Indoor Navigation

In recent years, indoor navigation is a kind of navigation mode becomes more and more popular. Navigation applications have been shifted from outdoors to indoors, which helps users to reach the indoor destination quickly. Indoor navigation can be used as the super entrance to "the last kilometer of map navigation", which is gradually playing its commercial value in recent years.

SuperMap iMobile has accumulated abundant experience in the navigation field. Traditional navigation, industry navigation functions have been widely used. Based on this, SuperMap iMobile 8C(2017) introduced 2D indoor navigation function. SuperMap iMobile 9D extends the indoor navigation from 2D to 3D, which enhances the navigation experience of users.

Following functions are provided by SuperMap iMobile for indoor navigation.

- > Indoor map display (two-dimensional, three-dimensional)
- Indoor floor switch
- > Indoor cross-floor, multi point path planning
- Indoor analog navigation, real navigation
- Navigation voice broadcast

This paper will introduce the indoor navigation function of SuperMap iMobile in details from the following aspects: indoor navigation data production, indoor positioning technology, indoor navigation and indoor navigation solution.

Data Preparation

Tool used for data preparation is SuperMap iDesktop V9.0.

2.1 2D Indoor Map

2.1.1 Navigation Map Composition

A two-dimensional indoor map for SuperMap iMobile indoor navigation engine includes the following contents:

- > Indoor data Source: Contains indoor map source data, navigation path data, floor association attribute table.
 - Indoor map source data, that is, indoor raw data, mainly used on the map for display. Take shopping malls for example, staircases, toilets, shops, ATMs and so on are included.
 - Navigation path data: Indoor data, including path data (line dataset), which can be used for for navigation after the topology network.
 - Floor association attribute table: Store floor association relation, which is the basis of the normal operation of navigation. The table needs to be made manually.
- Bounds data source: Used to control the display and hiding of floor controls. The bounds data source name is "bounds" (the name is not modifiable), containing a region dataset named "building" (the name is not modifiable). The dataset contains only one polygon object and the shape and size of the polygon are similar or identical to the shape and size of the inddor map.
- Outdoor data source (optional): Contains a variety of outdoor data, such as roads, points of interest, etc.. It is used to produce indoor and outdoor integration map to achieve display effect from outside to indoor.
- > Map: After a variety of style settings and thematic processing, maps will used to show in the program.

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Image: Second state secon	F F F

Figure 1 2D Indoor Map Data Structure

2.1.2 Map Display and Data Preparation

2.1.2.1 Import Dataset

Import the original data into the import data source before preparing the data.

Operations:

step 1: Create a datasource. Workspace Manager--Right click Datasource--New File Datasource, enter datasource name and storage path.

Workspace Manager # x ^{Onlin}	Workspace Manager 4 x Start Tab
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	Image: Image
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Dia Open Database Datasource	Diagra Copy Dataset
Open Web Datasource	Import Dataset
🗄 🖻 Re 🔯 New File Datasource	
New Database Datasource	Export Dataset
New Memory Datasource	Create from Template
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Download Datasource	↓↑ Sort Datasets By ►
Fold Datasource Node	Batch Transform
Close Datasource	Copy Datasource
	Compact Datasource
	Service Table Management
	Upload Datasource

Figure 2 Create new datasource (left) and import dataset (right)

Step 2: Import the dataset Workspace Manager--Right click the datasource created in the 1st step--Import Dataset, and add files for datasets via the Add File button.

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Source File	Туре	tatus	^	Result Settings —					
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T_1F_FL_INFO.csv	CSV File	Un		Conversion Paramet	hare				
T_1F_FL_INFO.dbf	ArcGIS DBF	Un							
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T_1F_PUB_INFO.csv	CSV File	Un		– Source File Info: –					
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T_1F_SHOP_INFO.shp	ArcGIS Sha	Un							
T1F_CON_INFO.csv	CSV File	Un							
T1F_CON_INFO.dbf	ArcGIS DBF	Un							
T1F_CON_INFO.shp	ArcGIS Sha	Un							
T1F_FL_INFO.csv	CSV File	Un							
T1F FL INFO.dbf	ArcGIS DBF	Un	¥						

Add: 6/F, Building 107, No. A10, Jiuxianqiao North Road, Chaoyang District, Beijing, 100015, CHINA, 100015 E-mail: request@supermap.com Website: www.supermap.com Figure 3 Add file

2.1.2.2 Layer Grouping

Organize data as layer groups, and each layer group contains all the data for one floor.

Operations:

Step 1: Create layer groups: Manage data for one floor in one layer group.

Layer Manager--New Group, New Root Group, create layer groups. (You need to add the dataset to the Map window before you can see the New Root Group button)

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Figure 4 New Root Group		
Layer Manager	ņ	×
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Figure 5 Sample for creating root group

Step 2: Add the indoor dataset to the current map and place it under the appropriate group.



Figure 6 Layer structure sample

2.1.2.3 Region Dataset Preparation

Region Data Attributes: The region data must contain the following attributes, which cannot be changed:

Floor ID	The attribute field name is called " FL_ID " (the name cannot be changed). It will be used for floor display, path analysis, and navigation. Each floor has an ID, and the floor IDs for all the features on the same floor are the same.
Туре	Used to make unique value thematic map, which displays in different colors depending on the type. You can set the value of a type based on different attributes of the object. Take shopping malls for example, shops, elevators, toilets can be set to different types.

Name	Used to make the label thematic map, and display the name on the maps.
-	

 Table 1 Attributes must be contained in the region dataset

Step 1: Add attribute items: If the dataset does not contain the above attributes, you need to manually add the content.

On the region dataset where you want to add the attributes, right click, select Attributes--Attribute Table, open the list of attributes as shown below, and use + Add = Modify = Modify = Odd + Apply to add the attribute items. You need to click Apply to take effect.

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⊡ ₽ -	
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	Browse Attributes
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T1F_RO4	Add to Current Map
• T1F_R04	Add To Diagram
	Add to New Spherical Scene
	Add to New Plane Scene
Layer Manager	Add to Current Scene
	Copy Dataset
	Export Dataset
C	SQL Query
1	Rebuild Spatial Index
G	 Create Scene Cache
	Close Dataset
	Recompute Range
1] Delete Dataset
	Rename Dataset
0) Properties

Figure 7 Open attribute table for operations

Properties ×					Properties ×						
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	2	*SmSdriW	SmSdriW	Single			9	*SmGeomet	SmGeometr	Int	
	3	*SmSdriN	SmSdriN	Single			10	FL_ID	FL_ID	Wide Char	
	4	*SmSdriE	SmSdriE	Single			11	BD_ID	BD_ID	Wide Char	
	5	*SmSdriS	SmSdriS	Single	-		12	FL_NO	FL_NO	Int	
	6	SmUserID	SmUserID	Int	-		13	FL_NONA	FL_NONA	Wide Char	1
	7	*SmArea	SmArea	Double			14	FL_NAME	FL_NAME	Wide Char	
	8	*SmPerimeter	SmPerimeter	Double	-		15	FL TYPE	FL TYPE	Wide Char	
	9	*SmGeomet	SmGeometr	Int	-		16	FL_NAME_CN	FL_NAME_CN	Wide Char	
							17	FL_NAME_EN	FL_NAME_EN	Wide Char	
							18	HIGH	HIGH	Single	
							10	C TIME	C TIME	Wide Char	*

Figure 8 Attribute list (left), attribute adding results (right)

Step 2: Add attribute values: When the attribute item is added, you can add the corresponding attribute to each object in the dataset.

On the above-mentioned dataset, right-click, select Browse Attributes, open the attribute table of the dataset as shown below, double-click an item in the property sheet (item with * cannot be edited) and edit the attribute.

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5- I 🖻 I 🔎 -	
T_1F_CON_INF T1F_DOOR_INF T1F_DOOR_INF	O A
····△ T1F_FL_IN ····△ T_1F_FL_I Ш	Browse Attributes
• T1F_PUB_	Add to New Map
T1F_ROA	Add to Current Map
• T1F_ROA	Add To Diagram
	Add to New Spherical Scene
	Add to New Plane Scene
Layer Manager	Add to Current Scene

Figure 9 Open attribute table for operations

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	No SmID		No SmID			FL_NO	FL_NONA	FL_NAME
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Figure 10 Attribute table structure (top), sample for adding attributes (bottom)

Step 3: Create unique value thematic map, which displays objects in different colors depending on the types.

In the Layer manager, select the region dataset layer, right-click, select "Create Thematic Map"--"Unique Values Map"--"Default", the following "Thematic Map" setting interface will display. Select expression. You can select appropriate colors via color ramps, or open Fill Symbol Selector via Styles button for color settings.







Figure 12 Settings for unique values map

Step 4: Create lable map and display names as labels.

In the Layer manager, select the region dataset layer, right-click, select "Create Thematic Map"--"Label Map"--"Default", the following "Thematic Map" setting interface will display. Select expression, and set on the Properties, Styles, Advanced tabs.

Layer Manager	1	ч×	Creat	e Thematic Map)	×
Layer Manager	Visible Selectable Editable Snappable	д х		e Thematic Map Unique Values Map Ranges Map Label Map Graph Map	TT Uniform	TT Unique Value Style TT	Ranges	Composite	×
1 • + 6 4 0 1 1 • + 6 4 0 1 1 • + 6 4 0 1 • + 6 4 0 1 • + 6 4 0 1 · + 6 4 0 0 1 · + 6 6 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Full Extent Associate Attributes Change Dataset Visible Scale Range Layer Control Layer Style	Þ		Graduated Symbols Dot Density Map Custom Map	Ranges label for admini	Uniform label	for weath	label for ro	
	Layer Style Template Object Selection Style Create Thematic Map Thematic Map Template New Group		Mai	> nage			OK	Cancel	

Figure 13 Operations for setting label maps

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Thematic Map Manager X	Thematic Map Manager 🛛 🗙	Thematic Map Manager X				
Thematic Map: TIF_SHOP_INFO@kaide_mall#1	Thematic Map: T1F_SHOP_INFO@kaide_mall#1 Thematic Map: T1F_SHOP_INFO@kaide_mall#					
Properties Style Advanced	Properties Style Advanced	Properties Style Advanced				
Expression: FT_NAME_DP	Font: Segoe UI 🗸	Alongline Labelling				
Background Settings	Initialize	Fixed Text Angle Remove Repeat				
Back Shape: Default 👻	Alignment: Center -	Label Direction: Along the norm V				
Back Style: Settings	Font Size: 11	Spacing: 1.1 Times				
Border Space Width: 4	Font Height: 39	Word Angl 20 °				
Offset Settings	Font Width: 0	Interval Unit: Map Distance U 🗸				
Offset Unit: Map Distance Un 🔻	Rotation: 0 🔹	Repeat Interval: 0 °				
Offset X: 0 🗸	Tilt Angle: 0	Draw Type: Compatible Dr. V				
Offset Y: 0 🗸 °	Text Color:	– Label Length Settings				
		OverLength: Single Line Dist 👻				
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Precision:	Background Transparency Outline 1 Pixel	Min Height: 0 0.1mm				
Apply Immediately Apply	Apply Immediately Apply	Apply Immediately Apply				

Figure 14 Settings for label maps

2.1.2.4 Point Data Preparation

Floor ID	The attribute field name is called " FL_ID " (the name cannot be changed). It will be used for floor display, path analysis, and navigation. Each floor has an ID, and the floor IDs for all the features on the same floor are the same.
Туре	Used to make unique value thematic map, which displays in different colors depending on the type. You can set the value of a type based on different attributes of the object. Take shopping malls for example, shops, elevators, toilets can be set to different types.
Name	Used to make the label thematic map, and display the name on the maps.

Step 1: Add attribute items: The method is the same as the adding attribute items for region datasets. You can add attribute items following steps below.

Table 2 Attributes must be contained in the point dataset

In addition to the above attribute items, staircases (including escalators, ladders, straight ladders, etc.) must also contain the following attribute items because of the navigation involved.

Staircase ID	The attribute field name is " FT_ID ", and each layer of stairs has an ID value. Even if parts of straight ladder on have different IDs.
Staircase Type	The "Type" in the table above. In the staircase attributes, the name of the attribute item must be " FT_TYPE ".
Floor Arrived	The attribute field name is " TO_CON ", in the form of "#Floor Arrived#ID of the next floor". For example, if you have arrived at the staircase with the ID 138690310200334 on the 2nd floor, the attribute value is "#2#138690310200334". Each staircase only needs to correspond to the upper stair. For example, for floor 1, the attribute of this field is 2. For the top level, this attribute can be empty.

Table 3 Attributes must be contained in the staircase data

Attribute items are added with the same region data's attribute items, please refer to the steps of of adding attribute items for region dataset.

Step 2: Add attribute values The method is the same as the adding attribute values for region datasets. You can add attribute values following steps below.

Step 3: Create unique value thematic map, which displays objects in different colors depending on the types.

Thematic Map Manager X	Marker Symbol Selector					X
Thematic Map: 🔀 T_1F_DOOR_INFO@kaide_mall#1	File (F) - Edit (E) -				Search i	in Symbol Library (Ctrl + E) 🔍 🛛 📮
Properties Advanced	C Root Group			\wedge	<u>A</u>	A Preview
Expression:	Control Points Horic Residential Area Land Survey Filed Control	SystemO	System1	1	4 73	
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< >>						OK Cancel Apply
Apply Immediately Apply						

In the following interface, set up properties for unique values maps. You can open Maker Style Selector via the Styles button to select appropriate market styles.

Figure 15 Operations for setting marker symbols

If marker styles in the Marker Style Selector cannot meet your requirements, you can choose to Import Symbol Library (import .sym files), Import Raster File (import .jpg, .png, .bmp, .ico pictures) to import desired symbols.

Mark	er Symbol Selector						×
File	(F) - Edit (E) -				Search	n in Symbol Library (Ctrl + E) 🔍 🤉 🗍	9 ₀ -
[Open Marker Symbol Library File Load Default Marker Symbol Lib	e rary	•	\triangle	4	Preview	
	Import	•	Import Marker S	/mbol Library	2		
	Export	•	Import Marker S	/mbol			
	Properties		Import TrueType	Font		•	
		× I	Import Raster Sy	mbol			
Auto	🗄 🖻 Population	3	Import AutoCAD	File	6		
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	< >		*	\times	\cap	~	
						OK Cancel Apply	

Figure 16 Import Symbols

Steps 4: Create label thematic map: The method is the same as creating label map for region dataset.

2.1.2.5 Save Map and Workspace

According to the above method, the data of each floor is processed. When finished, set one floor visible. The original layer used for creating the thematic map can be removed or hide.



Figure 17 Sample for data processing results

Click "Start"--"Workspace"--"Save". In the window for saving the map, enter the map name and save the map. Save the workspace by entering the workspace name and storage location in the window for saving the workspace.

Tip: To prevent data loss, you can save it from time to time during data production.

Save	×
Select All 🗹 Select Reverse	🛛 Activate 🕅 🗹 Rename
Name T2F_PUB_INFO@kaide_mall	Type Map
✓ Save KML layers in scenes	Save Discard Cancel

Figure 18 Save the map

2.1.3 Navigation Path Data Preparation

The raw indoor data needs to include path data stored in line datasets. You need to construct road network based on the path data for navigation. It is not necessary to add the road network to the map.

Click "Traffic Analysis"--"Network by Topology"--"Structure 2D Network", open the "Build Network Dataset" dialog box, select the dataset for the topology network, set the dataset name, click "OK" to complete the topology network.

Dataset		Datasource
1 TIF_ROA	ADMAP_LINKS	🔚 kaide_mall
Result Settings		
Result Settings Datasource:	kaide_mall	Split Settings
Result Settings Datasource: Dataset:	kaide_mall BuildNetwork	Split Settings Split Line by Point Split Lines at Intersection

Figure 19 Construct 2D network dataset



Before process

After process

2.1.4 Bounds Data Preparation

The size of the bounds data should be the same or slightly larger than the indoor bounds to control the display of floor controls. The bounds data is a datasource named "bounds" (fixed name, cannot be changed) containing a region dataset named " building" (fixed name, cannot be changed). The region dataset contains only one polygon.

Operations:

Step 1: Create a datasource: The datasource name is "bounds", and the storage path is the same as the path of the indoor datasource.

Right click Workspace Manager--Datasource, and click New File Datasource.

Figure 21 Create new datasource

Step 2: Create a region dataset Datset name is "building". The dataset is a region dataset.

Right click Workspace Manager--The bounds datasource, and click New File Datasource.

N	w Dataset						×
	' 🗹 🔟 🗔 🗯						
	Target Datasource	Туре	Dataset	Add to Map	– Template –		
	🖬 bounds	Point	New_Point	No	Don't Use	Template	
2	bounds	Point		No	O Dataset Te	mplate	
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					Dataset:	T2F_PUB_INFO	~
					Settings		
					Encode Type:	None	~
					Charset:	UTF-8	•
V	Auto close when finish					ОК	Close

Figure 22 Create a region dataset

Step 3: Add a region object The number of polygons can only be 1, the size of the polygon should be the same as or slightly larger than the indoor map area, and the location should be the same as the indoor data.

- 1 Add dataset to map: Add the dataset to the map window by double-clicking the "building" dataset or right click on the dataset and click Add to New Map.
- 2 Set the dataset editable: In the Layer Manager, click the third button (the editable button) before the "building" dataset, or right click the dataset and select "Editable" to set the dataset to editable mode.

Layer Manager	џ	×		٩	Visible	
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					Full Extent	
				0+0	Associate Attributes	
					Change Dataset	
				-	Visible Scale Range	•
				≶	Layer Control	
					Lover Style	

Figure 23 Two methods to set the layer editable

3 Drawing a region object: You can draw region objects in the building dataset following the steps below:

Object Operations--Draw Objects--Region

If the original indoor data contains a region dataset that is similar to the entire indoor area, you can copy and save the dataset into the building dataset.

In Workspace Manager, right click the dataset to be copied, click Copy Dataset to open the dialog box for copying the dataset, where you can set the target datasource "bounds" and the name of the result dataset "building".

Workspace Manager	# x building@bound
⊊ <i>e</i>	
IndoorNavigationMap □···□ □··□ □··□	
• T2F_POB_IN •••• T2F_CON_II ••••• T2F_SHOP_	NFO INFO
• T1F_P ==	Add to New Map
	Add to Current Map
• T_1F_F 	Add To Diagram
T_1F_F ** • Count • Xiang	Add to New Plane Scene Add to Current Scene
POI_A	Copy Dataset
Q	SQL Query

Figure 24 Copy dataset

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Source Dataset	Source Datasource	Target Datasource	Target Dataset	Encode Type	Charset	
T2F_FL_INFO	🔚 beijing	🔚 bounds	Building_1	None 🗸 🗸 🗸	UTF-8	
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Close when finish	ea			Сор	CI	ose

Figure 25 The dialog box for copying dataset

Step 4: Add attribute items. You need to add two fields LinkName" and "LinkDataSource" (the names are fixed and cannot be changed) for the building dataset.

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[Dounds							
[Datase	et Coordinate	Vector Att	tribute Table				
	🗄 🕂 Add 🗐 Modify 🏢 Delete 🗸 Apply							
		Name	Alias	Туре	^			
	2	*SmSdriW	SmSdriW	Single				
	3	*SmSdriN	SmSdriN	Single				
	4	*SmSdriE	SmSdriE	Single				
	5	*SmSdriS	SmSdriS	Single				
	6	SmUserID	SmUserID	Int				
	7	*SmArea	SmArea	Double				
	8	*SmPerimeter	SmPerimeter	Double				
	9	*SmGeomet	SmGeometr	Int				
	10	BD_NAME_CH	BD_NAME_CH	Text				
	11	LinkName	LinkName	Text				
	12	LinkDataso	LinkDataso	Text				
	<			>	~			

Figure 26 Add LinkName" and " LinkDataSource" fields

Step 5. Add attribute value	Step	5:	Add	attribute	values
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	No	SmID	SmSdriW	SmSdriN	SmSdriE	SmSdriS	SmUserID	SmArea	SmPerimeter	SmGeometrySize	BD_NAME_CH	LinkName
•	1	2	116.352188	39.94286	116.353378	39.940731	0	12303.761831	597.976601	1816	KaideMall	LayerGroup

Figure 27 Addvalues for LinkName" and " LinkDataSource" fields

The value of LinkName comes from the the upper level of the floor group in Layer Manager. You can get the value by right-clicking on the group, select Layer Properties, and get the value of the layer name in the Layer Properties window.

Layer Manag	ger		ч×	Layer Properties		ųх
	or)• ble		View Control	LaverGroup#1	
	Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set Image: Set	Full Extent Set Visible Scale → Layer Control New Group Cancel Group Rename Paste Delete	Layer Caption: Min Visible Scale: Max Visible Scale:	Mall 0 0	· · · ·	
E F	El) Ren Pasi					
	Laye	er Properties				

Fgiure 28 "LinkName" How to get attribute value

The value of LinkDataSource is the name of the datasource where the original navigation data is.

Fgiure 29 "LinkDataSource" How to get attribute value

2.1.5 Attribute Data Preparation

The attribute data	set pluys a endear fole in navigation, and it must contain the following data items.
Layer Name	The name of the attribute field is "LayerName", which means the name of each floor in Layer Manager.
Floor ID	The name of the attribute field is " FL_ID ", which is the same as the ID added for features of each floor.
Path File Name	The name of the attribute field is " NetworkName ", which means the name of the dataset where the path data for each floor is.
Floor Name	The name of the attribute field is "FloorName", which is used for name display during floor switch.
Floor Index	The name of the attribute field is "FloorIndex", which means the index value for each floor.

The attribute dataset plays a critical role in navigation, and it must contain the following data items:

Table 4 Attributes must be contained in the attribute dataset

Operations:

Step 1: Create the attribute dataset and store the dataset in the datasource where the original indoor data is. The name of the dataset is "FloorRelationTable" (cannot be changed).

Right click Workspace Manager--The datasource where the orginal data is, and click New Dataset.

Ne	New Dataset ×									
	Target Datasource	Туре	Dataset	Add to Map	– Template –					
1	🖬 kaide_mall	🛗 Tabular	FloorRelationTable	No	Don't Use	Template				
2	🛗 kaide_mall	Tabular		No	🔘 Dataset Te	mplate				
					Dataso	🔒 beijing	~			
					Dataset:	T2F_PUB_INFO	\sim			
					_ Settings					
					Encode Type:	None	~			
					Charset:	UTF-8	-			
V	Auto close when finish OK Close									

Figure 30 Create attribute table

Step 2: Add attribute items

On the FloorRelationTable dataset where you want to add the attribute items, right click, select Attributes--Attribute Table, open the list of attributes as shown below, and use + Add D Modify Delete | < Apply to add the attribute items. Note: Attribute fields cannot repeat. Click Apply to take effect.

	Properties ×										
6	kaide_mall FloorRelationTable FloorRelationTable										
[Dataset Vector Attribute Table Domain										
		Name	Alias	Туре	Length						
	1	*SmID	SmID	Int	4						
	2	SmUserID	SmUserID	Int	4						
	3	LayerName	LayerName	Text	255						
	4	FL_ID	FL_ID	Text	255						
	5	NetworkNa	NetworkNa	Text	255						
	6	FloorName	FloorName	Text	255						
	7	Int	4								
	< >>										

Figure 31 Add attribute items

Step 3: Add attribute values

On the FloorRelationTable dataset, right-click, select Browse Attributes, open the attribute table of the dataset as shown below, double-click an item in the property sheet and edit the attribute.

No		SmID	SmUserID	LayerName	FL_ID	NetworkName	FloorName	FloorIndex
۲	1	1	0	LayerGroup#8	138690100100	T_1F_Network	B1	-1
	2	2	0	LayerGroup#3	138690110100	T1F_Network	F1	1
	3	3	0	LayerGroup#4	138690110200	T2F_Network	F2	2

Figure 32 "FloorRelationTable" Add attributes

LayerName value that corresponds to the layer name for each floor in the layer manager.

Layer Manager	д	×				
□ • + • □ □	₽ -	÷	Layer Properties		×	
🗆 🔍 🛅 Mall			View Control —			
	Visible		Visible			
g 🖂	Full Extent		Layer Name(N):	LayerGroup#2		
200	Set Visible Scale	•	Layer Caption:	F1		
G 😂	Layer Control		Min Visible Scale:	0	-	
	New Group		Max Visible Scale:	0	-	
e	Cancel Group					
(E)	Rename					
e	Paste					
± < ⊡	Delete					
a	Layer Properties					

Figure 33 " The method to get layer name

FL_ID value: Floor ID. The floor ID for objects in each floor is the same.

NetworkName value is the name of the path navigation data for the floor.

Figure 34 " The method to get path file name

FloorName value that is the floor name value displayed in the floor operator control on mobile devices.

FloorIndex value is the floor index. For example, the value for the ground floor is-1, the value for the 1st floor is 1, and the value for the 2nd floor is 2.

2.1.6 Line Symbol Library Settings

The navigation path drawn on mobile devices after path analysis can be set through the line symbol library.

In Workspace Manager, right click Resources, click Line Symbol Library to open the Line Symbol Library dialog box, select Import, click Import Line Symbol... to import .lsl file.

Workspace Manager 4 X	Line Symbol Library							
	File (<u>F</u>) ▼ Edit (<u>E</u>) ▼			Search in Symb	ol Library (Ctrl	+ E) Q	₽ <u></u> +	
	Open Line Symbol Lib	orary File					^	
	Load Default Line Syn	nbol Library						
	Import		Import Line 9	wahal Library				
□	Export	^	Import Line 3	Symbol Library	webel			
i ⊕ m beijing		,	Import Line 3	symbol				
ter bounds	Line Inner Marker Syn	nbol Library				`		
⊞	Properties							
T2F_PUB_INFO@kaide_mall		System5	45	44	43	42		
Diagrams								
Layouts								
Resources		\rightarrow) () — 💥 - () →< (
Marker Symbol Library		41	40	39	38	37		
			——×·	+-		\longleftrightarrow		
		26	25	24	22	20		
		56	35	74	33	32		
			<u> </u>		\sim	$-\frac{1}{2}$		
						1111		
		31	30	29	28	27		
	<	>					¥	
				Con		in cl.		
				Lre	ate	LIO	se	

Figure 35 Import line symbol library

Line Symbo	Library								Х	ī	
File (F) 🔹	Edit (E)	•				Search in Sym	nbol Library (Ct	rl + E) Q	<u>₽</u> ₀ +	Line Symbol Editor	Х
- 🗂 Roo	t Cr	reate Symbol	•	Cre	ate 2D Line Symbo	ol			٨	M & . 100% v Width: 0.1) Knot Symbols	
<u><u></u></u>	Ed	dit Symbol		Cre	ate 3D Line Symbo	ol				Polyline Start D	
⊕-⊡	1 – Co	opv		Cre	ate three dimensio	onal strip tracking	g line	Suntand		PolylineEnd D Shape:	
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			Null						Polyline Center D Jok aspect ratio		
	De	elete		stem5	45	44	43	42		ID: 964582 Name: 964582	
	Ke	ename									
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			-	-	→ •(>─————————————————————————————————————	≻↔			Short-dash (system)	-
				41	40	39	38	37			
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				36	35	34	33	32			
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				31	30	29	28	27			-
۲.		>							v	OK Cancel	
						0	aata 💌	Edit Cl	050		
									0.00		

Or, you can edit line symbols in the Line Symbol Editor that displays when you click Edit->New Symbol->New 2D Symbol.

Add: 6/F, Building 107, No. A10, Jiuxianqiao North Road, Chaoyang District, Beijing, 100015, CHINA, 100015 E-mail: request@supermap.com Website: www.supermap.com Figure 36 Edit line symbol

2.1.7 Outdoor Map Data (Optional)

After the completion of the indoor data, the city map data can be superimposed as a base map, and the indoor and outdoor data can be integrated for usage. The production of outdoor data will not be introduced here.

Figure 37 Integration of indoor and outdoor data

2.2 3D Indoor Map

2.2.1 Map Display and Data Preparation

2.2.2.1 Import Dataset

Import the original data into the import data source before preparing the data.

Operations:

step 1: Create a datasource. Workspace Manager--Right click Datasource--New File Datasource, enter datasource name and storage path.

Step 2: Import the dataset Workspace Manager--Right click the datasource created in the 1st step-

111	port Dataset, and add mes	for datasets via the F	Add Flie Duttoll.
Workspace Manage	r 4 x Start Tab	Workspace Manager	🛛 🗙 Start Tab 🗙
⊊ <i>e</i>		<u>⊊</u> 4	Or
©- <u>۵</u> ₽-		o- ا 🖻 ا ۲۰	
3DindoorScene		⊡ 3DIndoorScene	
	On an Eile Determine	Datasources	
⊞	Open File Datasource	⊞ <mark>beijing</mark>	New Dataset
±im inc	Open Database Datasource		Copy Dataset
	Open Web Datasource	Diagrams	long at Dataset
Layout x>	New File Datasourse	Layouts	Import Dataset
⊞	New The Datasource	🗄 🔟 Scenes 🛄	Delete Dataset
🗄 🖻 🖻 Resou	New Database Datasource	🗄 🖻 Resources	Export Dataset
	New Memory Datasource	8	Create from Template
↓↑	Sort Datasources By		Import Nautical Chart
	Download Datasource	↓↑	Sort Datasets By
	Fold Datasource Node		Batch Transform
	Close Datacource		

Import Dataset, and add files for datasets via the Add File button.

Import Data									×
					1	Impo	rt SHP File		
Source File	Туре	tatu	^	Result Settings					
T_1F_CON_INFO.csv	CSV File	Un		Target Datasource:	indoor_info	*	Result Dataset:	T1F_SHC	P_INFO
T_1F_CON_INFO.dbf	ArcGIS DBF	Un		Encode Type:	None	-	Import Mode:	None	*
T_1F_CON_INFO.shp	ArcGIS Sha	Un		Import Empty Date	ataset				
T_1F_FL_INFO.csv	CSV File	Un		- Conversion Parame	ters				
T_1F_FL_INFO.dbf	ArcGIS DBF	Un							
T_1F_FL_INFO.shp	ArcGIS Sha	Un		M Import Attribute					
T_1F_PUB_INFO.csv	CSV File	Un		– Source File Info: –]
T_1F_PUB_INFO.dbf	ArcGIS DBF	Un		Source Folder:	D:\iDesktop\9D\test\1	T1F_S	HOP_INFO.shp		Properties
T_1F_PUB_INFO.shp	ArcGIS Sha	Un		Charset:	ASCII (Default)	-			
T_1F_SHOP_INFO.csv	CSV File	Un							
T_1F_SHOP_INFO.dbf	ArcGIS DBF	Un							
T_1F_SHOP_INFO.shp	ArcGIS Sha	Un							
T1F_CON_INFO.csv	CSV File	Un							
T1F_CON_INFO.dbf	ArcGIS DBF	Un							
T1F_CON_INFO.shp	ArcGIS Sha	Un							
T1F_FL_INFO.csv	CSV File	Un							
T1F FL INFO.dbf	ArcGIS DBF	Un	۷						
☑ Auto close when fir	nish							Import	Close

Figure 39 Add file

2.2.1.2 Create Spherical Scene

Right click Scenes in Workspace Manager, click New Spherical Scene to create a new scene. You will see the Layer Manager as follows:

Workspace Manager 4 ×	
₽ 4	Layer Manager 🛛 📮 🗙
Image: Section of Section 1 Image: Section 1 <td>Contraction of the second seco</td>	Contraction of the second seco

Figure 40 Create scene (left), results after creation (right)

After the spherical scene is created, add the dataset imported from the previous process to the current scene by dragging or right-clicking "Add to Current Scene". When finished, if you cannot find the layer you have added, select the layer in the layer manager, and right click quickly navigate to this layer.

Figure 41 Add a layer to a scene (left), navigate to layer (right)

2.2.1.3 Region Dataset Preparation

Floor ID	The attribute field name is called " FL_ID " (the name cannot be changed). It will be used for floor display, path analysis, and navigation. Each floor has an ID, and the floor IDs for all the features on the same floor are the same.
Туре	Used to make unique value thematic map, which displays in different colors depending on the type. You can set the value of a type based on different attributes of the object. Take shopping malls for example, shops, elevators, toilets can be set to different types.
Name	Used to make the label thematic map, and display the name on the maps.

Region Data Attributes: The region data must contain the following attributes:

Table 5 Attributes must be contained in the region dataset

Step 1: Add attribute items: If the dataset does not contain the above attributes, you need to manually add the content.

On the region dataset where you want to add the attributes, right click, select Attributes--Attribute Table, open the list of attributes as shown below, and add the attribute items. You need to click Apply to take effect.

		Properties	×
EijingMall TIF_CON_IN TIF_FL_INFC TIF_PUB_INI TIF_ROADM		beijingMall	
• T2F_CO	Browse Attributes		
<u></u> T2F_FL • T2F_PU T2F_RO	Add to New Map Add to Current Map	Dataset Coordinate Vector Attribute Table	Domain
T2F_SH	Add To Diagram	🕂 Add 📺 Modify 🏢 Delete 🗸 Apply	
🕀 🔆 T1F_Ne 👧	Add to New Spherical Scene	Name Alias Type	Lengtł ^
⊞… — T2F_Ne ⊞… ີ indoor inf	Add to New Plane Scene	7 *SmArea SmArea Double	8
Maps	Add to Current Scene	8 *SmPerimeter SmPerimeter Double	8
Diagrams	Copy Dataset	9 *SmGeomet SmGeometr Int	4
	Export Dataset	10 *SmGeoPosi SmGeoPosit Long	8
Resources Q	SQL Query	11 FL_ID FL_ID Wide Char	20
Laver Manager	Rebuild Spatial Index	12 CO_TYPE CO_TYPE Wide Char	20 60
Cayer Manager	Create Scene Cache		, ×
	Close Dataset		
R	Recompute Range		
面	Delete Dataset		
E)	Rename Dataset		
()	Properties		

Figure 42 Open attribute list (left), attribute adding results (right)

Step 2: Add attribute values: When the attribute item is added, you can add the corresponding attribute to each object in the dataset.

On the above-mentioned dataset, right-click, select Browse Attributes, open the attribute table of the dataset as shown below, double-click an item in the property sheet (item with * cannot be edited) and edit the attribute.

Workspace Manager # X	Start Tab 🗙	No	SmID	SmGeoPosition	FL_ID	-
Workspace Manager		1	1	196608	138690110100	
G 년		2	2	196796	138690110100	
		3	3	196888	138690110100	
		5	5	197280	138690110100	
• T1F_CON_INFO		6	6	197436	138690110100	Ī
		7	7	197672	138690110100	
		8	8	197796	138690110100	
		13	13	198544	138690110100	
T2 Browse Attributes		14	14	198876	138690110100	
T2 🛱 Add to New Map		▶ 16	16	199172	138690110100	
Add to Current Ma	р	18	18	199452	138690110100	
FI Add To Diagram	+	19	19	199592	138690110100	
Add to New Spheri	cal Scene	20	20	199748	138690110100	
⊞··· ☆ 12 Add to New Plane	Scene	21	21	199872	138690110100	

Figure 43 Add attribute values

Step 3: Create unique value thematic map, which displays objects in different colors depending on the types.

In the Layer manager, select the region dataset layer, right-click, select "Create Thematic Map"--"Unique Values Map"--"Default", the following "Thematic Map" setting interface will display. Select expression. You can select appropriate colors via color ramps, or open Fill Symbol Selector via Styles button for color settings.

	_			Create	Thomatic Man					\sim
	~	Visible		Create	Thematic Map					^
	~	Selectable					10 m 20	and the	-	_
Layer Manager		Editable			Unique Values Map				۲	
		Enable Shadow 🕨			Ranges Map	Default	Boudary line	Provincial	World's	
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Screen Layer		Zoom to Laver		ST .	Lable Map					
		Loon to Layer		I.	Graph Map					
🗆 💿 🖡 🔏 🗋 T1F_SHOP_I		Jump to Layer			Chapit map					
Terrain Layers	0+0	Associate Attributes			Custom Thematic M					
		Visible Altitude Range								
		Layer Style Settings								
		Laver Style Templates								
		Object Selection Style								
		Object selection style	1							
		Create Thematic Map								
		Thematic Map Template 🔹 🕨	1	<						
				Man	age			OK	Cance	el
								L		

Figure 44 Create unique values map

	Fill Symbol Selector					×
	File (F) • Edit (E) •				Search i	n Symbol Library (Ctrl + E) 🛛 🔍 🗎 🖳 •
Thematic Map Manager X	Boot Group Plain Color D Olors Administrative Col Texture	SystemO	Null System1	System2	System3	Preview
Thematic Layer: ITF_SHOP_INFO@beijingMail#1 Properties Unique Expression: FT NAME DP	≓ C Land Use C 3D Vater Surface ≥ o o o o o o o o o o o o o o o o o o	System4	System5	System6	System7	
Color Scheme:	aking Symbol	008	009	010	011	Foreground:
Visibli Styles Unique Title	830 Fill	012	013	014	015	Symbol:
CHOCOOL :CHOCOO CHARLES& CHARLES& COSTA COF COSTA CO		016	017	018	019	Offset I: 0 % %
	< >>	020	021	022	023	Offset Angle:
						OK Cancel Apply

Figure 45 Settings for label maps

When finished, you can convert it into 3D.

In Layer Manager, select the thematic layer, you will find altitude modes via Style Settings-->Stretch Settings. Absolute, Bottom Elevation and Stretch Elevation are available for your choice. Note that here the bottom elevation of this layer equals the sum of the bottom elevation and stretch elevation of the next layer.

Styles	Fly Manager	Draw	Object operation	3D Analysis	3D Plotting
Fills	Fill Color: Transparency: Fill Mode:		Templates	Altitude Mode: A	Abs Bottom Altitude: 0 Factor Altitude: 0 Abs Abs Bottom Altitude: 0 Factor Altitude: 0 F
	Fi	II Style			Extension
Styles	Fly Manager	Draw	Object operation	3D Analysis	3D Plotting
Styles	Fly Manager Fill Color:	Draw	Object operation	3D Analysis Altitude Mode:	3D Plotting
Styles	Fly Manager Fill Color: Transparency:	Draw The second	Object operation	3D Analysis Altitude Mode:	3D Plotting Abs Bottom Altitude:
Styles Fills	Fly Manager Fill Color: Transparency: Fill Mode:	Draw	Object operation	3D Analysis Altitude Mode: A Data From: Abov	3D Plotting Abs Bottom Altitude: 1 1

Figure 46 Stretch reference of the 1st layer (top), stretch reference of the 2nd layer (bottom)

Add: 6/F, Building 107, No. A10, Jiuxianqiao North Road, Chaoyang District, Beijing, 100015, CHINA, 100015 E-mail: request@supermap.com Website: www.supermap.com

36 / 55

Figure 47 Effects after stretch

Step 4: Create lable map and display names as labels.

In the Layer manager, select the region dataset layer, right-click, select "Create Thematic Map"--"Label

Figure 48 Create label maps

When you finish creating label map, you still need to perform stretch settings. Note that the Bottom Elevation and Stretch Elevation are the same with that of the corresponding label map.

2.2.1.4 Point Data Preparation

Step 1: Add attribute items: The method is the same as the adding attribute items for region datasets. You can add attribute items following steps below.

Floor ID	The attribute field name is called " FL_ID " (the name cannot be changed). It will be used for floor display, path analysis, and navigation. Each floor has an ID, and the floor IDs for all the features on the same floor are the same.
Туре	Used to make unique value thematic map, which displays in different colors depending on the type. You can set the value of a type based on different attributes of the object. Take shopping malls for example, shops, elevators, toilets can be set to different types.
Name	Used to make the label thematic map, and display the name on the maps.

Table 6 Attributes must be contained in the point dataset

In addition to the above attribute items, staircases (including escalators, ladders, straight ladders, etc.) must also contain the following attribute items because of the navigation involved.

Staircase ID	The attribute field name is " FT_ID ", and each layer of stairs has an ID value. Even if parts of straight ladder on have different IDs.
Staircase Type	The "Type" in the table above. In the staircase attributes, the name of the attribute item must be " FT_TYPE ".
Floor Arrived	The attribute field name is " TO_CON ", in the form of "#Floor Arrived#ID of the next floor". For example, if you have arrived at the staircase with the ID 138690310200334 on the 2nd floor, the attribute value is "#2#138690310200334". Each staircase only needs to correspond to the upper stair. For example, for floor 1, the attribute of this field is 2. For the top level, this attribute can be empty.

Table 7 Attributes must be contained in the staircase data

Attribute items are added with the same region data's attribute items, please refer to the steps of of adding attribute items for region dataset.

Step 2: Add attribute values The method is the same as the adding attribute values for region datasets. You can add attribute values following steps below.

2.2.1.5 Save Map and Workspace

Process data for each layer according to the method above.

Figure 49 Effects for 3D scene

Click "Start"--"Workspace"--"Save". In the window for saving the map, enter the map name and save the map. Save the workspace by entering the workspace name and storage location in the window for saving the workspace.

Save	;	×
Select All Select Reverse	🛛 Activate 🛛 🏹 Rename	
Name	Туре	
DindoorScene	Scene	_
		-
Save KML layers in scenes	Save Discard Cancel	

Tip: To prevent data loss, you can save it from time to time during data production.

Figure 50 Save 3D scene

2.2.2 Navigation Path Data Preparation

The raw indoor data needs to include path data stored in line datasets. You need to construct road network based on the path data for navigation. It is not necessary to add the road network to the map.

Click "Network Analysis"--"Construct Network on Topology"--"Construct 2D Network", open the "Construct 2D Network Dataset" dialog box, select the dataset for the topology network, set the dataset name, click "OK" to complete the topology network.

Dataset		Datasource
I T1F_ROA	ADMAP_LINKS	👼 kaide_mall
Result Settings		
Result Settings Datasource:	kaide_mall	Split Settings
Result Settings Datasource: Dataset:	kaide_mall BuildNetwork	Split Settings Split Line by Point Split Lines at Intersection

Figure 51 Construct 2D network dataset

Before process

After process

2.2.3 Attribute Data Preparation

1110 41110 410 444.000	
Floor ID	The name of the attribute field is " FL_ID ", which is the same as the ID added for features of each floor.
Path File Name	The name of the attribute field is " NetworkName ", which means the name of the dataset where the path data for each floor is.
Floor Name	The name of the attribute field is "FloorName", which is used for name display during floor switch.
Floor Index	The name of the attribute field is "FloorIndex", which means the index value for each floor.
Elevation	The name of the attribute field is " Height ", which means the elevation for each floor.

The attribute dataset plays a critical role in navigation, and it must contain the following data items:

Table 8 Attributes must be contained in the attribute dataset

Operations:

Step 1: Create the attribute dataset and store the dataset in the datasource where the original indoor data is. The name of the dataset is "FloorRelationTable" (cannot be changed).

Right click Workspace Manager--The datasource where the orginal data is, and click New Dataset.

Workspace Manager 🛛 📮 🗙	New Dataset	Х
Gr DindorScene	Target Dataseurce Type Dataset Add to Map 1 Image beijingMall Image Tabular FloorRelationTable to 2 Image beijingMall Point No	Template Don't Use Template Dataset Template Dataset. Dataset. Dataset.
TIF Copy Dataset TIF Strt Datasets By Floo Totaset Tataset Tataset		Dataset: • TIF_CON_INFO Settings Encode Type: None Charset: UTF-8
B→☆ TIF_ B→☆ T2F_ B→☆ T2F_	☑ Auto close when finish	OK Close

Figure 53 Create attribute table

Step 2: Add attribute items

On the FloorRelationTable dataset where you want to add the attribute items, right click, select Attributes--Attribute Table, open the list of attributes as shown below, and use + Add Modify Delete | < Apply to add the attribute items. Note: Attribute fields cannot repeat. Click Apply to take effect.

Properties									
e									
	Hoorkelationrable								
Da	atas	et Vector A	ttribute Table	Domain					
:		A. I. I							
	+	Add ⊑] Modit	y IIII Delete	Apply					
		Name	Alias	Туре	Length	1			
		*SmID	SmID	Int	4				
	2	SmUserID	SmUserID	Int	4				
Г	3	FL_ID	FL_ID	Text	255				
	4	NetworkNa	NetworkNa	Text	255				
	5	FloorName	FloorName	Text	255				
	6	FloorIndex	FloorIndex	Int	4				
	7	Height	Height	Double	8				
<						>			

Figure 54 Add attribute items

Step 3: Add attribute values

On the FloorRelationTable dataset, right-click, select Browse Attributes, open the attribute table of the dataset as shown below, double-click an item in the property sheet and edit the attribute.

	FloorRelatio	onTable@beijingMa	all X Start lab				
	No	SmUserID	FL_ID	NetworkName	FloorName	FloorIndex	Height
•	1	0	138690110100	T1F_Network	F1	1	1.1
	2	0	138690110200	T2F_Network	F2	2	51.1

Figure 55 "FloorRelationTable" Add attributes

FL_ID value: Floor ID. The floor ID for objects in each floor is the same.

NetworkName value is the name of the path navigation data for the floor.

Figure 56 " The method to get path file name

FloorName value that is the floor name value displayed in the floor operator control on mobile devices.

FloorIndex value is the floor index. For example, the value for the ground floor is-1, the value for the 1st floor is 1, and the value for the 2nd floor is 2.

Height value: Floor elevation. The method to acquire it is to calculate the sum "Bottom Elevation" + "Stretch Elevation" + 0.1. To ensure the proper display of analysis results, here we add 0.1 to the final results.

Sty	/les	Fly Manager	Draw	Object operation	3D Analysis 3D Plotting
Re	Fills	Fill Color: Transparency: Fill Mode:	0 Fill Only	Templates	Altitude Mode: Abs Bottom Altitude: 0 Above G Extension: 1 Texture Settings
		Fi	ll Style		Extension
Sty	les	Fly Manager	Draw	Object operation	3D Analysis 3D Plotting
Sty	rles	Fly Manager Fill Color: Transparency: Fill Mode:	Draw Draw 	Object operation	3D Analysis 3D Plotting Altitude Mode: Abs ▼ Bottom Altitude: 50 ▼ Data From: Above G ▼ Extension: 1 ▼ Texture Settings

Figure 57 how to get "Elevation"

2.2.4 Camera Properties

The camera data is used to save the camera location when switching floors. The data source name is "indoor_info" (fixed name, cannot be changed), the dataset name is "CameraInfo" (fixed name, cannot be changed), and the type is attribute dataset.

step 1: Create a datasource.

Workspace Manager--Right click Datasource--New File Datasource, enter datasource name "indoor_info".

Workspace Manage	r 4 ×
<u>⊊</u> 2 ⁸	
5- 🖻 P-	
B 1 3DindoorScene	^
	Open File Datasource
•	Open Database Datasource
	Open Web Datasource
tee	New File Datasource
	New Database Datasource
	New Memory Datasource
↓↑	Sort Datasources By
	Download Datasource
□	Fold Datasource Node
	Close Datasourse

Figure 58 Create new datasource

step 2: Create a dataset.

The name of the dataset is "CameraInfo". The dataset is an attribute dataset.

Right click Workspace Manager--The indoor_infodatasource, and click New Dataset.

Workspace Manager	# ×	Ne	w Dataset					Х
a 79			í 🗹 🔟 🗔 🗘) E				
			Target Datasource	Туре	Dataset	Add to Map	Template	
		1	🔚 indoor_info	🛗 Tabular	Camera_Info	No	Don't Use Template	
B Dataceurrer		2	📊 indoor_info	Point		No	O Dataset Template	
E G Datasources ⊕ G Datasources	ı –						Dataso 🔚 beijingMall	\sim
I - G indoo	New Dataset						Dataset: • T1F_CON_INFO	~
	Copy Dataset						- Settings	
	Import Dataset						Encode Type: None	~
🗒 3Dindi 🗐	Delete Dataset						Character UTE 0	
i È Resources	Export Dataset						Charsen Ulr-o	
8	Create from Template							
	Import Nautical Chart							
↓↑	Sort Datasets By							
	Batch Transform							
	Copy Datasource							
e	Compact Datasource							
			Auto close when finish				ОК СІ	ose

Figure 59 Create attribute table

Step 3: Create attribute items.

Attribute items contain following contents:

Longitude	Longitude
Latitude	Latitude
Altitude	Altitude
Heading	Heading
Tilt	Tilt
Floor	FloorIndex
Index	
Floor	FloorName
Name	

Floor ID	FloorID

Table 9 Attribute items for camera parameters

On the CameraInfo dataset where you want to add the attribute items, right click, select Attributes--Attribute Table, open the list of attributes as shown below, and use Attribute Table, open the list of attributes as shown below, and use to add the attribute items. Note: Attribute fields cannot repeat.

Click Apply to take effect.

Properties ×								
indoor_info								
Camerainfo								
Datas	et Vector	Attribute Table	Domain					
Jacas			Domain					
:+	Add 🗐 Mod	lify 🍈 Delete	🗸 🗸 🗸 🗸					
	Name	Alias	Туре	Length				
	*SmID	SmID	Int	4				
2	SmUserID	SmUserID	Int	4				
3	Longitude	Longitude	Double	8				
4	Latitude	Latitude	Double	8				
5	Altitude	Altitude	Double	8				
6	Heading	Heading	Double	8				
7	Tilt	Tilt	Double	8				
8	FloorIndex	FloorIndex	Int	4				
9	FloorName	FloorName	Text	255				
10	FloorID	FloorID	Text	255				

Figure 60 CameraInfo" attribute items

Step 4: Add attribute values

On the CameraInfo dataset, right-click, select Browse Attributes, open the attribute table of the dataset as shown below, double-click an item in the property sheet and edit the attribute.

_	No	SmUserID	Longitude	Latitude	Altitude	Heading	Tilt	Floorindex	FloorName	FloorID
•	1	0	116.350273	39,942186	118.718772	100.340196	58.39052	1	ы	138690110100
	2	0	116.350273	39,942282	172.369807	100.34 <mark>0196</mark>	58,38984	2	F2	138690110200

Figure 61 Effects of adding attribute values

Longitude, Latitude, Altitude, Heading, Tilt are camera parameters. Open the scene, adjust each floor to the location of the window center. You can get corresponding parameters via creating a new flying route. Open the Flying Stops Manager via Fly Manager-->Flying Route-->New, and create new flying route through the button.

Ľ¥Ľ¤∣ ⊒√ V% ruir	₩7+ ₩6& IIII ₩	
	Stop1	
Camera Sett	ings	
Longitude:	116.350815	
Latitude:	39.94229	
Altitude:	136.56385	▲ ▼
Heading:	100.340545	▲ ▼
Tilt:	58.390071	▲ ▼
Speed Se	ttings	
Speed Set	81.457796	km/l \sim

Fgiure 62 Get camera parameters

FloorIndex value is the floor index. For example, the value for the ground floor is-1, the value for the 1st floor is 1, and the value for the 2nd floor is 2.

FloorName value that is the floor name value displayed in the floor operator control on mobile devices.

FloorID value: Floor ID. The floor ID for objects in each floor is the same.

2.2.5 Cache Data Preparation

To ensure higher performance of 3D scene on mobile devices, cache will be employed.

Step 1: Create 3D cache

In Workspace Manager, right click in the current scene and click Create Cache.

Workspace Manager		ųх		Cam	eraInf
⊊ ℓ! ^					
Image: Second state st	nfo				
Scenes					
	3	Open Scene			
		Save Scene As			
		Save as Scene Te	mp	late	
<	Э	Create Scene Ca	che	e	1
		Delete Scene			
	Þ	Rename			
٢	2	Diagnose Perfor	rma	nce	

Figure 63 Create scene cache

Following prompts may appear during the process, you can click Yes.

SuperMap iDesktop 9D	\times	SuperMap iDesktop 9D	\times
The member may be too large when you open the scene cache. Are you want to close?		Do you want to save the changes to "3DindoorScene"?	
Yes No		Save KML layers Yes No Cance	9

Figure 64 Prompts during creating cache

In the Generate Scene Cache dialog box, select all dataset via , select cache type (the Android device uses the option "Android series device" and iOS devices use the "iOS series Device").

Generate Scene Cache						\times
Add Dataset 📄 Add	File 🛛 🗹 🕅	0				
Dataset		Datasource		Cache Type	Scene Type	^
C T2F_PUB_INFO		🔚 beijingMal		OSGB	Globe	
▲ T2F_FL_INFO		🔚 beijingMal		OSGB	Globe	
* T2F_CON_INFO		🔚 beijingMal		OSGB	Globe	
T1F_SHOP_INFO		📷 beijingMal		OSGB	Globe	
<pre>// T1F_ROADMAP_LINKS</pre>		🔚 beijingMal		OSGB	Globe	\sim
Scene						
Basic Settings	DDS		Cache Extent			
Scene Name:	3DIndoorScene		 Select Bounds Bounds D 	🔒 beijing Mal	I V	
Cache Path:	D:\iDesktop\9D\test	\Indoorl 🔁	Bounds Dataset: リ		~	
Storage Type:	Compact	-				-
File Type:	OSGB	~	Left: -180	Top: 90		
Terrain Cache Type:	Tin	~	Right: 180	Bottom: -90		
☑ Define style of point layer in t			Parameter Settings —			_
Whether or not			Tile Size:		~	
			Precache			
			Tile Width:	52.874057	m	
			LOD Count:	;		
☑ Auto close when finish	😨 Show Pr	ogress Bar		ОК	Close	

Figure 65 Settings for creating scene cache

Step 2: Adjust data structure again

- 1) Close the current workspace.
- 2) After creating the scene cache, a new workspace will be generated. Open the new workspace.

- 3) Copy the datasource where the orgional navigation data is located and the "indoor_info" to the folder of the workspace.
- 4) Open the two datasources via Workspace Manager-->Datasources-->Open File Datasource.
- 5) Save the workspace via Start-->Workspace-->Save.

Till now, you have finished data preparation for 3D indoor navigation.

Workspace Manager 4 ×					
⊊ <i>e</i>					
©• <u>▶</u> ₽ •					
BeijingMall Datasources Datasources DetigingMall O TIF_CON_INFO TIF_FL_INFO TIF_ROADMAP_LINKS TIF_SHOP_INFO T2F_CON_INFO T2F_FL_INFO T2F_FLUB_INFO T2F_SHOP_INFO T2F_SHOP_INFO T2F_SHOP_INFO T2F_SHOP_INFO T2F_Network T1F_Network T1F_Network Diagrams Layouts Scenes Scenes Marker Symbol Library Line Symbol Library Fill Symbol Library					

Figure 66 Indoor 3D navigation data structure

3.1 2D indoor navigation

3.1.1 Step 1: Loading map

```
//Sets license path
Environment.setLicensePath(sdcard + "/SuperMap/license/");
//Only when Environment is initialized, the component functions can be called.
Environment.initialization(this);
setContentView(R.layout.activity_main);
//Open workspace
m_wokspace = new Workspace();
WorkspaceConnectionInfo info = new WorkspaceConnectionInfo();
info.setServer(sdcard+"/SampleData/IndoorNavigationData/beijing.smwu");
info.setType(WorkspaceType.SMWU);
m_wokspace.open(info);
//Associate map display control with workspace
m_mapView = (MapView)findViewById(R.id.Map_view);
m_mapControl = m_mapView.getMapControl();
m_mapControl.getMap().setWorkspace(m_wokspace);
//Open map in workspace. Parameter 0 represents first map
String mapName = m_wokspace.getMaps().get(0);
m_mapControl.getMap().open(mapName);
//Set the drawing mode as full screen., Point, text and common layers display at the same time.
m_mapControl.getMap().setFullScreenDrawModel(true);
//Refresh map
m_mapControl.getMap().refresh();
```

Note:

1) You can reference online help or development guide for project creation and environment configuration to do indoor navigation with the libraries com.supermap.analyst.jar and com.supermap.navigation.jar should be added.

- 2) Please view online help or development guide for the way of applying for permission.
- 3) Set path of permission and data as the circumstances may require.

3.1.2 Step 2: Initialization of navigation module

```
//Get navigation module
m_NavigationEx = m_mapControl.getNavigation3();
m_floorListView = (FloorListView)findViewById(R.id.floor_list_view);
//Set MapControl associated with floor view</span
m_floorListView.linkMapControl(m_mapControl);</pre>
```

3.1.3 Step 3: Add navigation point

Add startting point.

m_NavigationEx.setStartPoint(pt.getX(), pt.getY(), mCurrentFloorID);

Add end point. m_NavigationEx.setDestinationPoint(pt.getX(), pt.getY(), mCurrentFloorID);

Add path point (one or more) when starting point and end point have been added. m_NavigationEx.addWayPoint(pt.getX(), pt.getY(), mCurrentFloorID);

3.1.4 Step 4: Path anlysis

```
//Determine whether indoor map has been opened
String currentFloorID = m_floorListView.getCurrentFloorId();
if (currentFloorID == null) {
    Toast.makeText(m_mapControl.getContext(), "Please open indoor map first", Toast.LENGTH_SHORT).show();
    return;
}
//Determine whether loading indoor map datasource is successful
Datasource datasource = m_floorListView.getIndoorDatasource();
if (datasource == null) {
    Toast.makeText(m_mapControl.getContext(), "Failed to load indoor map datasource",
Toast.LENGTH_SHORT).show();
    return;
}
//Set datasource where indoor map locates
m_NavigationEx.setDatasource(datasource);
//Path analysis
boolean bResult = m NavigationEx.routeAnalyst();
if(bResult){
    Toast.makeText(m_mapControl.getContext(), "Analyzing successfully", Toast.LENGTH_SHORT).show();
}
else{
    Toast.makeText(m_mapControl.getContext(), "Failed to analyze", Toast.LENGTH_SHORT).show();
    return;
}
```

3.1.5 Step 5: Navigating

```
//Start to navigate 0: real navigation, 1: simulate navigation , 2: cruising , 3: pedestrian navigation/span>
if(!m_NavigationEx.startGuide(1)){
    Toast.makeText(m_mapControl.getContext(), "Failed to start navigation", Toast.LENGTH_SHORT).show();
    return;
}
```

Detail reference sample code is provided in product packet (Non-green version), the path is ../SampleCode/SampleCode_ADT(SampleCode_AndroidStudio)/IndoorNavi, for downloading and reference.

3.2 3D indoor navigation

```
3.2.1 Step 1: Loading map and initializing navigation module
```

```
String sdcard =
android.os.Environment.getExternalStorageDirectory().getAbsolutePath().toString();
Environment.setLicensePath(sdcard + "/SuperMap/license/");//Set license path
Environment.initialization(this);
                                      //Only when Environment has been initialized, the component
function can be called
setContentView(R.layout.activity_main);
//Open workspace
m_workspace = new Workspace();
WorkspaceConnectionInfo info = new WorkspaceConnectionInfo();
info.setServer(sdcard+"/SampleData/3DIndoor scene/3DIndoor scene.sxwu");
info.setType(WorkspaceType.SXWU);
boolean result = m_workspace.open(info);
if (!result) {
    System.out.println("Failed to open workspace");
    return:
}
m_sceneView= (SceneView)findViewById(R.id.scene_control);
m sceneControl= m sceneView.getSceneControl();
//Scene control intialization callback listener
m_sceneControl.sceneControlInitedComplete(new SceneControlInitedCallBackListenner() {
    @Override
    public void onSuccess(String arg0) {
        //Open scene
        m_scene = m_sceneControl.getScene();
        m_scene.setWorkspace(m_workspace);
        String mapName = m_workspace.getScenes().get(0);
       m scene.open(mapName);
        m_navigation3D = m_sceneView.getNavigation();
                                                                //Get navigation module
        m_sceneControl.setNavigationControlVisible(true);
                                                                //Set navigation bar visible
        //InitializeFloorList
        m_floorListView3D = (FloorListView3D)findViewById(R.id.floor_list_view_3d);
        m_floorListView3D.setVisibility(View.VISIBLE);
        m_floorListView3D.linkScenepControl(m_sceneControl, m_workspace);
        m_floorListView3D.setNavigation3D(m_navigation3D);
        //Set datasource where indoor map
locates
                               m_navigation3D.setDatasource(m_workspace.getDatasources().g
et("beijingMall"));
        //Set 3D scene controls
        m navigation3D.setSceneControl(m sceneControl);
        //Set GestureDetector (Used for users to add navigation point through gestures.)
        m_sceneControl.setGestureDetector(new
GestureDetector(m_sceneControl.getContext(), mSceneGestrueListener));
         //Add navigation guide information and update listener
        m_navigation3D.addNaviInfoListener(new NaviListener() {
            @Override
             public void onStopNavi() {//Callback when navigation is stopped
                 //Close navigation when it is finished
```

```
m_naviState = NAVI_STATE.STATE_NULL;
                  m_navigation3D.cleanPath();
                  System.out.println("Navigation stopped");
              }
             @Override
             public void onStartNavi() {//Callback after starting navigation
              }
             @Override
             public void onPlayNaviMessage(String message) {//Play information of navigation
             @Override
              public void onNaviInfoUpdate(NaviInfo naviInfo) {//Callback when navigation guide
information updated
            }
             @Override
              public void onAdjustFailure() {//Callback when matching roads is failed
              }
             @Override
             public void onAarrivedDestination() {//Callback when getting to desination
                  //Close navigation when getting to destination
                  m naviState = NAVI STATE.STATE NULL;
                  m_navigation3D.cleanPath();
                  System.out.println("Getting to destination");
             }
         });
    }
});
```

3.2.2 Step 2: Add navigation point

```
Add starting point.
m_navigation3D.setStartPoint(pt3d.getX(), pt3d.getY(), pt3d.getZ());
Add end point
m_navigation3D.setDestinationPoint(pt3d.getX(), pt3d.getY(), pt3d.getZ());
Add path point(one
or more) when a starting point and an end point have been added.
m_navigation3D.addWayPoint(pt3d.getX(), pt3d.getY(), pt3d.getZ());
```

3.2.3 Step 3: Path analysis

m_navigation3D.routeAnalyst();

3.2.4 Step 4: Navigating

m_navigation3D.startGuide(1);

```
Detail reference sample code is provided in product packet (Non-green version), the path is ../SampleCode/SampleCode_ADT(SampleCode_AndroidStudio)/IndoorNavigation3D, for downloading and reference.
```