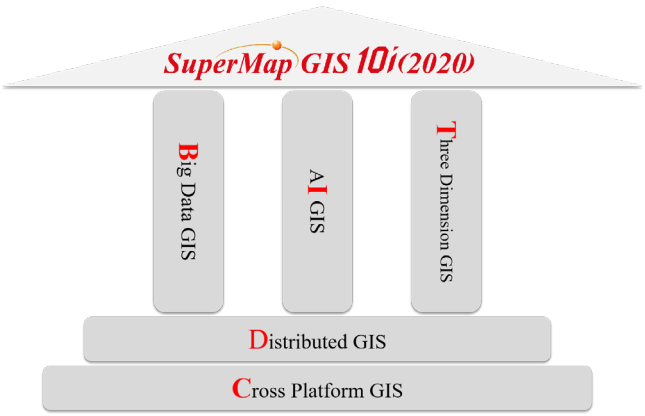
SuperMap

# SuperMap GIS 10i(2020)

SuperMap Software Co., Ltd.

SuperMap GIS is a complete package of GIS platform software for application development, 2D&3D mapping and visualization, as well as decision analysis of various industries.

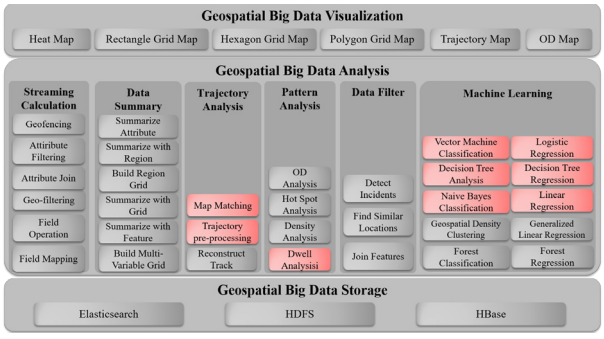
SuperMap GIS 10i(2020) integrates AI GIS technology, and further innovates Big Data GIS, 3D GIS, Distributed GIS and Cross Platform GIS to establish a five key technologies system of "BitDC" for GIS platform software.




SuperMap GIS 10i(2020) Technology System ( BitDC )

## 01 Big Data GIS

The big data GIS system includes the storage and management of geospatial big data, geospatial analysis, streaming data processing and visualization technology, dedicates to provide a comprehensive support for big data GIS infrastructure software and services, and to make more users easily manage geospatial big data "gold mine".




Big Data Technology System

### • Provides geospatial big data storage engines

◇ Provides HBase and HDFS engines for large scale raster data.

◇ Provides Elasticsearch engines for streaming data.

◇ Supports customized extensible geospatial big data storage engine.

### • Strengthens analysis capability of geospatial big data

◇ Kernel level extended Spark geospatial data model.

◇ Supports 6 categories covering 32 kinds of geospatial big data analysis operator.

◇ New distributed geospatial machine learning analysis operators, including decision tree classification, Naive Bayes classification, supports vector machine classification, linear regression, decision tree regression, etc.

◇ Provides more than 100 kinds of distributed geographic processing modeling tool for geospatial big data.

◇ Supports interactive use of geographic processing modeling tools of servers and desktop.

### • Provides plentiful and cool visualization of geospatial big data

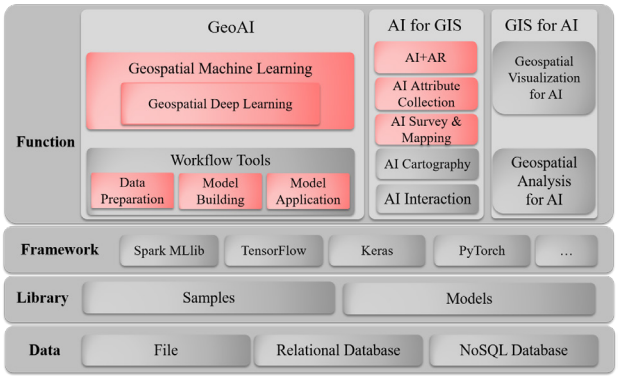
## 02 AI (Artificial Intelligence) GIS

AI GIS is the integration of AI and GIS. It includes the following features:

1) Combines GeoAI and relevant process tools.

2) Management, visualization and analysis of GeoAI results based on GIS.

3) Promotion and optimization of UI experience, operation and maintenance efficiency and other GIS software functions based on AI.




AI (Artificial Intelligence) GIS Technology Architecture

## • Enhances the capability of AI GIS for the whole package of products

◇ Server: improves machine learning and data science services, newly adds Notebook resources and intelligent alarm function.

◇ Desktop: new sample management tool improves the functions of image classification, video target detection, etc.

◇ Component: various of new geospatial machine learning and geospatial deep learning functions and new deep learning models.

◇ Mobile: improves AI attribute acquisition, AI mapping and other functions.

## • Improves AI GIS work–flow tools

◇ New work flow tools, including sample management, model transformation, model evaluation, etc.

◇ New post-processing tools for image analysis reasoning results, including major filter, nibbling, shrinking, expansion, boundary cleaning, regional grouping, thinning, etc.

## • New function of geospatial machine learning

◇ Classification analysis: map matching, logistic regression, gradient boosting classification, decision tree classification, Naive Bayes classification and supports vector machine classification.

◇ Regression analysis: geosimulation, linear regression and decision tree regression.

## • New function of geospatial deep learning

◇ Image analysis: object extraction.

◇ Spatio-temporal analysis: graph spatio-temporal regression.

## • New deep learning model

◇ Image analysis binary classification: FPN, DeepLab V3+, D-LinkNet.

◇ Image analysis ground-object classification: FPN, DeepLab V3+.

◇ Image target detection: YOLO V3.

## • New function of AR visualization based on AI analysis

◇ New AR visualization supports model data, raster data, terrain data, image data, video data, web data, etc.

◇ Supports multiple weather effects.

◇ Supports geo-fencing, speed limit analysis and video splitting.

## • Strengthens AI attribute collection capability

◇ Supports target recognition, 3D recognition, batch violation recognition, road detection and meter recognition.

## • Strengthens AI mapping capability

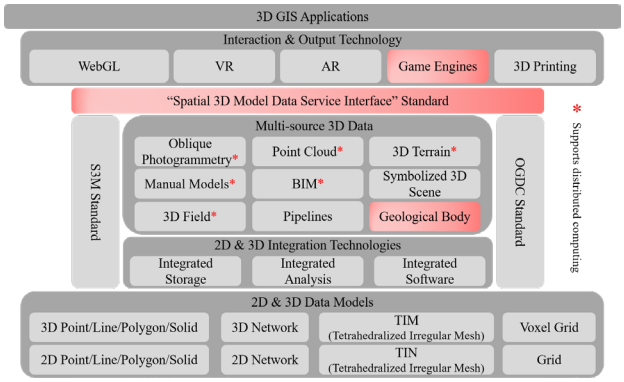
◇ Supports distance, area and height measurement.

◇ Supports 3D point cloud collection, indoor and outdoor mapping.

# 03 3D GIS

It is based on 2D & 3D integrated GIS technology, further develops the computing and analysis capabilities of geospatial data model, combines oblique photogrammetry, BIM, point cloud, 3D field and other multi-sourced heterogeneous data, and sets an open "Geospatial 3D Model Data Format" (S3M) standard and "Geopatial 3D Model Data Service Interface" standard to support GIS standard system. Based on distributed technology, the efficient whole-process management of real-time 3D data such as oblique photogrammetry model and point cloud

can be realized. It integrates IT technologies of WebGL, VR, AR, AI, 3D printing and etc. to bring a more realistic and convenient 3D experience, promote 3D GIS to achieve outdoor and indoor integration, macro and micro integration, and aerospace/surface/underground integration, and empower the application of full space new 3D GIS.



SuperMap 3D GIS Technology System

## • Improves 3D GIS standard system

◇ New "Geopatial 3D Model Data Service Interface" standard.

## • New GIS game engine development platform

◇ Supports loading, displaying, query and analysis of 3D geospatial data in game engine based on S3M data standard.

◇ Extends the capability of game engine, supports 3D virtual earth, local/online terrain, image, oblique photogrammetry model, point cloud, BIM model and manual modeling data.

## • New 3D effects, including ocean, volume cloud, sky

## • Newly supports the identification between 3D geospatial query and 3D geospatial relationship based on GPU

## • New function of geological body real-time analysis

◇ Supports real-time sectioning analysis.

◇ Supports polygon clipping.

◇ Supports cylinder and polygon excavation of geological body.

◇ Supports the construction of virtual drilling.

◇ Supports exaggeration and explosion expressions of geological model.

## • Strengthens 3D cache capability

◇ Improves the loading/downloading performance of terrain and image cache.

◇ Supports WebP compression to improve loading and browsing performance.

◇ Supports the storage of terrain, image, manual modeling, oblique photogrammetry and BIM in MongoDB.

◇ Supports the storage of manual modeling, oblique photogrammetry and BIM in SQLite.

◇ Point cloud supports Draco compression.

◇ Improves the loading performance of 3D cache data, including oblique photogrammetry model, manual modeling, BIM, point cloud, etc.

## • Strengthens the capability of 3D field data model

◇ Newly adds the inter-transformation of 3D body object and voxel grid.

◇ 3D field data supports time dimension.

## • New 3D data distributed geological processing tools

◇ New oblique photogrammetry distributed geological processing tool, including merging root node, texture compression, monomer, clipping, etc.

◇ New terrain distributed geological processing tool, including appending and generating cache.

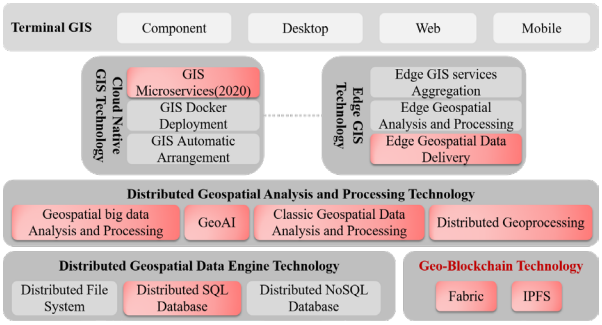
◇ New manual modeling distributed geological processing tool, including generating S3M tiles and storing to MongoDB.

◇ New capability of managing the whole process of oblique photogrammetry model data through geographic processing modeling tool.

# 04 Distributed GIS

It includes distributed geospatial data engine technology, geo-blockchain technology, distributed geospatial analysis and processing technology, cloud native GIS technology and edge GIS technology, and

supports the storage, management, analysis, processing, visualization and publication of massive classic geospatial data and geospatial big data. Thus, it can realize the major breakthrough of GIS in high-availability, high-concurrency, high-performance, high-capacity and high-credibility to build a new distributed collaborative model of cloud, edge and terminal integrated GIS.



Distributed GIS Technology Architecture

## • Distributed geospatial data engine technology

◇ Supports distributed geospatial file system, including HDFS, DSF, etc.

◇ Supports distributed SQL geospatial database.

◇ Supports distributed NoSQL geospatial database, including MongoDB, Elasticsearch, HBase, etc.

## • Geo-blockchain technology

◇ New federated storage of blockchain geospatial data Fabric and IPFS.

## • Distributed geospatial analysis and processing technology

◇ Provides kernel level extended Spark geospatial data model.

◇ Supports distributed geospatial file system, including HDFS, DSF, etc.

◇ Supports distributed SQL geospatial database.

◇ Supports distributed NoSQL geospatial database, including MongoDB, Elasticsearch, HBase, etc.

◇ Supports more than 200 kinds of distributed geological processing modeling tools.

◇ Provides more than 70 kinds of distributed geospatial analysis operators.

◇ Provides the high-performance distributed dynamic rendering capability.

## • Cloud native GIS technology

◇ Supports the splitting of GIS into microservices, which is elastic on demand.

◇ Realizes the full microservice of map, 3D, big data and AI functions.

◇ Supports docker deployment and provides rolling upgrade, elastic scaling and error recovery of GIS node.

◇ Supports seamless upgrade and local upgrade / rollback without service interruption.

◇ Provides general automatic layout based on Kubernetes, which can realize the real time monitoring of all microservice resources.

◇ Newly adds the extension development capability of cloud native GIS.

## • Edge GIS technology

◇ Provides edge GIS products to build cloud, edge and terminal integrated application system.

◇ Supports pre-proxy, service aggregation, data distribution and analysis processing of edge GIS.

◇ New cloud native deploy mode based on K3s.

# 05 Cross Platform GIS

Since 2001, based on the standard C++ to reconstruct the GIS kernel, a set of native cross platform GIS technology system which has high performance and supports multiple CPUs, operation system has been established.

Now, SuperMap GIS supports multiple CPU architectures, like x86, ARM, MIPS, SW-64, etc. It can also run on Linux, Windows, Android and iOS with high-performance.

## • Supports multiple CPU architectures

◇ CPUs: x86, ARM, MIPS, SW-64, Open-power, etc.

## • Supports multiple operation systems

◇ Operating systems: Linux, Windows, Android, iOS, etc.

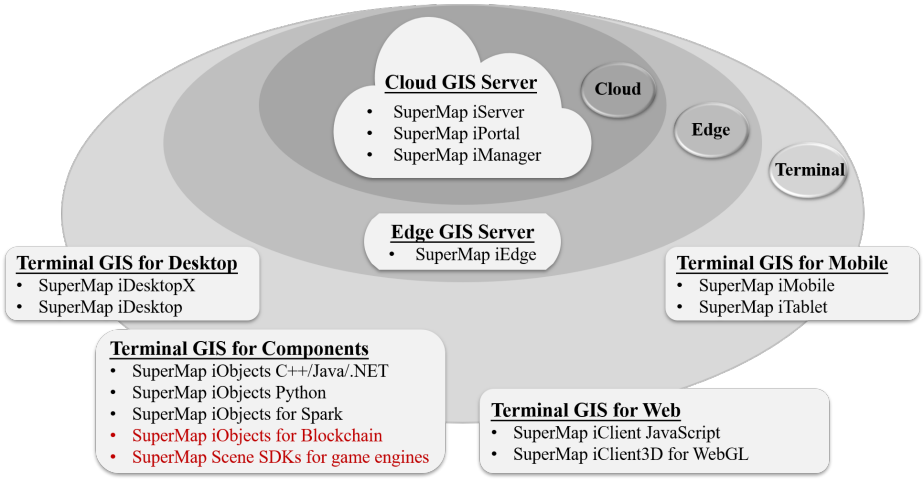
## • Supports multiple database

◇ Supports database series: file type, relational type, NoSQL, etc.

## • All products support cross platform

# Product Architecture

SuperMap GIS 10i(2020) includes Cloud GIS server, Edge GIS server, Terminal GIS, etc., and provides two diliver methods of offline deployment and online services (SuperMap Online).




SuperMap GIS 10i(2020) Product Architecture

## Cloud GIS Server

### SuperMap iServer

Cloud GIS application server is based on high-performance cross platform GIS kernel. It provides full-featured GIS service publishing, management and aggregation functions, and provides multi-level expansion and development.

It provides powerful web services for geospatial big data, GeoAI and 3D to support massive vector/raster data "slice-free" publishing.

It deeply integrates microservice and docker layout, provides a variety of SDKs to build big data, AI and 3D GIS application systems based on cloud native architecture.

### Product features

#### • More full-featured, micro and fast cloud native microservices

◇ Supports microservice architecture and docker technology for elastic scaling and flexible deployment of GIS services.

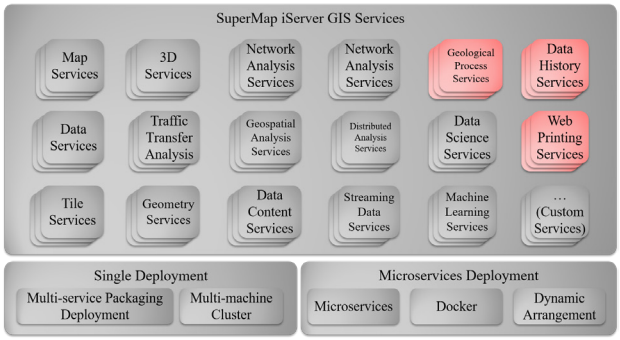
◇ Supports microservice of map, data, distributed analysis, 3D and machine learning.

◇ New microservices of streaming data, geological processing and Web printing.

◇ New smaller microservice package, including map, analysis and tile package.

◇ Supports native compilation technology, with faster startup and recovery.

◇ Supports cloud native storage, like OSS, OTS, PolarDB, etc.



SuperMap iServer Service System Architecture

## • Multi-level distributed storage, computing and processing

◇ Supports node dynamic accessing, intelligent scaling and automatic synchronization between nodes.

◇ Supports MPP distributed relational database, distributed NoSQL database and distributed file system.

◇ Supports distributed computing platforms of Spark, Hadoop YARN,etc.

◇ Provides distributed geospatial analysis, distributed data processing, streaming data real time processing, etc.

## • All-round extensible GIS service publishing and aggregation

◇ Provides domain geospatial service extension mechanism, including service capability, interface, security, cluster, etc.

◇ Supports extension services deploying in iServer process, or independently deploying as microservices.

◇ Supports aggregation SuperMap platform services, tripartite services, OGC services and online map services.

## • Accessing, processing and efficient publishing of geospatial big data

◇ Provides distributed analysis service, and supports distributed processing and geospatial analysis of vector and raster data.

◇ Provides streaming data service, and supports real time accessing and distributed processing of streaming data with 100 thousands/sec level.

◇ New geological processing service, and supports modeling and distributed operation of 2D&3D data processing progress.

◇ Supports "slice free" publishing technology of vector and raster data.

## • 3D data publishing, editing and analysis

◇ Provides data publishing of 3D point, line, polygon, body, field, as well as oblique photogrammetry model, BIM and point cloud.

◇ Provides online editing capability of 3D data to edit attribute and geospatial information.

◇ Provides geospatial computing of 3D Intersection, union and difference, and measurement and calculation of volume and surface area.

◇ Provides 3D geospatial analysis of sunshine, skyline, visualization, 3D buffer, etc.

## • GeoAI supports the whole process

◇ Provides machine learning services, and supports GeoAI analysis operator of target detection, ground object classification, object extraction, binary classification, decision tree regression,etc.

◇ Provides geospatial data science service to make online interactive geospatial data scientific exploration based on Notebook.

◇ Provides geospatial data science service for work flow of covering sample production, model training, model evaluation, model reasoning,etc.

## • New function of blockchain geospatial data publishing and editing

◇ Supports blockchain geospatial data published as map services, data services and data history services.

◇ Provides dynamic mapping and geospatial query capability.

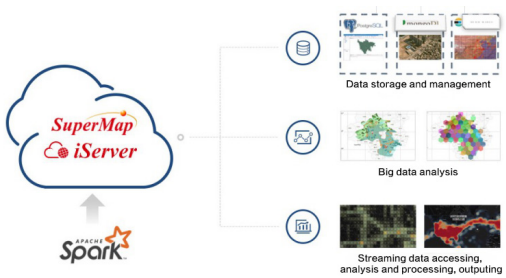
◇ Provides editing and history tracing for multiple users.

## • New function of Web map printing

◇ Supports GeoPDF which is printed as A0/A1 map.

◇ Supports secondary editing of geospatial/text information in printing results.

◇ Provides extensible layout template for transportation, land, etc.



Geospatial Big Data Accessing, Storage and Distributed Analysis

# SuperMap iPortal

It is a cloud GIS portal platform for integrating, searching, sharing and managing GIS resources. SuperMap iPortal has advanced technology and capabilities, such as quick website building without code, multi-source heterogeneous services registration, and multi-source service authority control, etc.

SuperMap iPortal provides plentiful Web applications, including thematic mapping, 3D visualization, distributed geospatial analysis, dashboard creation and display.

As the user center, resource center and application center of cloud & terminal integration GIS platform, the cloud portal site of GIS can be quickly built.

## Product features

### • GIS portal building

◇ Provides multiple common portal function modules, and supports custom development to quickly build exclusive GIS portal.

◇ Supports zero-code customization and newly adds multiple UI components.

◇ New full-code customization, and supports rewriting of homepage/log in page.

◇ New feedback module and news center module.

### • GIS resource integration and management

◇ Manages multi-source GIS resources through resource center.

◇ New Notebook resources which can plug into data science services.

◇ New service measurement capability based on key quota.

◇ Improves GIS service authority based on fine geospatial scope.

### • MapDashboard WebApp

Geological data visualization dashboard application can display the analysis based on location in the way of intuitive and interactive visualization, which can help decision making, visualization trend analysis, real-time monitoring and spatio-temporal playback analysis.

◇ Supports accessing of time series data and time series map, and supports application scenarios of operation and maintenance monitoring, history playback, etc.

◇ New multiple components and interaction among multiple components, and supports custom components.

◇ Supports independent edit layout for desktop, pad and mobile.

◇ New data panel manages multiple data sources.

◇ Additional more than 10 kinds of templates and 100 color bars.

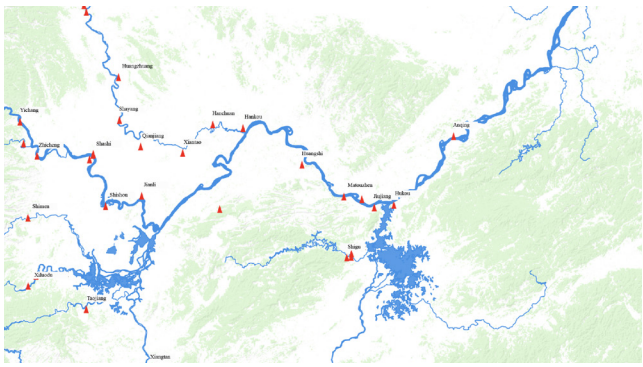
### • DataViz WebApp

It is a lightweight and high-efficient data visualization application, providing thematic map making, streaming data visualization and map printing, which can realize Web map making and sharing.

◇ New map printing capability.

◇ Supports accessing of SuperMap iServer to publish vector tile service.

◇ Improves label display capability, such as layout, location, font size, etc.



DataViz Web App

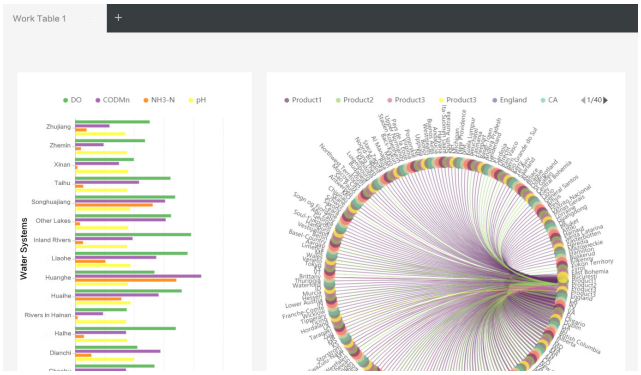
## • DataInsights WebApp

Through interactive operation, geospatial data analysis Web application can realize online visualization and analysis of geospatial data, integrate SuperMap iServer distributed analysis and data science service, and support extension to help users dig the value of geospatial data.

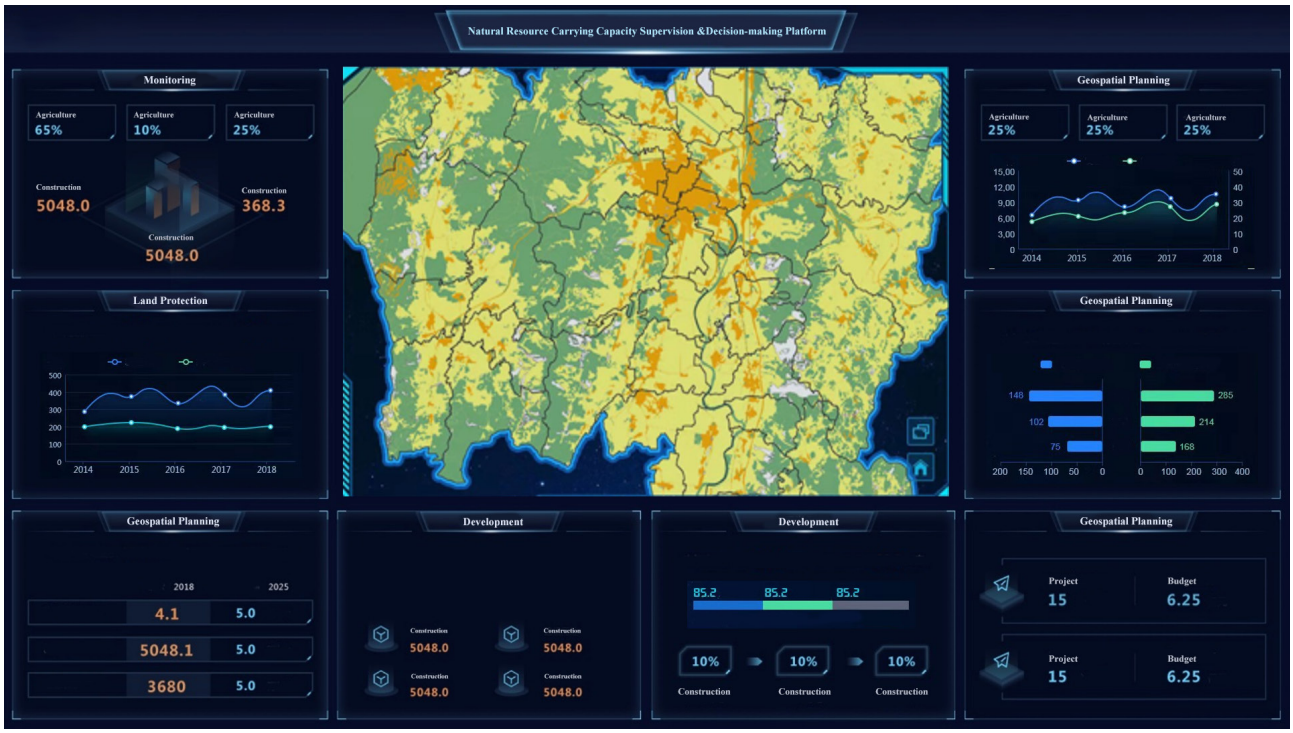
◇ Supports accessing maps made by DataViz WebApp.

◇ Supports extension of chart and geospatial analysis function through custom code.

◇ Supports WebMercator, CGCS2000 and WGS 84 coordinate system.




DataInsights Web App




MapDashboard Web App

## SuperMap iManager

It is a comprehensive GIS operation and maintenance management center which can be used for application service management, infrastructure management, and big data management. It provides cloud native GIS solutions based on Kubernetes to one-click create, manage and maintenance big data, AI and 3D GIS system based on cloud native technology.

It can monitor multiple GIS data storage, computing, service nodes or other Web sites, and monitor the occupancy of hardware resources, map access hotspots, node health and other indicators to achieve integrated operation and maintenance management of GIS system.

## Product features

### • Convenient sites building

◇ Provides one-click deployment of GIS systems and frequently-used databases.

◇ Provides quick building of big data site.

◇ Provides UI customization, grouping, and expands third-party industry application site.

◇ New function of quick building of blockchain environment.

◇ New Helm deployment.

### • Full featured monitoring capability

◇ Provides monitoring of hardware resources occupancy and service resources utilization.

◇ New function of statistical report.

◇ New function of intelligent alarm.

◇ New alarm rule management of general monitoring and database monitoring.

### • Easy to use GIS microservice management

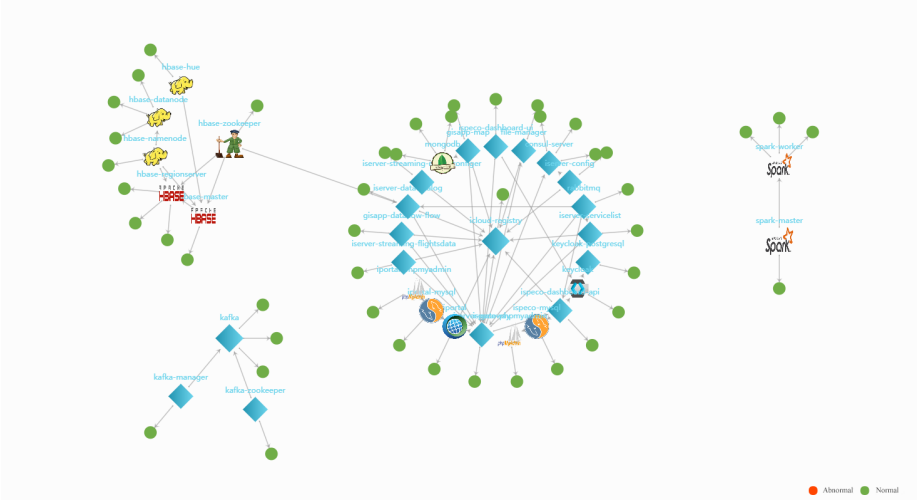
◇ Realizes GIS microservice monitoring and elastic scaling.

◇ Realizes GIS microservice error recovery.

◇ Built-in and connects GIS computing and storage resources.

◇ New adjustment function of service CPU and memory specification.

◇ Provides service topology map of GIS site.




Topology Map of GIS Site Microservice

## Edge GIS Server

SuperMap iEdge

Edge GIS server, which is deployed near the client or the data source side, is to achieve near-by service publishing and real-time analysis and calculation, reduce response latency and bandwidth consumption and reduce the pressure of cloud GIS center. It provides efficient service publishing capabilities and supports the rapid release of massive vector data.

It can be used as the edge node between the cloud and application terminals of GIS. By using service proxy aggregation and cache acceleration technology, it can effectively improve the terminal access experience of cloud GIS, and provide the ability of intelligent content distribution and efficient edge analysis and calculation, and help to build a more efÞcient and intelligent "cloud-edge-terminal" GIS application system.

## Product features

### • Edge pre-proxy and acceleration

◇ Proxy standard services: SuperMap REST service and OGC service.

◇ Proxy internet services: Google map service, etc.

◇ Proxy services published by third-party: open source platform and business platform.

◇ Efficient service acceleration mechanism to greatly improves service throughput and reliability.

### • Edge service aggregation

◇ Map aggregation: aggregates multiple maps from different sources into one map.

◇ Data aggregation: aggregates multiple data from different sources into one data source.

### • Edge content distribution

◇ Efficient and reliable distribution technology: distributes GIS data of cloud GIS center to edge nodes quickly and securely.

◇ Flexible and convenient distribution methods: automatically distributes by region and level without any manual operates, and newly adds append distribution mode.

◇ Plentiful distribution data types: local files, vector and raster tiles, WebP tiles, 3D terrain and model tiles.

◇ Powerful service distribution capabilities: SuperMap REST and vector tiles services, OGC standard services, third-party services, SuperMap REST services, etc.

### • Edge analysis and computing

◇ Edge dynamic mapping: based on local data, PostGIS data and HBase data rendering.

◇ Edge data query: based on local data, PostGIS data and HBase data space query,

◇ Edge processing and analysis: measurement, coordinate transformation, geospatial relations, geospatial computing.

### • New edge cloud native distribution mode

◇ Creates iEdge cluster with multi-node based on K3s technology, which improves the efficiency of proxy service.

◇ All nodes share the same service configuration and backup for each other, which improves the stability of proxy service.

◇ Provides automatic scaling mechanism based on CPU threshold, which considers both performance and resource utilization.

# Terminal GIS for Components

## SuperMap iObjects C++

It is a large-scale full-component GIS development platform, providing cross-platform and 2D and 3D integration capabilities. It is suitable for C++ development environment.

## SuperMap iObjects Java

It is a large-scale full-component GIS development platform, providing cross-platform and 2D and 3D integration capabilities. It is suitable for Java development environment.

## SuperMap iObjects .NET

It is a large-scale full-component GIS development platform, providing 2D and 3D integration capabilities. It is suitable for .NET development environment.

## SuperMap iObjects Python

It is a convenient GIS script language pack and provides data organization, transformation, processing and analysis. It is suitable for Python development environment.

## Product features

### • Data processing

◇ Supports vector data processing methods of smooth, resampling, clipping, geospatial connection, integration, etc.

◇ Supports vector topology operations of topology processing, topology checking, topology faceting, etc.

◇ Supports raster data processing methods of vector and raster conversion, resampling, algebraic operation, reclassification, etc.

◇ New function of raster data processing of majority filter, expansion, contraction, cannibalization, regional grouping, boundary cleaning, thinning, etc.

### • Mapping

◇ New capability of thematic map making.

◇ Provides plentiful raster layer color table, and supports custom color table, transparent color, etc.

### • Geospatial analysis

◇ New 2D grid and 3D grid analysis module.

◇ New address matching module.

◇ New function of hydrological analysis and collection point catchment.

◇ New function of trajectory analysis, including trajectory preprocessing, map matching based on HMM, etc.

◇ New function of map simulation, including cellular automaton based on artificial neural network and principal component analysis

### • Geospatial statistic analysis

◇ Supports geospatial general characteristics analysis of geospatial autocorrelation, geospatial stratification heterogeneity, etc.

◇ Supports geospatial interpolation methods of Kernel density, inverse distance weighting, Kriging, etc.

◇ Supports geospatial pattern explorations of geospatial point pattern, geospatial hotspot, etc.

◇ New function of geospatial sampling and statistical inference of SPA, B-SHADE, etc.

◇ Supports least square regression, geographically weighted regression and other geospatial regression algorithms.

### • Supports the complete workflow of image analysis based on deep learning

◇ Supports image analysis sample data production.

◇ Supports image analysis model training.

◇ Supports image analysis model reasoning.

◇ New function of analysis model evaluation.

### • Machine learning

◇ Supports image data analysis, including binary classification, target detection, scene classification, ground objects classification, objects extraction, etc.

◇ New function of iamge data analysis, including target detection, image classification, etc.

◇ New function of spatio-temporal regression analysis.

# SuperMap iObjects for Spark

It is a big data GIS platform component based on distributed technology. It provides various big data distributed management and analysis functions, and it is suitable for Spark development environment.

## Product features

### • Distributed data storage

◇ New function of loading raster data in GeoTiff and img format which supports plug-in tfw.

◇ New function of using mosaic dataset as data source of distributed raster data.

◇ Supports HBase, Elasticsearch, HDFS and DFS distributed storage and management.

### • Distributed geospatial analysis

◇ Optimizes trajectory related analysis algorithm of trajectory preprocessing, residing analysis.

◇ New function of raster value statistic.

◇ New simplification and smoothing processing of line and polygon data set.

◇ New function of vector data rasterize.

### • Distributed geospatial machine learning operators

◇ Supports distributed geospatial density clustering.

◇ Supports distributed generalized linear regression.

◇ Supports the classification and regression based on forest.

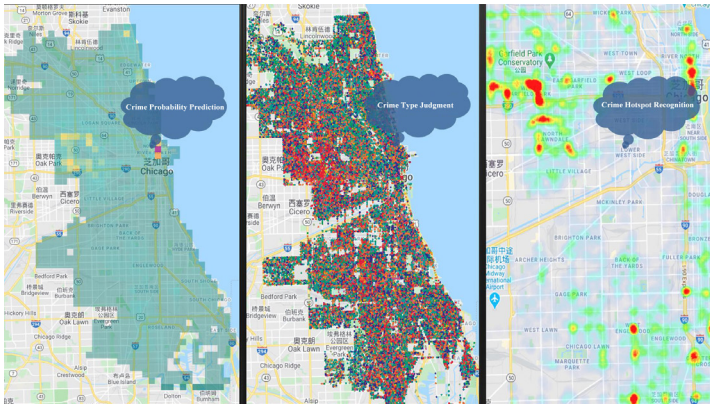
### • Distributed streaming data processing

◇ Supports access to multi-transport protocols of streaming data.

◇ Supports the real time processing algorithms of multiple streaming data.

◇ Supports push processing results to Elasticsearch database, as well as updating and appending.

◇ Supports SuperMap iServer configuration processing progress.




Geospatial Machine Learning Application

# SuperMap iObjects for Blockchain

It is a blockchain GIS platform component based on distributed technology. It provides geospatial data on chain and management on chain, and it is suitable for the development and computing environment of Fabric architecture.

## Product features

### • Blockchain geospatial data storage

◇ Supports joint storage of Fabric and IPFS.

◇ New function of point, line and polygon data on chain.

◇ New function of text, image and video data on chain.

### • Blockchain geospatial data management

◇ Supports attribute and geospatial query of blockchain geospatial data.

◇ Supports blockchain geospatial data editing.

◇ Supports blockchain geospatial data thematic map.

◇ Supports history tracing of blockchain geospatial data.

◇ Supports channel, member, organization and certificate management of Fabric.

## Terminal GIS for Desktop

### SuperMap iDesktop

It is a desktop GIS application and development software with 2D&3D integrated data management and processing, editing, mapping, analysis, 2D&3D plotting and other functions. It supports charts, online map service access and cloud resource collaborative sharing, which can be used for production, processing, analysis of geospatial data and rapid customization development of industrial application systems.

## Product features

### • Data management

◇ Supports PostGIS, Oracle, MongoDB database engine.

◇ Supports importing of more than 70 kinds of data formats and exporting more than 30 kinds of data formats.

◇ Newly supports image file data format like map slice package file.

◇ New data type based on COGO standard.

◇ Improves mosaic dataset functions, and supports clipping range reconstruction according to valid value region.

### • Data processing

◇ Provides more than 200 data processing functions such as fusion, appending, vacuate, clustering, sampling, smoothing, etc.

◇ Improves raster mosaic function, and supports mosaic of image data set and local image files.

◇ Provides topology functions such as topology check, topology network construction, topology polygon construction, line topology processing, etc.

### • Geospatial analysis

◇ Supports analysis functions such as buffer analysis, overlay analysis, interpolation analysis, hydrological analysis, etc.

◇ Provides contour/polygon extraction, surface analysis functions such as slope, aspect, fill and excavation, 3D shading, etc.

◇ Improves indoor navigation analysis, and supports multipath network construction and indoor and outdoor integration navigation model.

◇ Improves NDVI/NDWI function, and supports different image data sets involved in computing.

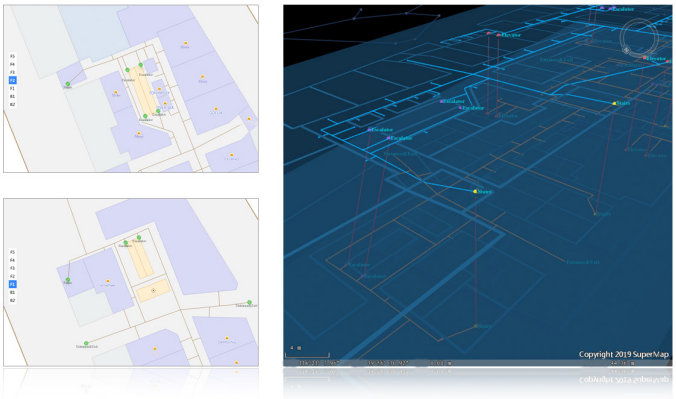
### • Geospatial statistic analysis

◇ Supports measurement geographic analysis of center elements, average center, median center, direction distribution,etc.

◇ Provides analysis mode functions of geospatial autocorrelation, high and low value clustering, average nearest neighbor analysis, etc.

◇ Supports clustering distribution functions of hot spot analysis, clustering and outlier analysis, etc.

◇ Supports geographical weighted regression analysis and scientific statistical prediction by establishing models.




Indoor Navigation

## • Statistic chart

◇ Supports 11 chart forms such as histogram, scatter plot, and area chart.

◇ Improves the linkage display of charts, maps, and property sheets.

## • Mapping

◇ Newly supports raster tiles in WebP format.

◇ Improves multi-task slicing, and supports adding database workspace to carry out slicing task.

◇ New function of labeling along line mode, which is suitable for river data.

◇ Provides the technical scheme of whole process of map tiles from production to publishing.

◇ Supports mapping tools such as map framing, map grid, standard frame, etc.

## • Geological processing modeling

◇ Provides 6 kinds of tool sets, such as vector analysis, raster analysis, mapping, etc.

◇ Supports the import and export of model templates.

## • Cloud & terminal collaboration

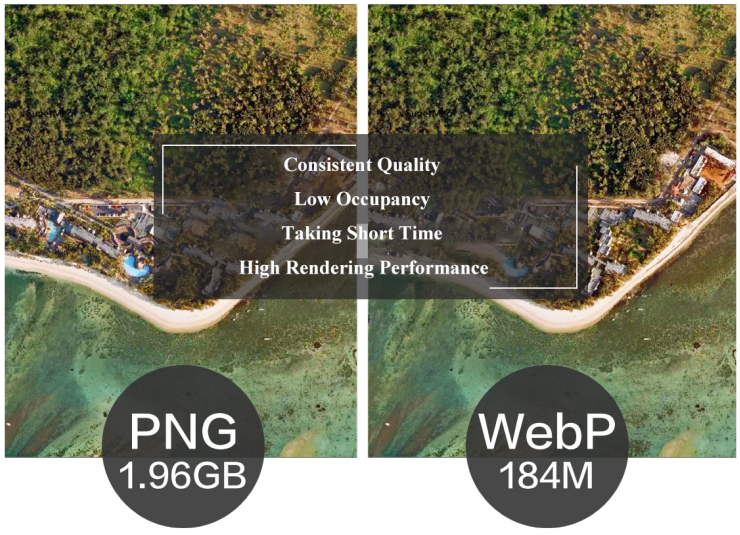
◇ Direct access to standard online map services such as WMS, WFS, WMTS and SuperMap REST.

## • Map layout

◇ Supports wizard layout, pre-defining different types of layout templates.

◇ Supports adding maps, legends, charts, tables, compass, etc. in the layouts.

◇ Improves the function of printing atlases, and adds the function of batch outputting in the format of common picture file.




Optimization of Tile Performance

## • 3D

◇ Supports 3D model data importing, such as IFC, CityGML, FLT, GIM, etc.

◇ Supports adding particle objects on KML layers.

◇ New function of scene positioning, supporting camera positioning to the specified coordinate position.

◇ Optimizes the flight route site management function to support smoother flight route.

◇ New function of vector stretching, supporting the point data set and the line data set to be stretched along the Z axis to generate the line data set and the surface data set respectively.

◇ Supports merging adjacent polygons into one polygon.

◇ New model material editing function supports browsing and batch modification of object model materials.

◇ Supports image cache reconstruction.

◇ Supports model cache merge root node.

◇ Optimizes the function of generating 3D cache for maps, terrain, images, point clouds, vectors, models, etc.

◇ Supports generating raster cache from raster data, and optimizes the browsing and loading performance of raster data.

◇ Supports generating normal lines from TIN terrain and raster datasets without normal lines.

◇ Supports point data set and contour data set to generate TIN cache.

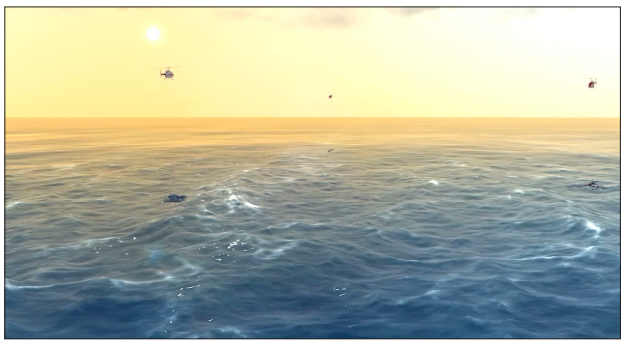
◇ New functions of positioning and delete point cloud grouping information on the point cloud cache layer.

◇ New function of multi-view domain analysis, supporting the analysis of all viewpoint collections in multiple areas.

◇ Optimizes 3D analysis functions such as openness analysis and visual domain analysis.

◇ New dynamic wave effects, and supports reflection, refraction, and ship wake special effects.

◇ New various sky special effects, such as volumetric cloud, flowing cloud, lens flare, alternate day and night.



3D Ocean Surface Special Effects

# SuperMap iDesktopX

It is a cross-platform full-featured desktop GIS software in industry supports the mainstream operating systems like Linux, Windows, etc. It breaks the predicament of professional desktop GIS software that can only run in Windows.

It provides geospatial data production and processing, distributed big data management and analysis, mapping, service publishing, geoprocessing modeling, machine learning, AR maps and other functions. It can be used for data production, processing, analysis and mapping.

## Product features

### • Data management

◇ Supports PostGIS, Oracle, MongoDB database engine.

◇ New function of raster histogram supports viewing raster values and image pixels values distribution.

◇ Improves the mosaic dataset management, supporting adding image data.

### • Data processing

◇ Provides more than 200 data processing functions such as blending, thinning, clustering, sampling, etc.

◇ Provides topology functions such as topology check, topology network, construct region by topology, and line topology processing.

◇ New function of data set splitting.

◇ Improves the calculation function of coordinate system conversion model parameters, supporting 5 coordinate system conversion models.

◇ Improves the vector resampling and line smoothing functions, and supports setting the line intersection point unchanged.

◇ Improves the raster splicing function, supporting the splicing of image data sets and local image files.

◇ Strengthens distributed data query capabilities and fully supports ECQL query conditions.

## • Mapping

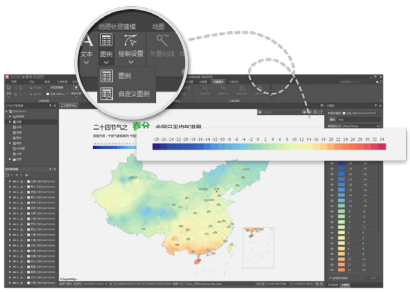
◇ New function of creating map legend, adding appended drawings on map.

◇ The temporal data and multi-version tiles can be output as GIF animation.

◇ Improves the symbol library management function, and supports importing points, lines, filling symbols and svg symbols.

◇ Supports grid tiles in WebP format.

◇ New function of tile conversion, merging, and distribution, supports local tile dump and merge into MongoDB tiles, and distributes tiles of specified range/scale.



Mapping

## • Statistic chart

◇ Supports 11 chart forms such as histogram, scatter plot, and area chart.

◇ Improves the linkage of charts, maps, and property sheets.

## • Map layout

◇ Improves layout elements and supports add three north compass, chart and other elements onto the layout.

◇ New function of printing atlas, the layout can be output as a set of PDF or image files with the same frame size, scale, etc.

## • Geospatial statistical analysis

◇ Supports measuring of geographic analysis of center element, average center, median center, direction distribution, etc.

◇ Provides analysis mode functions of geospatial autocorrelation, high and low value clustering, average nearest neighbor analysis, etc.

◇ Supports clustering distribution functions such as hot spot analysis, clustering and outlier analysis.

◇ Improves geographic weighted regression analysis, adds ordinary least squares method, and supports scientific and statistical predictions by establishing models.

◇ New function of density clustering, provides three clustering methods of DBSCAN, HDBSCAN, OPTICS.

◇ New function of geospatial sampling and statistical inference.

## • Machine learning

◇ Supports image analysis workflow based on deep learning, including tools of sample making, model training, model evaluation, model reasoning, etc.

◇ Improves binary classiÞcation function, and newly adds FPN, DeepLabV3+ and D-LinkNet model.

◇ New function of object extraction, image classification and target detection.

◇ New function of model transformation, and supports the transformation of desktop model to mobile model.

◇ New function of road damage detection, which can extract damages according to camera parameters and road images.

## • Geological processing modeling

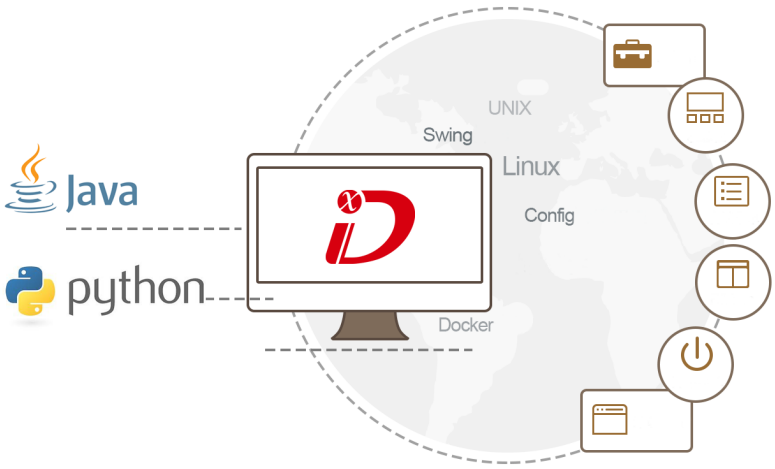
◇ Provides more than 600 kinds of tools for data processing, classification transformation, geospatial analysis, geostatistical analysis, machine learning and distributed geological processing.

◇ Supports custom tool parameter panel and control type.

◇ New function of conditional judgement, and supports adding judgment conditions and preconditions.

◇ New function model publishing, and supports using models published by desktop in SuperMap iServer.

◇ Improves related functions of task manager, and supports viewing the model execution progress, history and other information in real time.




Pathon Development

## • Blockchain

◇ Supports attributes and geospatial query based on blockchain geospatial data.

◇ Supports thematic map making based on blockchain spatial data.

## • Map dashboard

◇ Supports the adjustment of the display order of dashboard controls.

◇ Supports the adjustment, revocation and resuming of the position and size of dashboard controls.

◇ New custom function controls, and supports clicking to bind on full-screen view.

◇ New custom panel controls, and supports types of panel like customized tree node, multi options, etc.

## • Coordination of cloud and terminal

◇ Supports the verification, friends adding and deleting and groups creation through SuperMap Online accounts.

◇ Supports sending text messages, data, maps, videos to GIS App (SuperMap iTablet).

## • Python

◇ Supports the management of Python environment and dependent package by Conda.

◇ Supports Python custom development tools and expands the functions of toolbox.

◇ Provides Python component features of data processing, topology, interpolation, proximity analysis, etc.

## • Map migration

◇ Improves importing of File Geodatabase, Personal Geodatabase, etc.

◇ Newly supports importing of SQL Server, Oracle and PostgreSQL data based on ArcSDE.

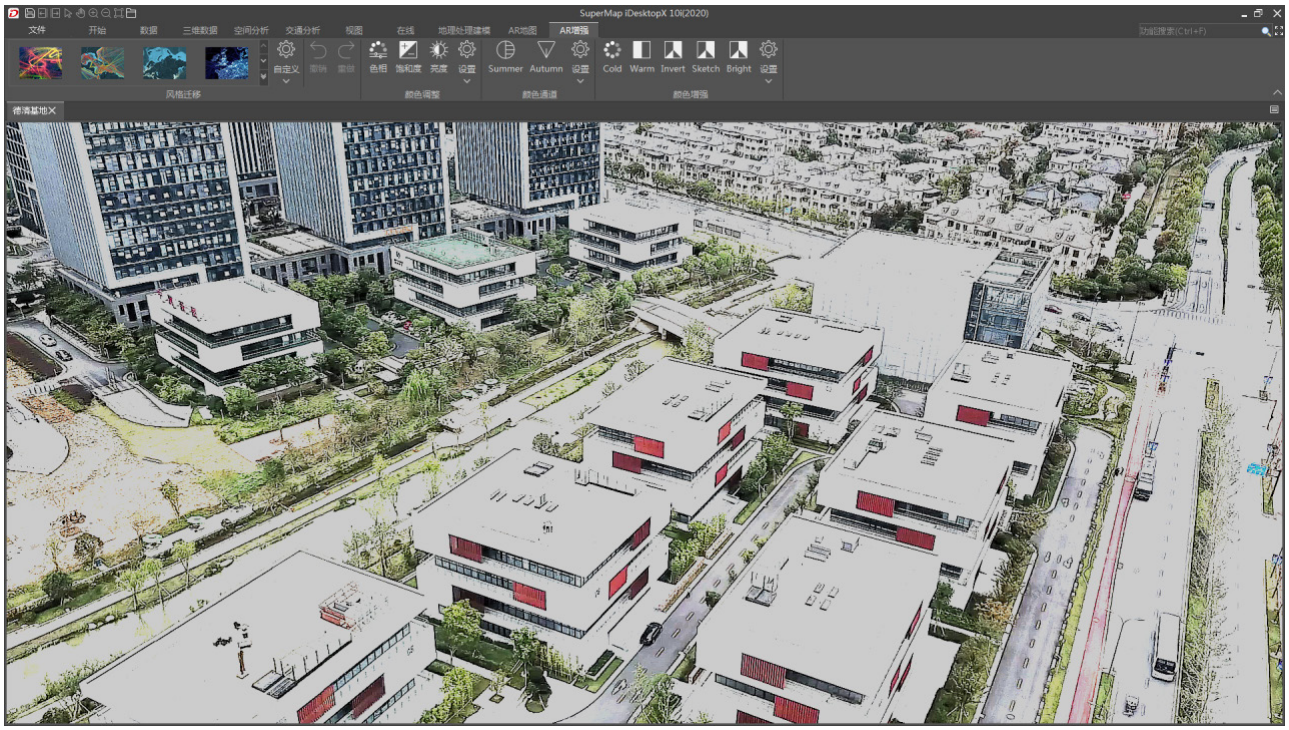
◇ Newly supports importing of EDB data, and supports map creation based on EPS data.

◇ New function of DWG mapping, and supports exporting EPS data of specified time period in Oracle database to DWG file.

◇ Supports the migration of MXD map files (including symbols, thematic maps, etc.) of ArcGIS software into SuperMap workspace.

◇ Supports hosting REST map service released by ArcGIS.

◇ New migration tools, which can build process template for data processing and map transformation based on business processes.




AR Enhancement Effect--Sketch

## • AR map

◇ New video dataset, which can store the file path and video location parameters of multi-channel video.

◇ Supports batch registration of videos and adds geological geospatial attributes to videos based on map.

◇ Supports dynamic registration of videos, which can make dynamic registration of video position with video playback.

◇ Improves the display of video dataset in maps, including video points, range and real scene.

◇ New multiple video effects, like flowers falling, leaves falling, raining, dark clouds, lightning, snowing, etc.

◇ New function of video enhancement, including warm&cool colors, brightening and sketch, and supports adjustment of video hue, saturation and brightness.

◇ New function of AR analysis, including license plate recognition, violation analysis, geofencing analysis, buffer analysis, SQL query, etc.

## • 3D

◇ Newly supports importing of BIM model data like 3DXML, IFC, CityGML,etc.

◇ Supports adding particle objects on KML.

◇ Supports opening multiple scene windows, and switching between different scenes.

◇ Supports 3D point dataset to generate 3D custom thematic map.

◇ Optimizes storage of oblique photogrammetry data into database, and supports setting coordinate system parameters with progress bar.

◇ Optimizes 3D data extraction function of oblique photogrammety model, and supports distance calculation based on sampling.

◇ Newly supports generating raster data into grid cache to optimize the display and browsing performance of raster data.

◇ Optimizes the generation of map, terrain, point cloud, oblique photogrammety model to 3D cache.

◇ Newly supports layer color and group classification setting of point cloud cache, and supports viewing group classiÞcation properties and delete the specified group data.

◇ Newly supports storage of local TIN data to MongoDB.

◇ New function of TIN cache building by feature point dataset.

◇ New function of slope and aspect analysis for TIN.

◇ New distributed processing operator for oblique photogrammetry, including merging root nodes, texture compression, monomer, clipping, etc.

◇ New distributed processing operator for terrain, including additional generating cache.

◇ New distributed processing operator for manual modeling, including generating S3M tile, storing to MongoDB.

◇ New capacity of whole process management for oblique photogrammetry data through visual modeling tools.


AR Map--Vector Data Overlying Dynamic Video

## Terminal GIS for Web

### SuperMap iClient JavaScript

The cloud GIS web client development platform is based on the modern Web technology. It is the unified Javascript client for the SuperMap cloud GIS and online GIS platform products.

## Product features

### • Integrates the commonly used maps and chart libraries

◇ Map development library supports: Leaflet, OpenLayers, MapboxGL-JS, iClient Classic.

◇ Chart development library supports: ECharts, D3, MapV, DECK.GL.

### • Component development

◇ Supports component development under Vue framework, including map component, rich geographic visualization components, chart component and basic GIS component, etc.

◇ MVVM mode (model view ViewModel) is adopted in architecture design, and other frameworks are compatible, such as Angular and native H5 development.

◇ More than 100 sets of themes are built in the component, and the theme styles of all components can be switched with one click.

### • Big data visualization

◇ Provides unified API and visualization for distributed analysis service and data flow of SuperMap iServer.

◇ Supports various temporal and static visualization effects: scatter plots, thermograms, honeycomb plots, trajectory plots, O-D plots, flow diagrams, 3D architectural drawings, wind maps, etc.

### • Vector tiles

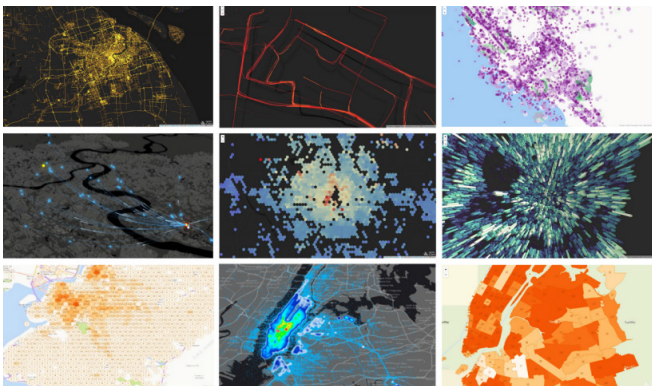
◇ Supports MVT and standard coordinate systems like Web Mercator, WGS84, CGCS2000 and local coordinate system.

◇ Supports interaction and style configuration, including query, selection, highlight, etc.

### • Client computing

◇ Integrates turf.js, and supports client computing like geospatial, topology, equivalence, measurement, etc.

◇ Client can achieve high performance analysis and calculation without interaction with server.



City Night Scenes Effects

# SuperMap iClient3D for WebGL

It is a 3D client development platform based on WebGL technology, which can be used to build 3D GIS applications with plug-ins free, cross-operating systems and cross-browser.

## Product features

### • Full functions

◇ Supports high-performance loading and display of massive, multi-source, and heterogeneous data such as images, terrain, maps, vectors, manual modeling data, underground pipelines, tilted photography models, BIM, laser point clouds, and 3D field data.

◇ Supports efficient rendering of massive real-time dynamic data.

◇ Supports 3D geospatial analysis and analysis result output: through-view analysis, visual field analysis, skyline analysis, sunshine analysis, profile analysis, openness analysis, etc.

◇ Supports efficient visualization of voxel grid.

◇ Optimizes distance and area measurement based on land surface.

◇ New function of 3D geospatial query and relations judgement based on GPU.

◇ Supports polygon clipping of videos, and can only display the videos in specified area.

◇ Newly supports label thematic map making based on point cache and style modification in real time.

◇ MVT can support 3D characters, which optimizes loading and browsing performance.

◇ MVT and S3M layers can support traction line and icon, and the custom images can be set as background.

◇ MVT can set filter, and the style, explicit and implicit of the specified object can be searched and modified through condition setting.

## • Data security

◇ Supports the loading of terrain image service encrypted by cache stream.

◇ Supports terrain, image, S3M layer, WMTs, body object data to set custom request header.

## • High reality

◇ New fireworks particle effects.

◇ Supports scan line with texture.

◇ Optimizes the display effects of border lines.

## • New function of real time analysis for geological body

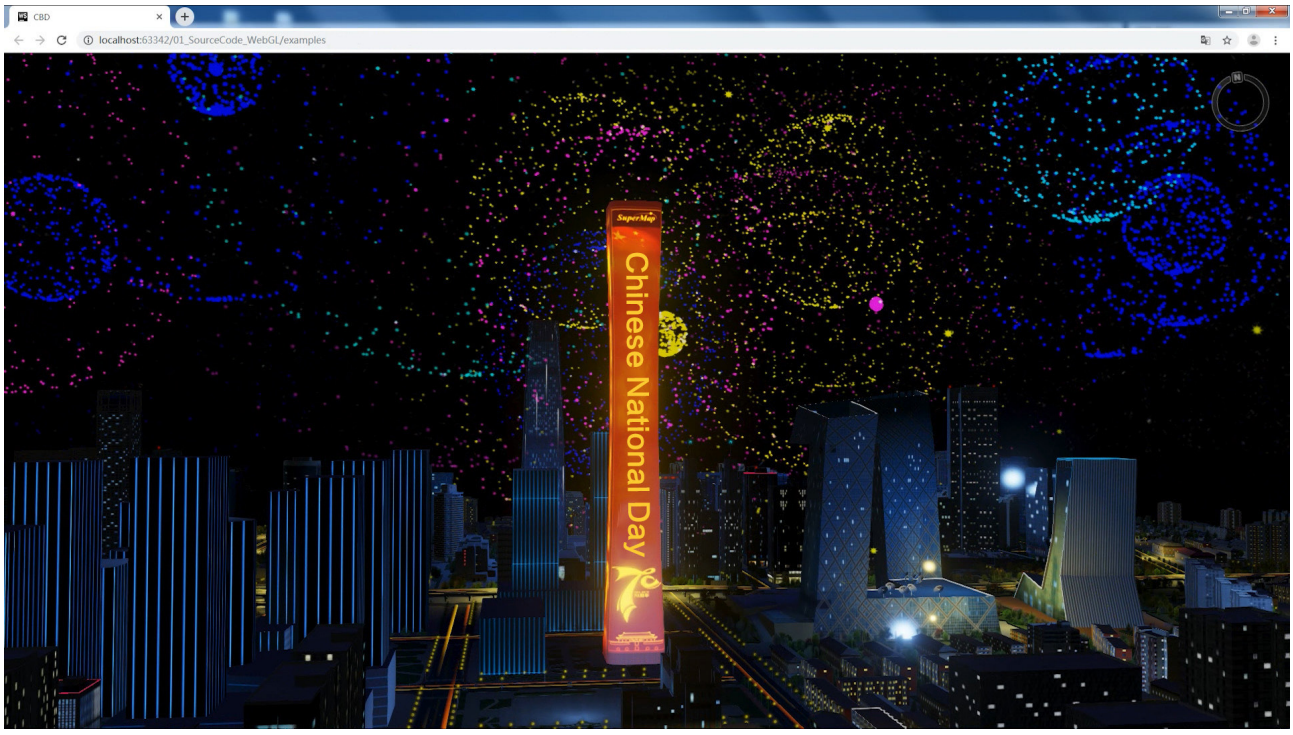
◇ Supports real time sectioning analysis.

◇ Supports polygon clipping.

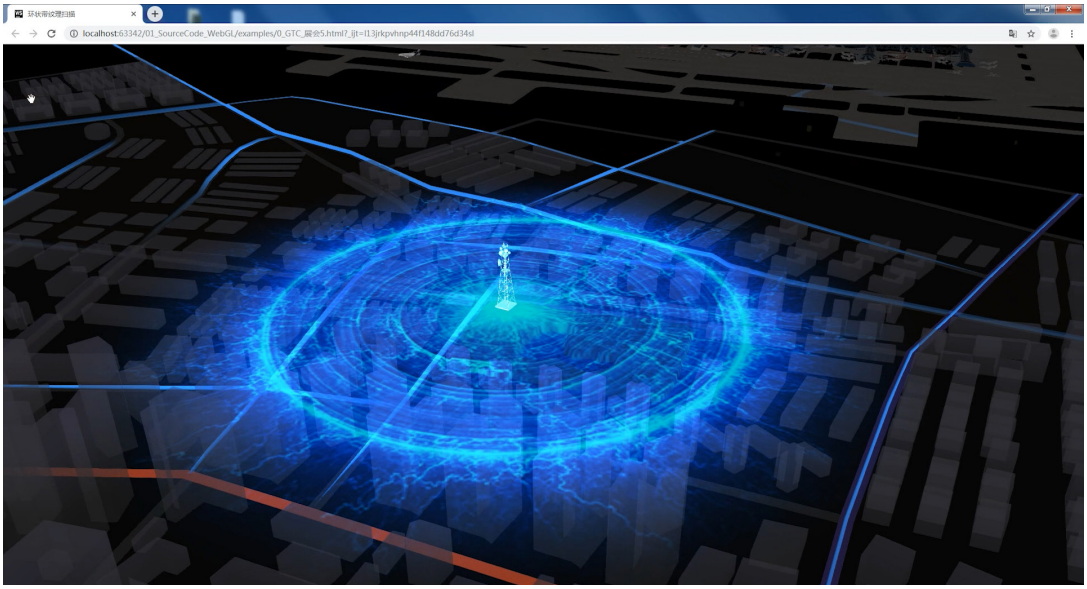
◇ Supports cylinder and polygon excavation of geological body.

◇ Supports virtual drilling.

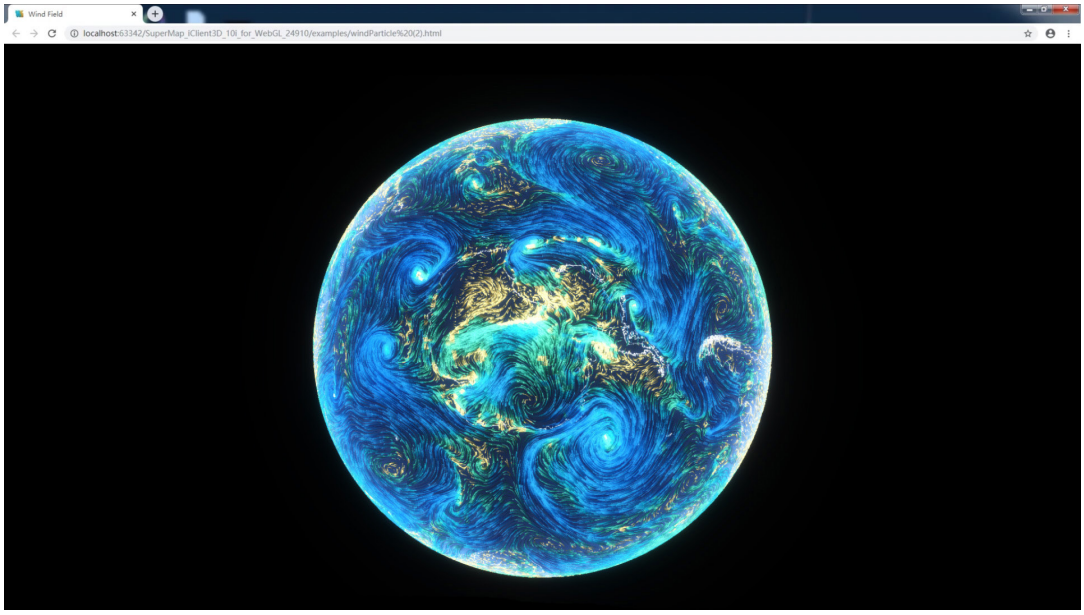
◇ Supports geological model expressions of exaggeration, explosion, etc.




Fireworks Particle Effects



Scan Lines with Texture



Wind Field Expression

## Terminal GIS for Mobile

### SuperMap iMobile for Android / iOS

It is a full-featured mobile GIS SDK that supports 2D&3D application development, online/offline applications and offline applications.

## Product features

### • AR map

◇ Supports integration of AR and multiple geospatial data, such as vector, model, image, terrain, effects, POI, web page, etc..

◇ New AR effects of flower falling, leaves falling, dark clouds, raining, snowing, as well as custom effects.

◇ New sand table capability of AR, which is suitable for scenic spots, real estate, battlefield scenes, and supports gesture operation of sand table.

◇ New pipeline capability of AR supports browsing, interaction, attribute query and automatic picking based on location.

◇ Provides GIS point coordinate acquisition, trajectory acquisition, point cloud collection with centimeter level.

◇ New AR measurement function supports area, distance and height measurement.

◇ Improves AR mapping to suitable for indoor and outdoor vector and point cloud data acquisition.

◇ New visual location based on feature point cloud and icon location based on image recognition.

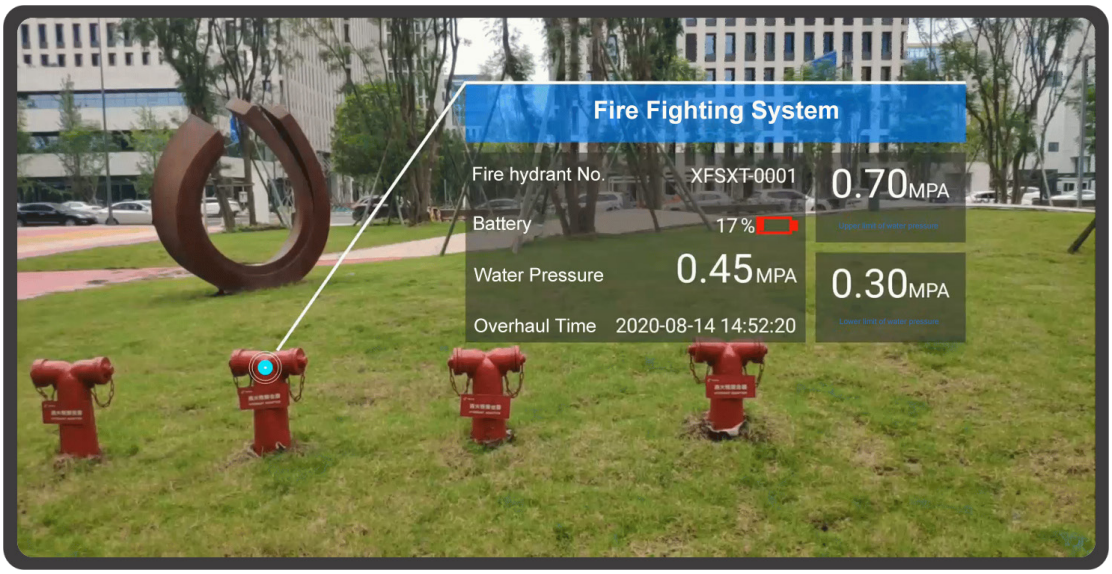
◇ Supports target segmentation, 3D recognition, target detection and target classification.

◇ Supports recognition of pose, gesture, foot and other objects.

◇ Supports the recognition of license plate and vehicle number, color, type and other information to realize low-speed continuous recognition of real-time license plate.

### • Coordination of cloud and terminal

◇ Supports access to SuperMap Online and SuperMap iPortal account for multi-terminal group management.




AR Recognition

◇ Supports the management of user group, message and task data, and supports the delivery of files, services and resources.

◇ Supports multiple terminal data acquisition and synchronous update, and supports real time display of SuperMap iPortal dashboard.

### • Data collection

◇ Supports GNSS collection, manual drawing, etc.

◇ New trajectory acquisition filter optimizes trajectory smoothing effect.

◇ Supports topological editing methods such as merging, splitting, and breaking based on line and polygon objects.

◇ Supports multimedia information collection such as sound, image, video, etc.

## • 3D scenes

◇ New rolling shutter function.

◇ New height measurement function.

◇ New function of loading plane TIN and image.

◇ New function of grid terrain loading optimizes online terrain image download performance.

◇ Optimizes loading point cloud data, and supports layered color setting.

## • Data management

◇ Supports local vector format: udb, shp, mif, dwg, dxf, kml, kmz, etc.

◇ Supports local raster format: tiff, GeoTiff, img, sit, sci, jpg, png, bmp, etc.

◇ Supports 3D data: fine model, oblique photogrammetry, point cloud, terrain, BIM, etc.

◇ Supports online map: Google, OSM, OGC, SuperMap Online, etc.

◇ Supports MVT, GL map tiles and TPK.

## • Map display

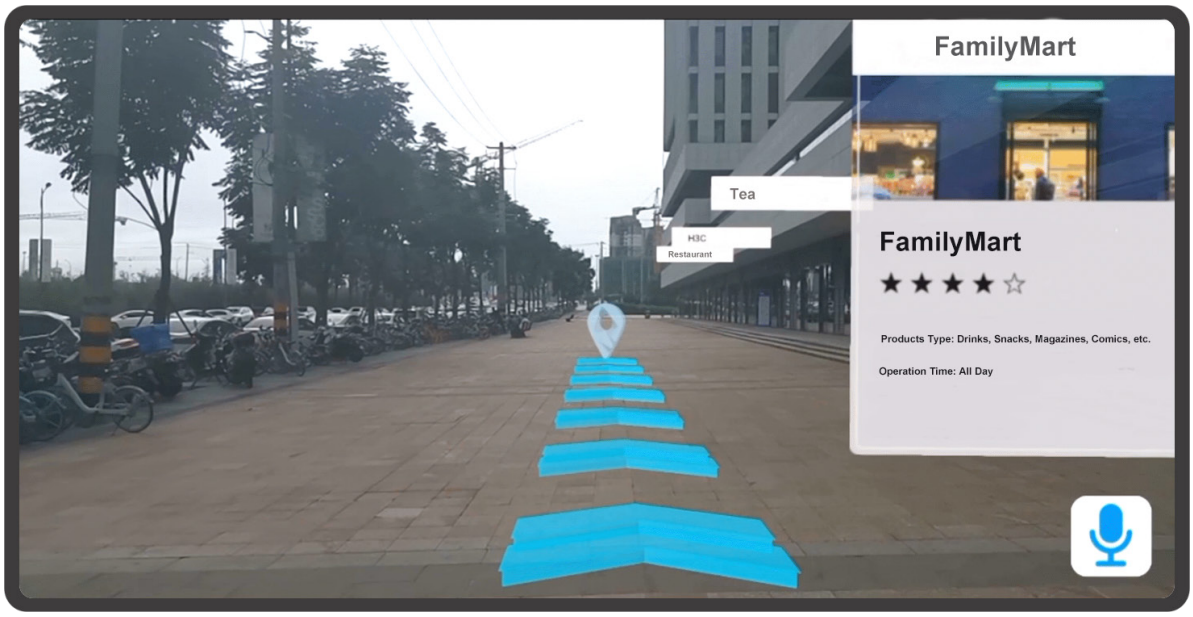
◇ Newly supports Google HD tile service and custom HD tile service.

◇ Optimizes vector performance, and realizes the output of hundreds of thousands of spots in seconds.

## • Navigation map

◇ Supports park navigation, enhances map data collection, production process, and realizes customized navigation guidance, road network model, etc.

◇ Supports AR real scene navigation, and optimizes the ground effect of the guide arrow.




AR Navigation and Image Projection

## SuperMap iTablet for Android / iOS

It is a full-function mobile GIS APP based on SuperMap iMobile development. It supports finger mapping, templating data collection, data analysis, 3D data display, indoor and outdoor integrated navigation, target recognition and detection, and also supports the extension of development and can be used to for rapid customization development of industrial application system.

## Product features

### • Custom extension

◇ APP homepage upgrades, supports horizontal and vertical UI interfaces, and realizes multi-size device adaptation.

◇ Available in Chinese, English, Japanese, French, Arabic, Turkish, etc.

◇ Supports small program extension plug-in development, and realizes plug-in download and deployment management without restarting.

◇ Supports full-featured interface customization such as title, icon and homepage customization.

### • AR map

◇ New AR sand table function supports overlaying multiple model data such as buildings, routes, and annotations into real scene.

◇ New AR measurement function of area, distance and height.

◇ Improves AR collection and supports saving/canceling collection process.

### • Map browsing

◇ New function of voice operation and map searching.

◇ Improves multi-source data importing, including the format of tif, mif, shp, img, kml, kmz, gpx, etc.

◇ Improves the labeling function, and supports editing labeling objects and modifying object styles.

AR Measurement

AR Sand Table

### • 3D scene

◇ Newly supports WebP texture compression, which reduces resource usage by 70%

◇ Supports accessing to multi-source 3D data, such as fine model, oblique photogrammetry, BIM, terrain and other .

### • Field collection

◇ New function of custom collection template creation.

◇ New function of template management supports element name, code and attribute setting.

◇ Supports satellite dotting, manual dotting and gesture drawing.

◇ Supports object editing operations such as merge and split.

### • Navigation collection

◇ Provides outdoor road network collection function, and supports hand-painted and trajectory road network collection.

◇ Improves the function of road network building.

◇ Supports accessing to external positioning equipment.

◇ Improves indoor and outdoor integrated navigation.

### • Thematic mapping

◇ Supports more than 20 thematic types such as area map, ladder map, rose map, etc.

◇ New custom color scheme for single values thematic map.

◇ New custom segments of the segment thematic map.

◇ Supports automatic generation of legend, and adds title for thematic map.

### • Data processing

◇ New function of data registration supports four algorithms: linear registration, quadratic polynomial registration, rectangular registration and offset registration.

◇ New function of projection conversion supports 6 conversion methods, and can copy or reset the coordinate system.

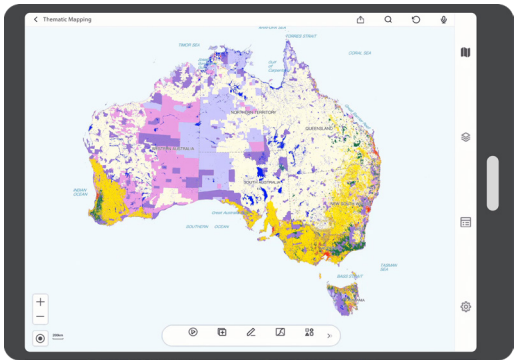
◇ Supports 10 kinds of data analysis methods, such as path analysis, connectivity analysis, etc.

### • Coordination of cloud and terminal

◇ New function of online collaboration supports friend collaboration, group collaboration.

◇ New function of public data, which can provide users with downloadable public data.

◇ Available to share account with SuperMap Online or SuperMap iPortal.



Thematic Mapping

## Online GIS Platform

SuperMap Online

SuperMap online GIS platform (www.supermapol.com) helps users to achieve the security of GIS data on cloud, and provides a wealth of tools for data online display and analysis, a variety of SDKs to access the use of GIS data and rapid development of business systems.

## Product features

### • GIS cloud storage

◇ Storage and use: safety on cloud of 2D/3D data (SuperMap workspace, UDB, Excel, Shapefile, GeoJSON, etc), and can be browsed, queried, edited, analyzed through cloud application.

◇ Mobile office: download and share data through Web, PC and mobile terminals anywhere at any time.

◇ Easy maintenance: with its own GIS cluster, health monitoring and self-recovery capabilities, users do not need to care about deployment and operation and maintenance.

### • GIS cloud analysis

◇ Provides 7 kinds of GIS cloud analysis API, such as national route navigation, geocoding, coordinate conversion, etc.

### • GIS cloud application

◇ Various Web Apps: DataViz WebApp, DataInsights WebApp, Earth WebApp, map matching, MapDashboard WebApp, map studio, etc.

◇ Supports online interactive visualization and 2D and 3D data analysis.

### • Satellite remote sensing data and value-added service solutions

◇ Integrates mainstream remote sensing data resources, and provides online high-score image data that can be easily retrieved.

◇ Supports intelligent analysis of remote sensing data, including calculation of vegetation index and mountain shadow.

### • GIS cloud host service

◇ Instant access: 3 minutes to get GIS cloud host online, which is easy to build a dedicated public network GIS server.

### • GIS cloud license subscription

◇ New authorization method for GIS software supports using GIS software by directly logging in to SuperMap Online account, and subscribing to the usage time on demand.

### • GIS cloud development

◇ REST API: including GIS cloud storage interface of uploading, publishing and downloading GIS data, and GIS cloud analysis service interface.

◇ Various SDK : JavaScript, Python, Android, iOS, etc.

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