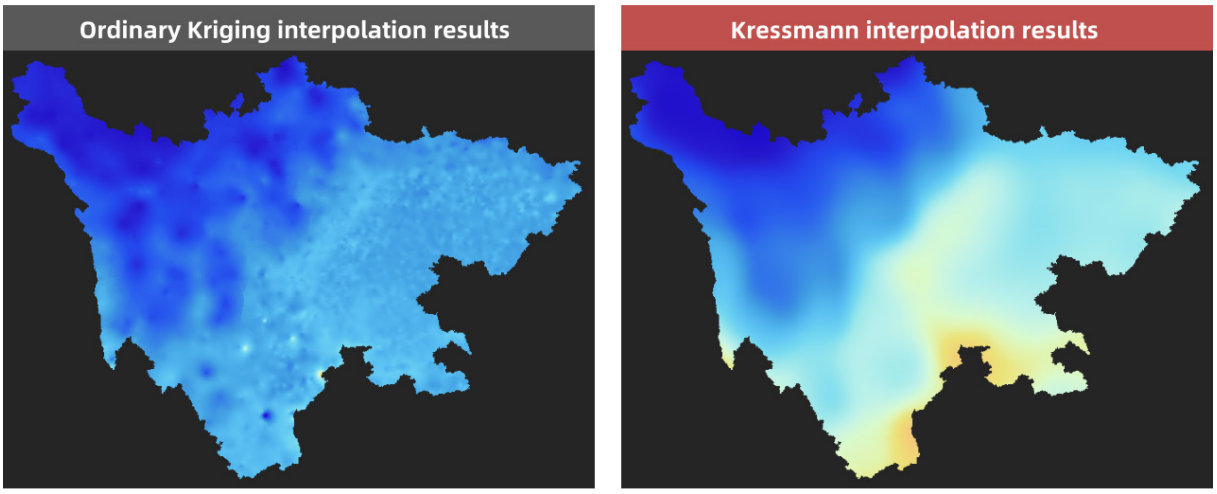


Figure 1: Ordinary Kriging and Kressmann interpolation results

boundaries or line objects during drawing to avoid topological errors during drawing.

• Processing and analysis are more professional and industry applicability is improved

In order to empower industry production with more professional capabilities, SuperMap iDesktopX 2024 has also made many optimizations in data processing and analysis: a new pipeline attribute conversion data function has been added, which supports one-click mapping of pipeline data, greatly improving the data processing efficiency in urban planning, underground facility management and other fields; a new Cressman interpolation analysis has been added, and the analysis results are smoother and more continuous than the ordinary Kriging interpolation results, which conforms to the actual situation and can better meet the application needs of the meteorological industry.

Besides, SuperMap iDesktopX 2024 has also further optimized the raster calculation function, supporting raster band calculation, and can quickly select the band information under the image for analysis and calculation, improving the applicability of the remote sensing industry.

Innovative and intelligent, a leap forward in remote sensing image production

In terms of remote sensing images, SuperMap iDesktopX 2024 introduces a number of new features to improve the efficiency and quality of remote sensing image processing; more automated processings are built-in, such as direct production of DOM based on orthophotos and one-click generation of DSM/DEM; through algorithm upgrades, image fusion, true color output, and

color uniformity are optimized; AI technology is used to achieve image cloud removal, water elevation intelligent repair and other functions, greatly improving the quality of image production. In addition, image quality inspection and pattern deformation detection tools are introduced. Pattern deformation detection can automatically detect areas with deformed mountains, buildings, and road patterns, greatly improving work efficiency.

Assisting high-precision spatialization, AI & video technology is more advanced

To realize spatialization, the requirements for data production accuracy is higher and higher. SuperMap has conducted more explorations in high-precision spatialization of multi-type videos, high-precision recognition of thick cloud in images, and improvement of geometric accuracy in image processing.

- **Video Map**

SuperMap iDesktopX 2024 adds support for high-precision spatialization of zoomed videos, which reduces the matching error by about 40% compared with similar products in the industry. In terms of video spatialization, it optimizes point registration and provides terrain data functions, which automatically obtains elevation values when puncturing points; it optimizes online video spatialization and supports real-time multi-angle point registration of rotating camera videos, which greatly improves the measurement accuracy and data production efficiency.

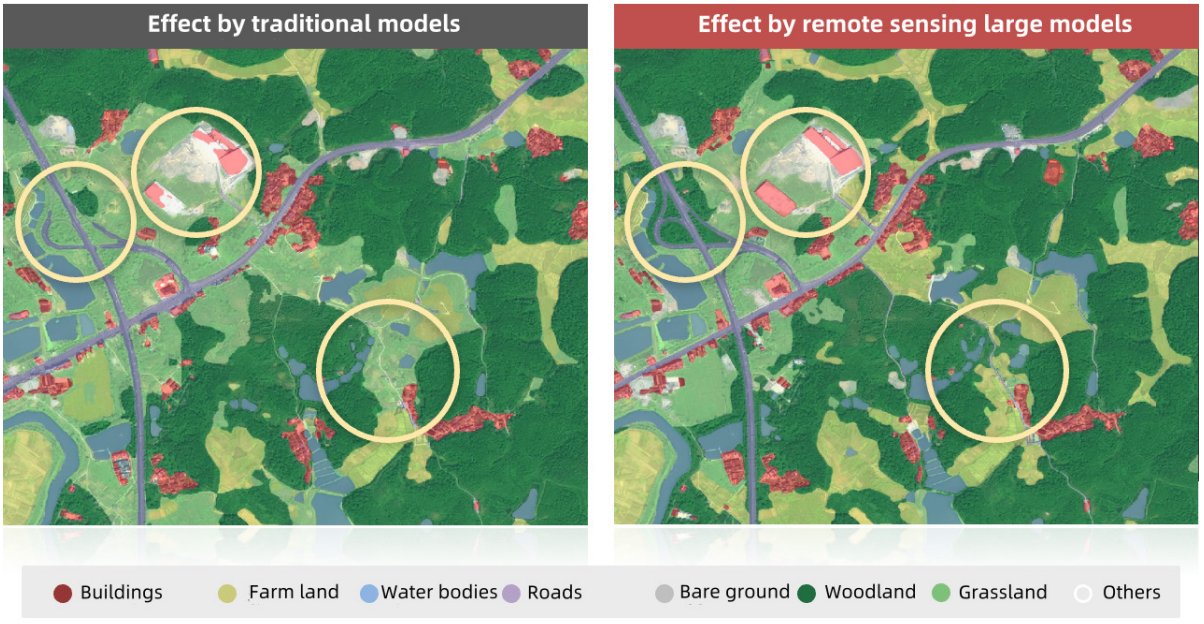


Figure 2: Effect comparison of tradition models and remote sensing large models

- **Machine Learning**

In terms of machine learning image analysis, SuperMap iDesktopX 2024 adds SAM-based segmentation capabilities without prompts, and with rectangular frame prompts, and polygon prompts, which can accurately segment targets in images; adds pre-trained models for forest extraction and thick cloud detection. In the image recognition thick cloud task, through cloud detection model optimization, the single-scene GF1-PMS cloud detection task can be completed within 10 seconds, and the thick cloud detection accuracy is over 90%; adds a large model for object classification, which can complete image object classification without complex model training process, reducing usage costs.

Optimized user experience, better interaction and performance

In addition to the above features, SuperMap iDesktopX 2024 has also optimized and upgraded product performance and interactive experience in many aspects.

- **Smoother performance**

SuperMap iDesktopX 2024's processing automation adds Spark local (multi-process) mode, which greatly improves analysis and processing efficiency. After testing the use of multi-process mode, the performance of line-surface overlay analysis tasks at the million-level has been improved by about 60%, and the performance of surface fusion tasks has been improved by about 80%.

SuperMap iDesktopX 2024 optimizes the "Generate Distance Raster" function, and the performance is more than doubled when generating surface and cost distance rasters. The larger the amount of resulting raster data generated, the more significant the performance improvement.

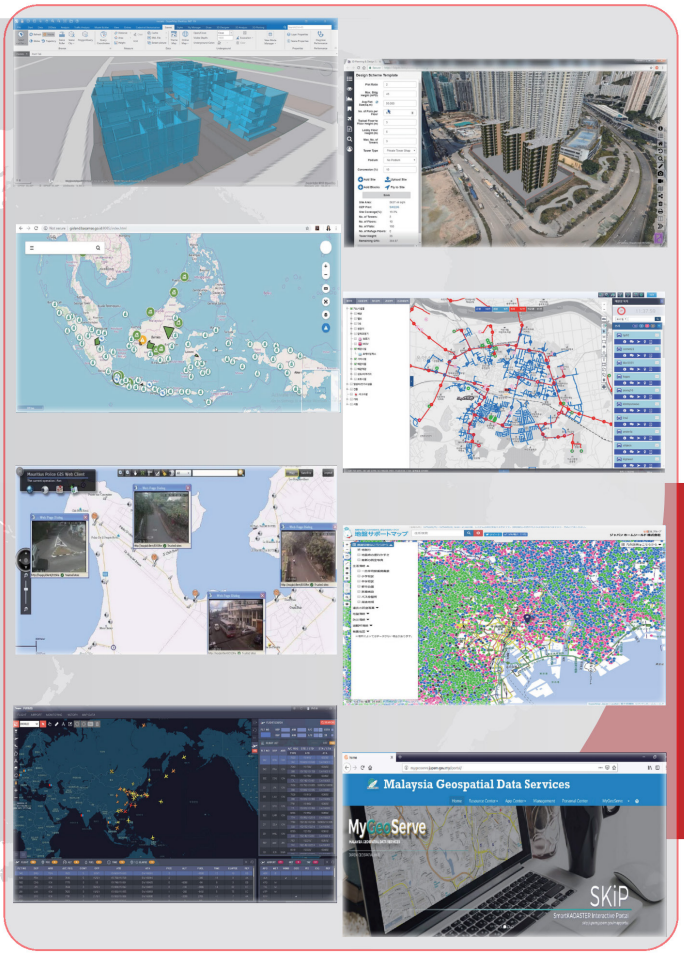
- **More user-friendly interaction**

In terms of interactive experience, SuperMap iDesktopX 2024 optimizes the custom scale list, supports setting and saving your own default scale list, and automatically applies it to newly created maps, which greatly improves the efficiency of cartography and reduces duplication of work; it optimizes the function of re-specifying data sources/data sets. Users can specify just one of them to automatically associate other data sources or data sets under the path or data source, reducing repeated operations for users.

SuperMap iDesktopX 2024 provides users with a solid geographic information software platform with efficient and secure data management capabilities, professional data production capabilities, aesthetic and practical map making capabilities, comprehensive data migration capabilities and high-precision spatial processing. Welcome to download and experience SuperMap on the official website to learn more about more specific new features.

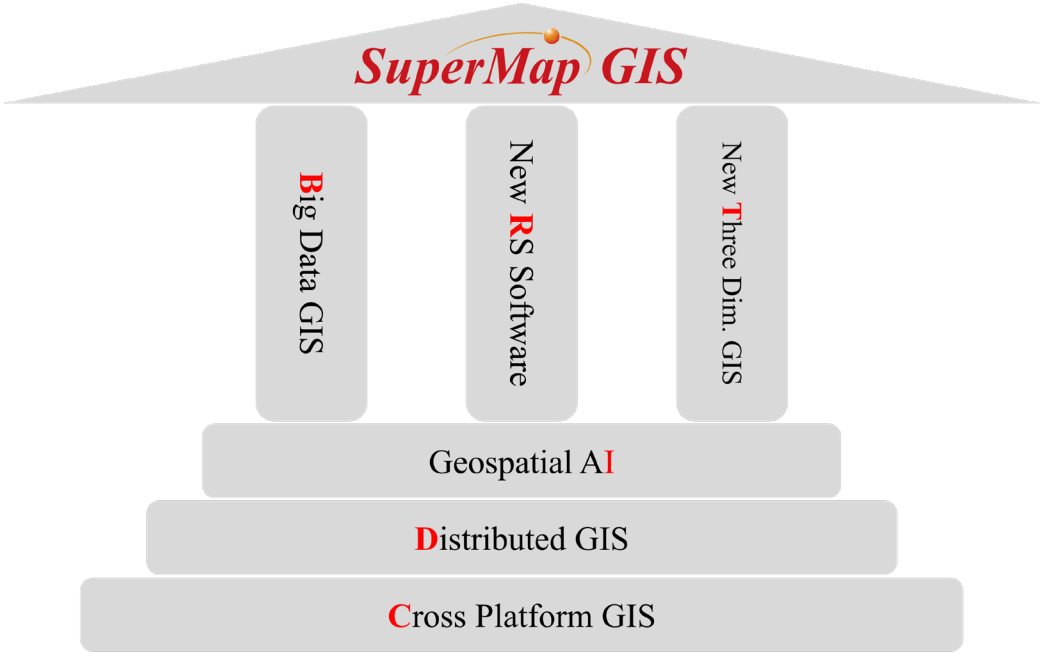
Application Cases

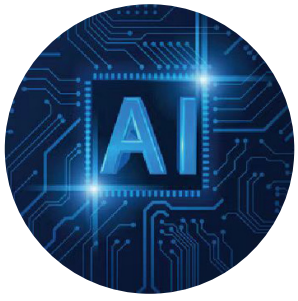
- *Municipality GIS for Nyköping, Sweden*
- *3D Underground Pipeline Management System, Germany*
- *3D Cadastral Project, Turkey*
- *Mobile AI Recognition of Water Meter, South Africa*
- *National Police GIS, Mauritius*
- *Land Property Management System, Egypt*
- *House Decision Support System, Malaysia*
- *Geospatial Data Services Portal, Malaysia*
- *Global IOT Management System of HITACHI, Japan*
- *One Map of Ground Strength of National Residence, Japan*
- *Mobile Mapping Solution for Foreclime, Indonesia*
- *Big Data Spatial for Secure BaseMap System in BSSN, Indonesia*
- *Nature Reservoirs Locating System, Thailand*
- *Smart Agriculture Real-time Soil Monitoring System, Thailand*
- *Pipeline Analysis Solution, South Korea*
- *Forest Disaster Management System, South Korea*
- *Flight Monitoring System for Asiana Airline, South Korea*
- *Mountain Development Support System, Cuba*
- *Epidemic Surveillance System, Laos*



Technologies

In SuperMap GIS 2024, a new remote sensing image processing server software product has been released, enhancing the capabilities of the cloud-edge-terminal GIS product series. This update further innovates the six major technologies system of GIS platform software (BRT-IDC), which include Big Data GIS, New Remote Sensing Software, New 3D GIS, Geospatial AI, Distributed GIS, and Cross Platform GIS technologies. These advancements enrich and revolutionize GIS theories and technologies, empowering digital transformation across various industries.





Smart Angat, a pioneering solution by RASA and SuperMap in the Philippines

The town of Angat is established in 1683 during the Spanish colonial period in the Philippines. Today, Angat is a first-class municipality located in the province of Bulacan, about 50km north of Manila. As per the Land Management Bureau, Angat is around 65 hectares. Angat is home to around 70,000 residents based on their municipal household interviews done in 2023. Its main industries are agriculture and quarrying. Their main agricultural products are rice and vegetables while the quarry products are sands and gravel for construction.

Currently, Angat faces challenges with regards to different aspects of managing the municipality.

1. Taxation – land parcel information is not integrated into the cadastral map; update land parcel database (e.g. lands which were inundated by the river)

2. Business permit and licensing – need to monitor business permit issuance and payment by integrating into municipal map

3. Planning, development and disaster preparedness – lacking updated map to locate and assess critical assets in terms of hazard and risks for urban planning and development

4. Environment – need to monitor waste disposal/ collection of households

5. Agriculture – need to monitor livestock and crop production businesses throughout the municipality

6. Engineering – lacking updated topographic and road networks map; need to monitor which infrastructures need improvement (e.g. road widening/expansion)

In order to address these challenges, the Angat municipal government has acquired the services of RASA Surveying, a leading GIS and surveying company to come up with a GIS solution. It is also SuperMap's main partner in the Philippines. With the collaboration between RASA Surveying and SuperMap, the Smart Angat project was established. Started in early 2024, the Smart Angat will provide a smart city system in which it provides a platform to integrate and organize different types of data including the updated building footprints from satellite image, field survey data, land-use maps, tax maps, and geo-hazard maps. Smart Angat will help in more effective decision-making processes for the officials of the Angat local government.

Smart Angat will involve three (3) phases. Currently, Phase 1 is almost done, which involves the establishment of basemaps and system for Digital Twin through the use of updated satellite image for mapping, updated road networks, integrating cadastral map and other existing data from the local government. Phase 1 also jumpstarts the digital connectivity with the citizens.

Phase 2 will involve the updating of Comprehensive Land-use Plan (CLUP) using Digital Twin. The CLUP is mandated by the national government for all cities and municipalities. This will need to conduct new studies for land development, hazard and risk-assessment such as flood, erosion, suitability studies, etc. For Phase 3, the project team will integrate the Internet of Things (e.g. CCTVs, flood sensors, air quality sensors, etc.) into the Digital Twin.

The different components of Smart Angat were managed and utilized using the SuperMap GIS technology. Smart Angat has three (3) components: input, processing and output. The input component is a combination of both existing data from the municipal government and new data acquired on the field by SuperMap's partner, RASA Surveying.

Existing data from the government includes the cadastral map, existing business location and information, hazard data, etc. RASA Surveying acquired a new satellite image covering the municipality of Angat and conducted field surveys to update the different features of the municipality such as the road network.

In the processing stage, all existing and new data were compiled into different maps according to the needs of

Figure 1: A portion of satellite image with digitized building footprints. Digitization was done using the SuperMap iDesktopX

each department in the municipal government using the SuperMap iDesktopX. And all those maps and data were published into the SuperMap iServer for central storage and management.

To increase the utilization, the project team visualizes all maps and data will be visualized online using SuperMap iPortal by the municipal departments via different outlets like PC workstations & mobile devices. The municipal government also plans to procure new LED dashboards to display different maps and information that the government officers and stakeholders need.

Part of the project also is the creation of a web-based query application for the tax payers and business owners in which they can check in the Smart Angat system the payment status of their land parcel and business permits via their smartphones.

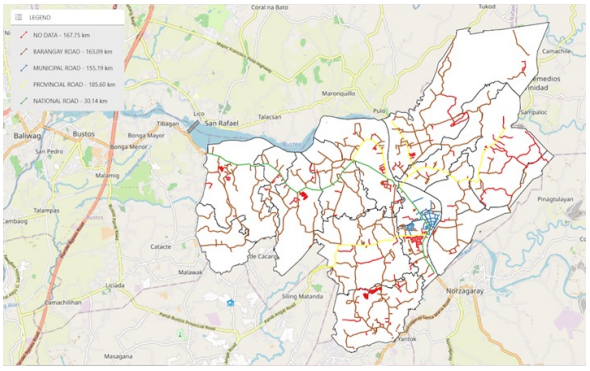


Figure 2: New road network map of Angat. It is a combination of existing road network data and new data from the field survey. This is a screenshot from the prepared dashboard of road maps using the SuperMap iPortal

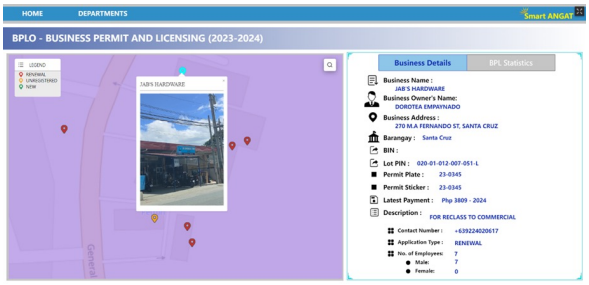


Figure 3: Dashboard for the Business Permit Office. It shows the details of a business when clicked on the map. The red highlight shows the important details that we need to monitor, the permit identification and payment status

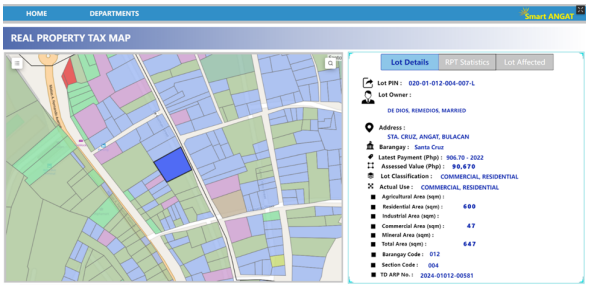
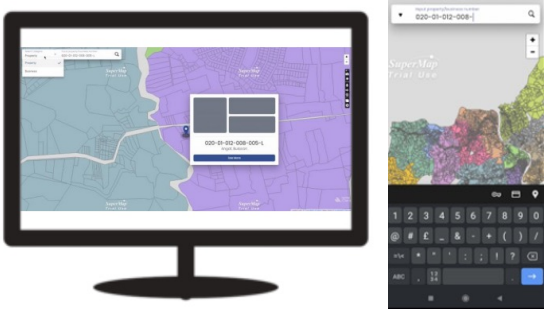


Figure 4: Dashboard for Assessor's Office. It shows the details of a land parcel when clicked on the map. Same with business permit, the red highlight shows the important details that we need to monitor, the payment status.



Figures 5 & 6: A separate web-based query application was developed for the citizens. Thru this, the citizens can access their tax and business payment status.

With the Smart Angat, there will be an effective tool for decision-making processes for the department offices. Here are the benefits it will bring to each municipal department:

1. Assessor's Office – accurate and updated tax maps for the whole municipality; ability to identify the land parcels with deficient tax payments and improve the tax collection of the municipality

2. Business Permit and Licensing Office – locate the businesses in the whole municipality for more effective business permit issuance and monitoring

3. Planning and Development Office – integrated land-use and geo-hazard maps for the whole municipality; ability to identify the suitable location for urban development by analyzing the maps and evaluating potential impacts

4. Engineering Office – ability to identify suitable locations for infrastructure development and, locate and classify the road networks within the municipality

5. Disaster Risk-Reduction and Management Office – to have an effective tool for risk assessment, mapping and analysis for pre-disaster phase

6. Environment and Natural Resources Office – visualization of waste collection via community survey data

7. Agriculture Office – availability of maps and charts of livestock and crop production in the municipality

Smart Angat will not only improve decision-making processes and resources management but is also expected to contribute in raising revenue collection for the municipal government, thus, ability to give more services to the citizens.

Additional information: SuperMap and RASA Surveying conducted a training program for the Angat Municipal government staff last August 12-14, 2024. They underwent training about the software used for the project: SuperMap iDesktopX, SuperMap iPortal, SuperMap iServer, and the created web-based query application.

The Department of Land's initiative in Thailand: enhancing public access to land information

The Department of Land, a key agency in the Thai government, has been at the forefront of providing public services related to land management. In 2022, the department launched an initiative to digitize land plot data and various rights documents, making this information accessible to the public through both web and mobile applications. By leveraging SuperMap GIS technologies and GIS data, the department now offers essential land information such as plot numbers, survey details, land area, coordinates, and appraised values. These online systems allow users to conveniently search for land plot positions via internet-based GIS, saving time and reducing costs for the public. This initiative also aligns with the government's broader policy goals of reducing social disparities, increasing access to public services, and utilizing GIS data for informed decision-making.

Background & Challenges

In Thailand, the growing recognition of the importance of data across various sectors has led many government agencies to open up their data to other entities and the public through Open Data systems. However, the dispersed nature of this data, its continuously increasing volume, and the lack of integration into cohesive datasets have limited its potential to fully address societal, economic, and policy challenges faced by the government, businesses, and the public.

To fully harness the power of this data, it is essential to develop platforms that can aggregate and extract information from multiple sources. Such platforms would enable more effective use of land-related data for economic and social analysis. For instance, the Bank of Thailand could use this data for economic assessments, while the Department of Local Administration could utilize it for property tax collection—a key strategy in Thailand's tax structure development and a significant revenue source for both national and local governments. Additionally, integrated data could guide more efficient land use and development decisions, ultimately increasing overall efficiency.

Addressing the land and building tax act

With the introduction of the Land and Building Tax Act, which aims to modernize local tax collection and stimulate land utilization, it became apparent

that the previous system had several shortcomings. The old system often overlapped with income tax, had high collection rates, and suffered from inaccuracies due to insufficient land and building data, including information on condominiums and individual units. Furthermore, there was a lack of maps or systems to accurately assess room values for tax purposes, as required by the new law.

The CondoMaps project: a comprehensive solution

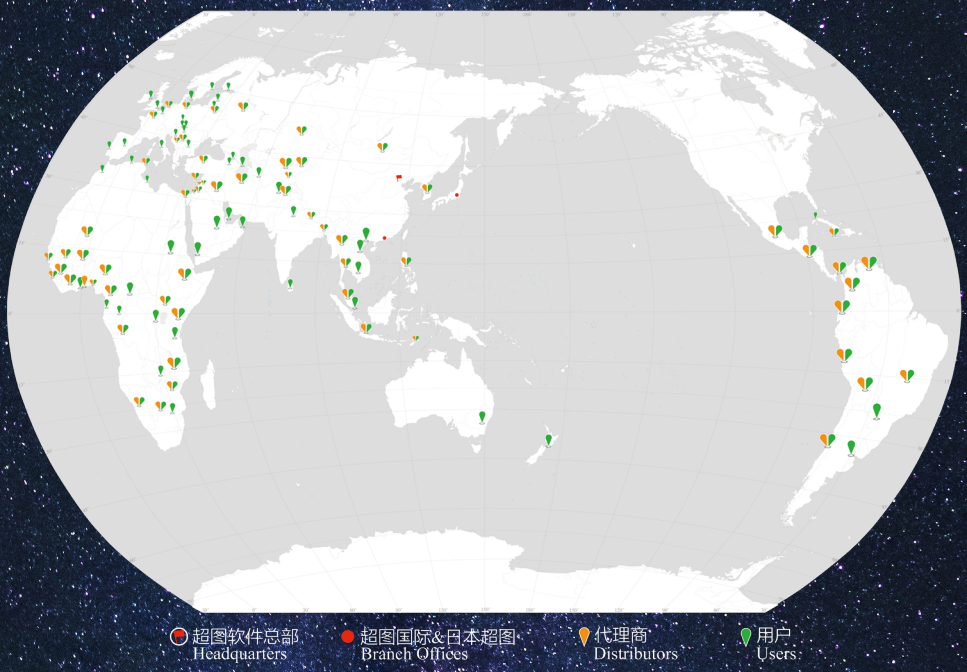
In response to these challenges, the Department of Lands launched the CondoMaps project, recognizing the need to integrate land and building data from various government agencies. Supported by the Ministry of Digital Economy and Society and with SuperMap GIS platform software and technology, the CondoMaps project was completed in 2023 and now serves as a centralized repository for data on condominiums and buildings, displayed in a three-dimensional format.

The project aggregates data from multiple sources, including land plots from the Department of Lands, property assessment data from the Treasury Department, citizen registration data from the Department of Local Administration, corporate data from the Department of Business Development, and land utilization data. On-site surveys conducted by the Department of Local Administration provide additional insights into land utilization by citizens in each area.

The primary goal of the CondoMaps project is to develop a platform that offers comprehensive land and building data services in Thailand, facilitating data integration among government agencies. This platform serves as a Data as a Service (DaaS) model, providing accessible data services to various organizations. By ensuring compliance with legal land utilization characteristics, the platform will establish a more accurate and reliable tax base.

The project not only enhances public service delivery but also supports the formulation of tax collection policies and provide valuable data for decision-making across various policy areas. Relevant agencies, including the Bank of Thailand, the Department of Local Administration, commercial banks, and the Ministry of Agriculture and Cooperatives, will benefit from this integrated approach, which aligns with national strategies, state action plans, and the needs of the people.

Global Distributors and Users



SuperMap has developed distributors and partners in more than 50 countries and SuperMap GIS end users in over 100 countries. We are looking for more partners from all over the world to build a global partner eco-system.