Instruction of SuperMap GIS Contest

2019

Content

1. Introduction

SuperMap GIS Contest is organized by SuperMap Software Company, which is a leading provider of GIS software products and services in Asia. And SuperMap software platform is one of the most popular GIS platforms and takes up No.1 market share in China.

SuperMap GIS Contest started in 2003. As one of the earliest GIS contest in China, it has been attracted more than 30,000 students from more than 200 universities. It is now becoming one of the most competitive contests for students who want to become GIS professionals in the future.

Mapping Group, Paper Group, Analysis Group and Development Group are set for SuperMap GIS Contest in 2019. The contest started in April and works need to be submitted before August 6th. After preliminary evaluation, re-evaluation and final evaluation, the final competition will be hold in September in Beijing.

2. Participants

Undergraduates, Postgraduates and PhDs in universities or academic institutes

3. Contest Groups

(1) Group Types

➢ Mapping Group

➢ Application Analysis Group

➢ Paper Group

➢ Web & Online Development Group

(2) Instruction of Each Group

a) Mapping Group

Entry Requirements

Using SuperMap iDesktop software to configure one (or more) flat map, free topic

selection, works content is not limited, based on a variety of data sources through data processing and mapping expression means to create a thematic map with characteristics of style. This category does not involve development, and the ability of geographic information processing and visual expression is comprehensively investigated.

1. **Software Requirements**

   Either SuperMap iDesktop.Net or SuperMap iDesktop Java, the version must be higher than 9D (2019) SP1.

2. **Data Requirements**

   a) the data used in the entries can be the map data published by the country or the relevant organization, or the big data or other source data provided by Internet enterprises。

   b) in order to ensure the security of geographic information and safeguard national sovereignty, security and interests, contestants are required to ensure the legitimacy of data sources and have the right to use and issue data accordingly.

3. **Mapping Requirements**

   a) Attractive and professional map with strong visual appeal. Map is a graphic expression of geographic information. In order to achieve better information expression, map must have strong visual appeal.

   b) Map display is smooth. The performance of map display affects the user experience directly, and the display speed of the process is one of the important indicators of the map.

   c) The contents of maps shall conform to the provisions of China's relevant policies and laws. World maps and national maps involving the national boundaries of the People's Republic of China shall fully represent the territory of the People's Republic of China. For example, the map of China must show the important islands in the South China Sea, such as the Diaoyu Islands, Chiwei Islands, and draw the boundaries of the islands in the South China Sea with corresponding symbols.

Submission Criteria

1. Submit the **original data** and **processing data** (generated in map making process).

2. Submit **data description documents** in .PDF format, including introduction of original data (such as data source, data content description), introduction of result data (such as layer explanation, meaning of attribute field);

3. Submit all **maps** you made (as .JPG or .PNG format).

4. Submit mapping **report**, including data processing notes, mapping process notes, and map performance optimization notes (optional).

5. Submit attractive **screenshots** (at least three) (as .JPG or .PNG format) and an instruction **video** (no more than 15 minutes, with subtitles in English, need to be uploaded to YouTube).

6. Submit **a self-evaluation document of the work by the instructor**. The document is submitted in .PDF format (Requirements: concise and clear; 100-200 words). If there is no instructor, no need to submit.

7. All the files required need to be submitted as compressed files in .ZIP format to Dropbox.

8. Structure of submission files:
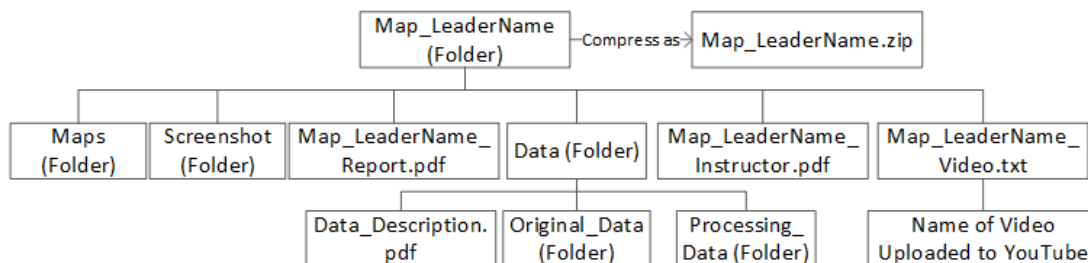
Note: LeaderName: first name of team leader (in English), if it too long, Retain first 4 letters.

Selection Rules

Item	Requirement	Mark
Data(35)	Data stratification is reasonable and standard, and there is no topology error, such as: suspended line, non-closed polygon, broken polygon, etc.	15
	Using data source and working space correctly, optimize file data source and set data coordinate system correctly.	15
	Using of different scale data correctly.	5
Map(50)	Appropriate selection of symbols, lines, filling and other resources, fine production, to meet the needs of the map.	10
	Thematic maps are made properly and correctly.	15
	Visually pleasing	10

	Optimize the map display effect and operation speed.	15
Work Display (15)	Clear description of the document, diagram is concise, which are able to explain the data organization and mapping process.	10
	The video demo (no more than 15 minutes) is required to show the highlights of the work with subtitles in English, which can be accompanied by voice explanation and PPT presentation. Video needs to be submitted to YouTube.	5
Extra marks (10)	Using the SuperMap iDesktop Java desktop deployed on the Linux platform to display the prepared map. Recording the process of run the SuperMap iDesktop Java product on the Linux platform to browse the map, submit the video results, and judge according to the display effect, with a maximum of 10 points.	10

Note: Marks will be lost if the work does not meet the submission requirements.

Mapping Process Reference

Mapping process below is only a suggestion:

1. Data preparation

(1) convert vector data in other formats into SuperMap data format;

(2) query and copy data, and make data preprocessing;

(3) vectorize images data.

2. Data processing

(1) conduct topological check on vector data and correct errors;

(2) fuse vector data and fusing small or mini objects;

(3) extract the data through resampling;

(4) obtain data of other specified types through type conversion;

(5) obtain buffer range of data through buffer analysis;

(6) isolines and isosurfaces are extracted from raster data.

3. Map rendering

(1) preset points, lines and filling symbols, which are produced by the symbol editor;

(2) set styles for layers;

(3) make thematic maps to achieve richer styles;

(4) optimize label display effect through label avoidance and labeling along the line.

(5) one dataset can be added to the map many times, such as the road layer. Different display styles can be configured. The display scale can be set to control the display and improve the display effect of the map.

(6) the layer grouping function can be used to uniformly manage the layers of the same map.

4. Functions of map browsing

(1) cancel map editing, selection, capture and other states;

(2) fixed scale can be set for the map;

(3) set the display scale for layers, which not only conforms to the drawing specification, but also can be hidden when unnecessary to improve the browsing performance;

(4) different display scales use data of different scales, with fewer data nodes of smaller scales and higher browsing efficiency.

(5) balance between aesthetics and performance through anti-aliasing control of layers.

(6) with the performance diagnosis function of SuperMap iDesktop, I searched for poor performance layers, analyzed the reasons and carried out optimization processing.

b) Application Analysis Group

Entry Requirements

With GIS methods, you are required to meet the actual needs of industry applications and life through spatial analysis and spatial data mining. Theme and content are unlimited. You will be comprehensively examined the ability to identify, analyze and solve problems.

1. **Software Requirements**

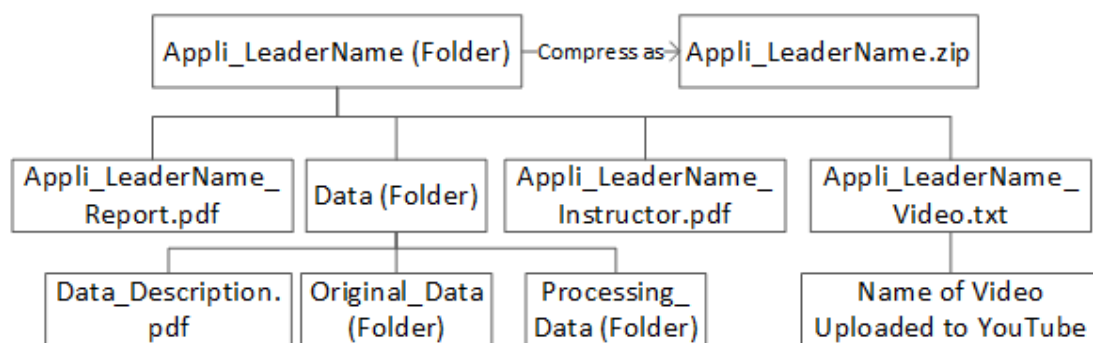   You need use SuperMap iDesktop .NET or SuperMap iDesktop Java. The version must be 9D (2019) SP1 or higher.

2. **Data Requirements**

    a) Use file-type data sources and file-type workspaces.

b) The related data could be spatial data published by the state or relevant organizations, or data provided by Internet companies or other sources.

c) To ensure the security of geographic information and safeguard national sovereignty, security and interests, participants are required to ensure the legality of the data source and have the right to use and distribute the data.

Submission Criteria

1. Submit the **original data** and **data generated during the processing**.

2. Submit **data description documents** in .PDF format, including introduction of original data (such as data source, data content description), introduction of result data (such as layer explanation, meaning of attribute field);

3. Submit an analysis **report**, including requirement description, solutions, analysis process and analysis results;

4. Submit an instruction **videos** (no more than 15 minutes, with subtitles in English, need to be uploaded to YouTube, can be accompanied by voice explanation and PPT presentation);

5. Submit **a self-evaluation document of the work by the instructor**. The document is submitted in .PDF format (Requirements: concise and clear; 100-200 words). If there is no instructor, no need to submit.

6. All the files required need to be submitted as compressed files in .ZIP format to Dropbox.

7. Structure of submission files:

```
Appli_LeaderName (Folder) ─Compress as→ Appli_LeaderName.zip

Appli_LeaderName_        Data (Folder)    Appli_LeaderName_      Appli_LeaderName_
Report.pdf                                Instructor.pdf          Video.txt

            Data_Description.  Original_Data   Processing_         Name of Video
            pdf                (Folder)        Data (Folder)       Uploaded to YouTube
```

Note: LeaderName: first name of team leader (in English), if it too long, Retain first 4 letters.

Selection Rules

Item	Requirement	Mark
Problem-solving Ideas(30)	The topic can meet the business needs in actual work and life;	10
	Comprehensive and correct in problem analyzing, perfect and clear in solving ideas;	20
Problem-solving Process(50)	Combined with the actual needs of the problem-solving, the produced data is correct and sound, containing both spatial data and attribute data;	15
	The map configuration is artistic and smooth, in line with industry habits;	15
	Select a proper analysis function, operate it correctly and form the resulting map.	20
Analysis Report(15)	Clear in description and concise in diagrams, being able to explain the problem-solving ideas and processes;	15
Instruction Video (5)	The video demo (no more than 15 minutes) is required to emphasize the brilliant functions and designing highlights, and display the operation steps; The vocal explanation and PowerPoint instructions can be provided. The video ought to be submitted to the corresponding video website in the format specified by the competition committee.	5

Note: Marks will be lost if the work does not meet the submission requirements.

c) Paper Group

Entry Requirements

A paper is written for academic research or technical application based on SuperMap products, including but not limited to: SuperMap GIS application cases, industry solutions; SuperMap GIS software application development skills and experience; SuperMap 2D & 3D integrated application; GIS technology development status and trend; GIS basic software application of emerging technologies such as big data and artificial intelligence.

1. **Content Requirements**

   a) The chosen topic needs to be reasonable, scientific, practical and innovative, and writing standards. The academic paper ought to have clear-cut propositions, sufficient grounds, reliable arguments, concise style, and rigorous logic.

   b) The thesis content includes excellent academic papers based on SuperMap technology in related fields in basic theories, scientific researches, and applied technologies. It also could be based on the works of other groups in this competition.

   c) 2000-4000 words (except Abstract, Table of Contents and References).

   d) The student participants must be the first author of the paper.

2. **Format Requirements**

   a) Papers need to be submitted in .PDF format.

   b) Essay structure refers to the Instruction of SuperMap GIS Contest.

   c) Reference format refers to the Harvard Reference, no less than 10 articles.

Submission Criteria

1. If the paper has been officially published in an academic journal, please submit a copy of the academic publication (cover and copy of the catalogue) or the certificate of the conference. The paper must be published no earlier than 2017. If the paper has been accepted by an academic journal but has not yet been officially published, please provide a copy of the acceptance notice for the academic journal.

2. The required files include: 1) **paper** in .PDF format; 2) Submit **a self-evaluation document of the work by the instructor**. The document is submitted in .PDF format (Requirements: concise and clear; 100-200 words). If there is no instructor, no need to submit; 3) **original data** and **data generated during the processing**; 4) **data description documents** in .PDF format, including introduction of original data (such as data source, data content description), introduction of result data (such as layer explanation, meaning of attribute field).

3. All the files required need to be submitted as compressed files in .ZIP format to Dropbox.

4. All submissions will not be returned. Please keep the manuscripts if needed.

5. Structure of submission files:
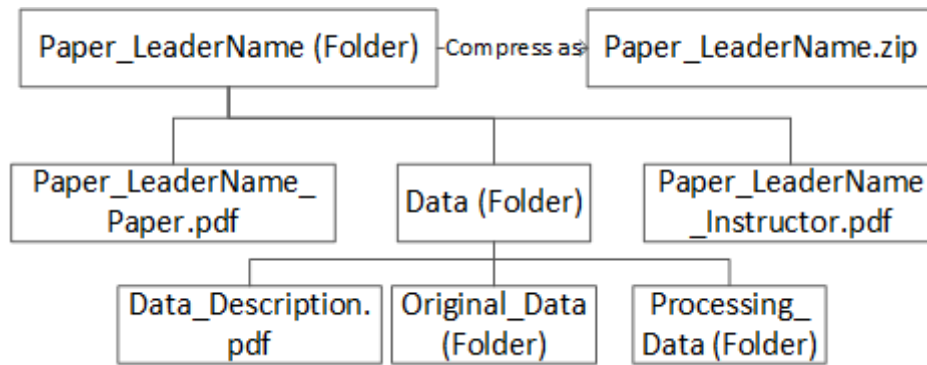
Note: LeaderName: first name of team leader (in English), if it too long, Retain first 4 letters.

Selection Rules

Item	Requirement	Mark
Topic Selection (25)	The frontier or key issues in the GIS field or industry	10
	Has important academic significance or practical value	15
Scientific & Innovative (25)	The results or progress achieved are scientific, unique or irreplaceable	10
	Has substantial breakthrough or progress in solving scientific or technical problems	15
Difficulty (10)	Research in the novel, deep and vast fields, have enough difficulties and rich materials, analyze insightfully and massively	10
Published (5)	SCI Search (5)	5
	EI or ISTP Search (3)	
	National Core Journal (2)	
	Other Core Journal (1)	
Writing quality and specification (35)	Complete in structure, accurate in words, clear in organization, rigorous in exposition, and normative in writing	8
	Informative in content, accurate and reliable in graphs, forms and data	8
	Use various methods flexibly for comprehensive research	8

	Excellent completion of abstract translation, accurate translation of professional vocabulary, no ill-formed sentences	6
	Normative referencing	5

Note: Marks will be lost if the work does not meet the submission requirements.

d) Web & Online Development Group

Entry Requirements

The application system of GIS is designed and developed by using SuperMap software. The application value of GIS in various fields is fully embodied by combining the current mainstream IT technology. Free topic selection, unlimited content, comprehensive examination of the contestants' system design ability, software development ability, application innovation ability and analysis and problem-solving ability.

Software requirements

You need use one or more following softwares：SuperMap iServer, SuperMap iClient JavaScript, SuperMap Online, SuperMap iClient3D for WebGL, SuperMap iObjects .NET, SuperMap iObjects Java, SuperMap iDesktop.NET, SuperMap iDesktop Java, SuperMap iMobile for Android, SuperMap iMobile for iOS，Version 9 D (2019) SP1 or above.

Submission Criteria

1. The submission of a work must be original and not infringe the copyright of a third party. After submission, the ownership of the work remains with the original author, but the Organizing Committee of the contest has the right to publish and publicize the work.

2. Submit system **original program**, **installation package** and **data**.

3. Submit **system development documents** (hints: can explain the system outline design and detailed design, explain the system development plan and progress, help others understand the system development process).

4. Submitting works need ensure smooth operation. And submit **system installation and deployment instruction** (hints: need explain the steps and precautions of software installation or deployment, and system operation methods to help others understand the system installation and operation).

5. Submit **system instruction** (hints: Describe the background and operations of the system to help others understand the operation process of the system).

6. Submit **installation packages of third-party plug-ins** used by the system if you use.

7. Submit **screenshots** of your system (at least 3) and function instruction **videos** (no more than 15 minutes, with subtitles in English, need to be uploaded to YouTube, can be accompanied by voice explanation and PPT presentation).

8. Submit **a self-evaluation document of the work by the instructor**. The document is submitted in .PDF format (Requirements: concise and clear; 100-200 words). If there is no instructor, no need to submit.

9. All the files required need to be submitted as compressed files in .ZIP format to Dropbox.

10. Structure of submission files:
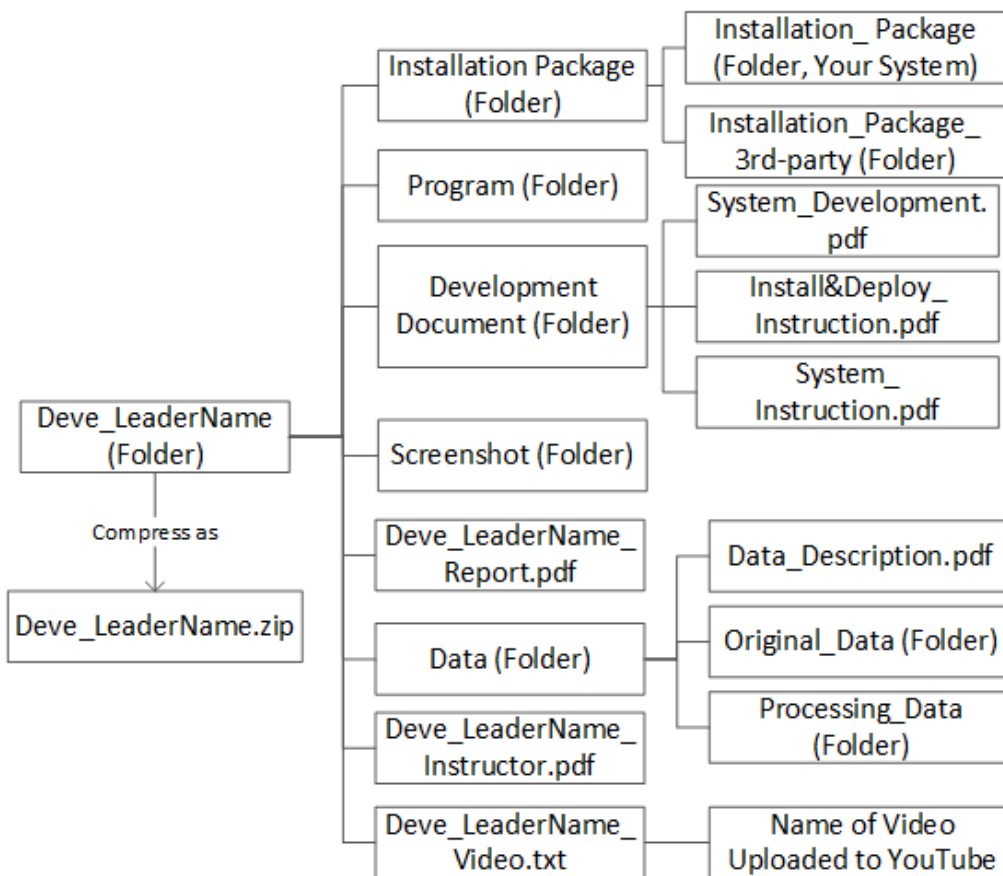
Note: LeaderName: first name of team leader (in English), if it too long, Retain first 4 letters.

Selection Rules

Item	Requirement	Mark
System design (40)	New topics: new industry applications, new application points in traditional fields.	10
	Functional design industry has distinct characteristics and is closely integrated with GIS. It can meet the actual needs of the industry and has promotional value.	15
	The design scheme is advanced, the overall design is reasonable and the system functions are complete, which embodies the current mainstream IT technology and GIS technology.	15
System implementation (30)	The code structure is clear and the code is standardized, and the functional modules are implemented according to the system design requirements.	10
	The data content is rich, the data production standard, the display is visually pleasing, meets the application system demand.	10
	Complete packaging, convenient installation/deployment, stable and efficient system, no serious system errors.	10
User experience (10)	The interface is friendly, the menu design is reasonable, the operation is simple, maps and system interfaces are visually pleasing.	5
	Optimize the performance of maps or scenes, and there is no obvious Karton phenomenon in roaming operation.	5
System display(20)	Documents are complete and standardized, the description of documents is clear, and the charts are concise, which can explain the thought and process of system work realization.	15
	The length of the video is no more than 15 minutes. It need highlight the excellent functions and design highlights of the works, and show the operation steps. It can also be accompanied by voice explanation and PT display instructions.	5

	Video is submitted to the designated video website in accordance with the uniform proposition format of the Organizing Committee of the contest.	
Extra marks (10)	The following points or points can be achieved in a work. Consider adding points as appropriate: 1. If the mobile SDK is used for secondary development, the work submitted to App Store or other application market will be added 2 points, and the AR map will be realized and the work of operation recording screen will be added 2 points. 2. Submitted works include two or more works in WebGIS application system, PC desktop application system and mobile terminal APP, plus 6 points.	10

Note: Marks will be lost if the work does not meet the submission requirements.

(3) Sample Works of Each Group

a) Mapping Group

Title: Food is the paramount necessity of the people -- Crop Distribution & Grain Trade in China (Excerpt)

University: Liaocheng University

Instructors: Xiao Yan, Ma Xuemei

Team leader: Li Zhenxin

Team members: Yi Zhaoqing, Yuan Xiaoning, Zhang Chunying

As the saying goes, "A country is based on the people, and food is the first necessity for the people", which shows the importance of food to us. All the countries in the world pay attention to grain production, including China. China has been an agricultural country since ancient times. With 7% of land in the world, China supports 22% population of the world, making remarkable achievements. In order to make people better understand China's ancient and modern crops distribution, production, trade and other relative aspects of crops, the team commitments to show crop distribution and grain trade in China to all Chinese people, all the Asian people and even people around the world.

The series of thematic maps are produced by using SuperMap GIS 9D series products. Different from most previous works with only one main line, these maps are made by three main lines: from the whole to the part, from ancient to modern, and from single to multiple. Although there are multiple main lines, the work does not deviate from the theme, and it is mutual connection, which is an innovation.

Review of Ancient and Modern Silk Road of Grain Trade between China and Foreign Countries (Routes in China)

Features

1. Making classification, hierarchy is clear. There are mainly six types of maps, including the map of heaven for folk food, the planning of producing areas, the ancient grain transportation line, the current grain transportation line, the food shortage's dark, and the total food beauty. Each type of map corresponds to one or more styles, and the style is consistent with the content of the map.

2. The main tone with the theme is harmony going with diverse colors .When it comes to grain, our first reaction is grains, and most of color of these grains are yellow and green, so the main colors of the system are yellow and green.

Distribution map of grain crop growing areas in China

3. Rich content and clear expression. Through some relevant websites and papers, we have collected a lots of data and materials related to the cartographic, and added them to the map to enrich the map content.

4. By rendering map made from DEM, not only improves the ornamental value of map, but also reflects local terrain changes. For example, the silk road of grain and trade between China and foreign countries (domestic route) in ancient and modern used this kind of expression effect to beautify the map while highlighting the up and down of the road of grain and trade.

5. To improve the readability, a symbol library was built, making the map vivid.

6. Combining ancient and modern, China and other countries, mapping styles are various. In order to avoid the uniformity and visual fatigue of maps, we set up the style with the cartographic content, which enhances the interest of maps while not divorcing from the practicability of maps.

Customized Symbol Library

Comments by instructors

Overall, this series of maps has the following features:

1. The theme is based on crop and grain, and the content is comprehensive. It introduces the distribution of grain in China, the road map of grain transportation in ancient and modern times, the route of grain migration due to grain shortage, and the regional characteristic delicacies after grain production and processing. The work provides a perfect combination of ancient style and modern feeling.

2. Appealing map color and map symbols. With light yellow and light green as the color tone, the ancient color and charm of grain can give people a fresh feeling, and many exquisite symbols were made, such as different kinds of food crops, wheat, rice, etc., which enhance the expressiveness and readability of the map.

3. Application of digital elevation model (DEM). When making the ancient Silk Road for grain transportation, DEM was imported to make a three-dimensional rendering effect map, which made the map more attractive.

b) Application Analysis Group

Title: Location Analysis of Itinerant Peddlers' Diversion Area Based on GIS and Analytic Hierarchy Process——Taking Jianghan District, Wuhan as an Example

(Excerpt)

University: Hubei University

**Instructor: Li Zhongyuan**

Team leader: Fu Yuanhao

Team members: Bao yuhui, Pu haochen, Xiao Jin

Itinerant peddlers are informal practitioners who retail and serve by setting up booths on the streets or other public places, often without a business license and a fixed business place. The problem of itinerant peddlers takes a great proportion of the urban social space contradiction in China. But the existence of itinerant peddlers is reasonable and necessary. Whether the diversion area can attract peddlers to settle in is the key to whether the "diverting-and-blocking" governance measure could work, which depends on whether the diversion area can meet the economic needs of the peddlers. If not, they will tend to operate informally, invalidating the inclusive governance policy.

Therefore, the quality of the site selection of the diversion area directly determines the effectiveness of the "diverting-and-blocking" governance measure.

Study Area

Jianghan, named after the intersection of the Yangtze River and the Han River, is the most prosperous center in Wuhan. Jianghan District is a comprehensive land mixed by public land, residential land, commercial land and green space, where it has a high potential for peddlers' gathering. Jianghan District is selected as the representative and for the generalizability, reducing the research difficulty in the meantime.
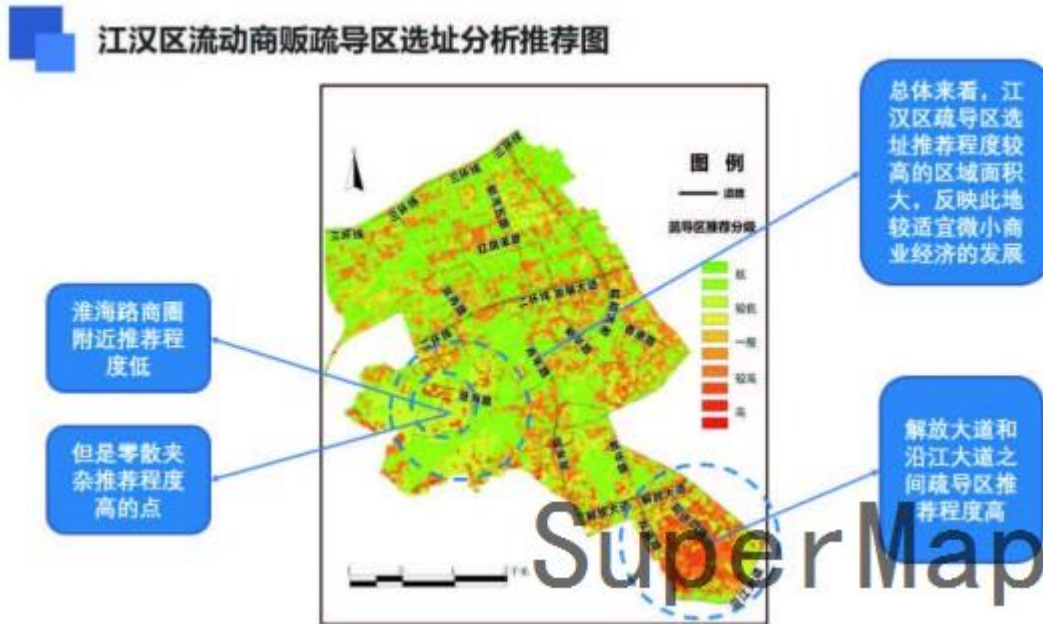
Recommended Map for Site Selection of Itinerant Peddlers in Jianghan District

Analysis Process

Based on the research results of the existing literature, this work, choosing Jianghan District as the research area, uses 102 community units, population density data, vector road network data, housing price data and POI big data. It analyzes the locations where they have a high potential for peddlers' gathering by 6 indicators (population density, housing prices, type of land use, comfort degree of block scale, diversity and abundance of urban functions). Combining with the "local standardization" principle and the specific control measures, the work provides guidance for regulating itinerant peddlers in the urban management system.

To eliminate the difference in magnitude between the grid values in the six raster maps, the normalization process is adopted, and then analyze by the analytic hierarchy process, obtaining the contribution of each of the six factors affects the spatial distribution of itinerant peddlers.

合适的疏导区	price	road	density	diversity	population	land type	权重结果	
price	1	3	5	5	1/2	2	0.2586	房价
road	1/3	1	2	2	1/4	1/2	0.0932	街区尺度的宜人性
density	1/5	1/2	1	1	1/6	1/3	0.0528	城市功能的丰裕度
diversity	1/5	1/2	1	1	1/6	1/3	0.0528	城市功能的多样性
population	2	4	6	6	1	3	0.3915	经济社会活动的区活性
land type	1/2	2	3	3	1/3	1	0.1511	用地类型

Six-factor Analysis

Result

By six-factor analysis, we obtain the recommended areas of (potential) high-incidence gathering of itinerant peddlers in Jianghan District, which can be also regarded as the locations of the diversion area.

Summary

Based on previous research, the team is committed to providing a scientific analysis framework that can provide guidance for the location analysis of itinerant peddlers in various regions. We hope that, at the expense of the least urban public space, it is possible to not only preserves itinerant peddlers' means of livelihood but also resolve the contradiction between the three major groups of itinerant peddlers, residents and urban managers.

c) Paper Group

Title: Individual Abnormal Travel Characteristics Recognition and OD Matrix Analysis based on AFC Data (Excerpt)

University: Chinese People's Public Security University

Instructor: Chen Peng

Team leader: Yin Wenrui

Team members: Xiao Song, Yao Minggang, Gu Haishuo

The development of the city depends on a perfect urban road network system. In the past, the planning of urban rail transit network was often made by experience, manual

analysis and questionnaire survey. With bus IC cards popularization, it is more scientific and accurate to analyze residents' travel characteristics and passenger flow with AFC data in this era of cloud computing and big data.

However, with the continuous establishment of the urban public transport system, pick-pocketing on those transports is also increasing. More than 10 crimes may occur in one day on a bus route. Unfortunately, there are currently no effective prevention and control methods for such crimes. Public transport pick-pocketing often commits in the form of gangs, and according to police statistics, the occurrences have certain regularity. In this case, the use of AFC data could be effective in the prevention and control of those crimes, since it is able to reflect the passenger flow and individual travel characteristics using information technology. Finally, we can obtain patrol suggestions for pickpocket gangs.

Research Method

In order to realize the effective identification of abnormal travel characteristics, this research firstly acquired and cleaned the data through Python. Next, we utilized Baidu API to distinguish working days, non-working days, peak periods, off-peak periods establishing a recommendation time matrix. Then we established rules to sift abnormal cards, and analyzed the reachable sites by elliptical model obtaining the patrol & prevention suggestions for key areas. Further, the rules to sift companion cards were established, and the OD matrix analysis and visualization were carried out to obtain the key areas of the criminal gang.

Criminal Gang Analysis

Count all enters and exits of companion cards, and record the number of occurrences of those stations to find its internal rules. Taking a criminal gang as an example, the gang has a relatively fixed entry and exit station, then it can be judged as locals-committing crimes. According to statistical analysis, the gang lives near Tongzhou Beiguan. Visualize the companion cards' OD matrixes of two people in the gang separately, as the figure below shows. Then connect the two stations with an arc. The thickness of the arc is related to the number of times the card is swiped. The result shows that this group often stay at traffic-congested and crowded areas near Chegongzhuang West Station, Beijing West Railway Station and the Military Museum Station, which are in the vicinity of Tongzhou Beiguan. It verifies that the abnormal cards have a low degree of travel consistency. In addition, it can analyze the correlation between the stations and verify the proportional relation between the number of abnormal card occurrences and the passenger flow.
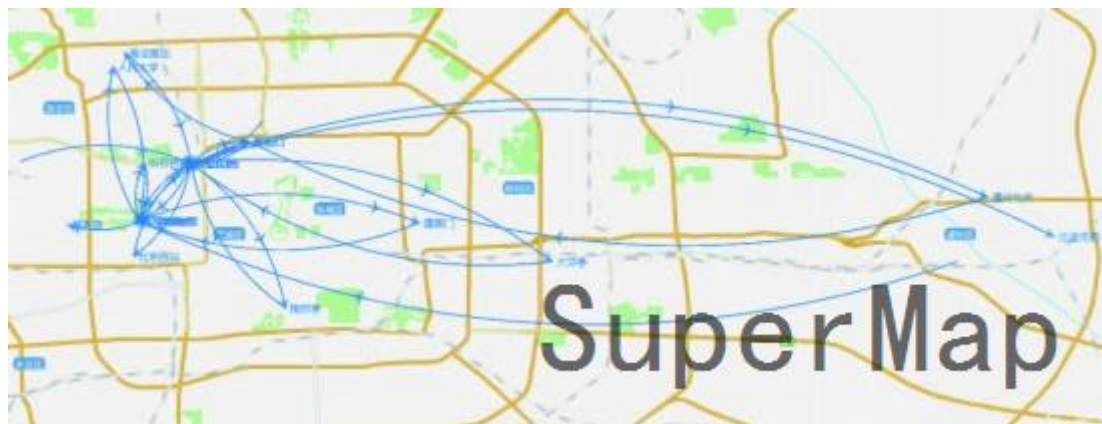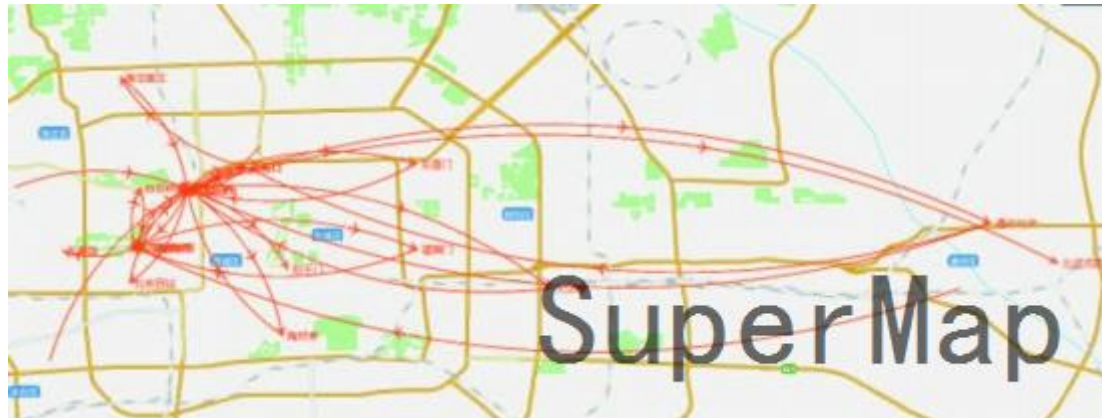
OD Track Visualization of Companion Cards

Conclusion

The work realizes the sifting of the abnormal cards and the companion cards through rules, and uses the OD matrix to analyze the accompanying abnormal travel characteristics. The SuperMap iClient 9D Beta for Leaflet is used to develop the OD matrix visualization toolbox. The work performs gray box trajectory analysis of those stations that we only know to enter and exit using the elliptical model. Further, it draws a Kernel density map and compares with the actual police statistics to verify the criminal gangs' footholds. According to the hot lines and hot sites of the abnormal cards, the patrol & prevention suggestions for key areas are obtained. And by locating companion cards landing points, we can get arresting recommendation of the criminal gangs, which provides the policy a practical method for improving the pick-pocketing prevention and detection.

Comments by instructors

The work is for finding abnormal travel individuals from the perspective of bus card

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big data analysis, and then identifies and predicts potential criminals. It is a very typical public security big data intelligence analysis. Based on the comprehensive application of various analysis tools, the team boldly innovates from previous methods and realizes the effective mining of public transport big data. The research process is scientific, standardized, and reliable, not only has a high academic significance but also has high application value in the actual work of public security.

d) Web & Online Development Group

Title: Campus Fire Safety Assistant System Based on GIS+BIM (Excerpt)

University: North China University of Technology

Instructors: Liu Yajing and Ren Yongqiang

Team leader: Zhu Bangren

Team members: Yang Xiao, Wen Danqi and Yue Chao

With the continuous expansion of the scale of higher education in China, colleges and universities generally take the construction of high-rise buildings to improve the per capita area, but the fire hazards caused by high-rise buildings are far more complex than low-rise buildings. The relationship between building floor height and fire risk does not increase in a fixed proportion, but in an exponential way. The fire rescue work of high-rise buildings is more complex, so the fire risk assessment and emergency rescue norms of high-rise student apartments require more.

The campus fire safety assistant system based on GIS+BIM adopts C# language under Microsoft Visual Studio platform, and combines SuperMap for JavaScript and WebGL of SuperMap GIS 9D series products for secondary development. The work uses Microsoft SQL Server as the core database, through the analysis and design of fire safety in Colleges and universities, and combined with the abundant data resources of the campus to build a campus safety assistant system. The system standardizes the maintenance process of firefighting equipment in schools, including the repair part of students and the maintenance part of maintenance personnel. By analyzing various weight factors, the system realizes the maintenance of firefighting equipment in schools. At the same time, through the particle effect of WebGL, the fire scene is simulated. SuperMap GIS 9D series products are imported into BIM fine model to simulate indoor fire scene, which provides three-dimensional route planning for fire trucks.

Features

1. Through SuperMap GIS 9D series products, the BIM model data sets are

lightweight processed to provide a smoother three-dimensional visualization effect. The building model display function from outside to inside is applied to the campus fire safety assistance, which makes the fire rescue efficient, safe and integrated. Rescue workers can make a detailed analysis of the firefighting facilities, safety passages and the internal structure of dormitories in order to achieve the best rescue.

2. The traditional two-dimensional shortest path analysis is extended to three-dimensional visualization, which solves the unreasonable situation of path planning caused by the large area of campus and the dense vertical and horizontal road network. At the same time, the firefighting equipment and its status in the whole school are displayed in three-dimensional form, so as to facilitate the fire fighters to select appropriate firefighting equipment.

3. Real-time monitoring of the temperature inside the building avoids the lack of information on the fire inside the building caused by the smoke generated by the fire. At the same time, the indoor monitoring equipment can be used to avoid the false alarm situation caused by the damage of the fire alarm.

4. Based on the actual situation of the students' apartments in our school, five first-level fire risk assessment indicators and 18 second-level fire risk assessment indicators are summarized from five aspects: the fire prevention ability of the dormitories themselves, the safety evacuation of personnel, fire emergency rescue, external fire hazards and the level of fire safety management. A hierarchical fire risk assessment index system for high-rise students' apartments is established.


Main Function Modules

1. Management of firefighting equipment in school: administrators can inquire the firefighting equipment in school according to their needs, and check the status of the equipment. Red represents the current state of inability to use, green represents the normal state of use.

Distribution of Fire Fighting Equipment in School

2. Fire monitoring: After a fire disaster occurs, the sensor can be located at the fire source, and the temperature changes around the sensor can be monitored and displayed in the form of a broken line chart. At the same time, the monitoring equipment inside the building can be invoked to view the internal details.

3. Three-dimensional attribute query and roaming: Because the visualization degree of two-dimensional map is relatively low, and the detailed information inside the building cannot be displayed, the BIM model can be imported through SuperMap GIS 9D platform and processed lightly, which can realize indoor roaming and layered profile query of building material information.

4. Campus three-dimensional display and rescue route planning: displaying the distribution and status information of campus fire-fighting equipment through three-dimensional model, and planning the campus fire-fighting rescue route at the same time.
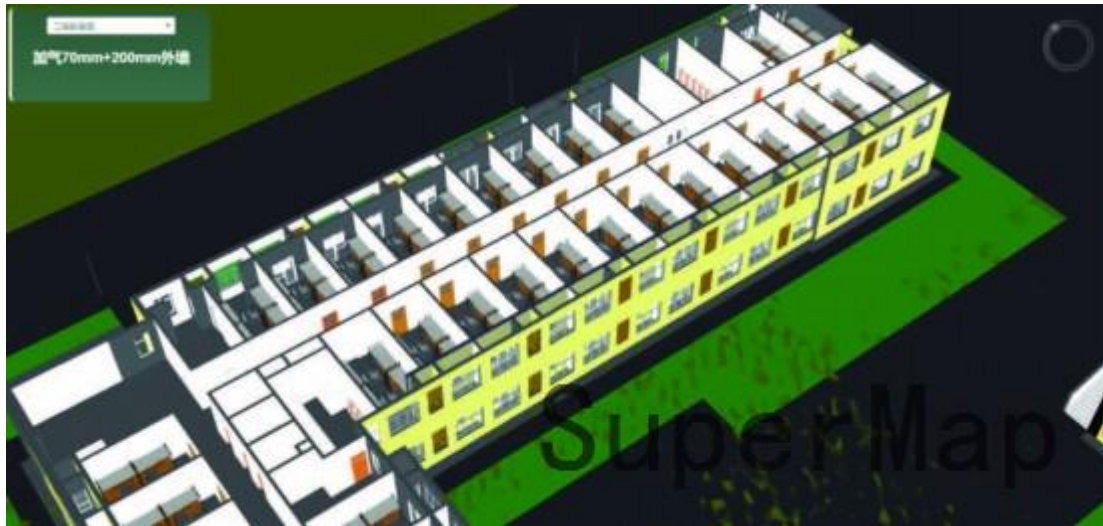
Hierarchical Query for Attribute Information

Comments by instructors

The whole system mainly serves administrators, students and maintainers. It has rich functions and is practical and efficient. It includes perfecting the maintenance system of school firefighting equipment; three-dimensional simulation demonstration of fire scene; three-dimensional roaming rescue route for rescue firefighters; and three-dimensional safety evacuation plan demonstration for students. The project effectively realizes the two-dimensional and three-dimensional integrated management of campus fire spatial information.

The work combines with the current popular intelligent city architecture of GIS+BIM and realizes the system function with B/S architecture supported by SuperMap GIS 9D platform. The work provides powerful support technology for fire rescue. It visually displays the periphery and interior structure of each building with three-dimensional entity model, and can view the basic information and interior structure of each building. Fireproof material. The whole system has an attractive and generous interface and is a complete and systematic entry.

Comments by Review Team

The work uses BIM+GIS technology, the three-dimensional effect is relatively smooth and dazzling. Data lightweight is good, but BIM data volume is generally larger, after the scope of application increases, we need pay attention to the problem of data lightweight. It is suggested to focus on only one target user, and then solve all his points. The target user can be an administrator, who can publish content. Besides, function to send escape routes to mobile phones near dangerous buildings can be added.

(4) Requirement:

- ➢ 1-4 person(s) a group

- ➢ 0-2 instructor(s) a group

- ➢ Must use SuperMap Software

- ➢ Language must be English

4. Report/Paper Structure

(1) Report

This section is for Mapping Group, Application Analysis Group and Web & Online Development Group. Your report need to be structured in the following way (at least includes these 5 parts):

1. Introduction – Discuss the objectives of your work. You should also aim to discuss or comment on the importance of your work, e.g. atmospheric correction is necessary for the calculation of spectral indices.

2. Methodology – You should briefly discuss your chosen study area and explain the processing approach. Try to avoid writing in the first person e.g. "I did x". You may want to use flow charts or diagrams. Do not include chunks of code – you should discuss the theoretical steps so that the method is reproducible regardless of the software/platform used.

3. Results – This section should include your results. Do not just paste the images into this section. The results section should include text highlighting interesting features that will be drawn upon in the discussion section. All figures need to include a figure number and a full caption explaining what the figure shows. All figures need to be referred to from the text. Please see any research journal article for advice on how to do this if you are not sure.

4. Conclusion – Conclude what you have found and discussed and any other information that you feel may be relevant to future work/studies.

5. References

(2) Paper

This section is only for Paper Group. Your paper need to be structured in the following

way (at least includes these 7 parts):

1. Abstract

2. Table of Contents

3. Introduction – Discuss the objectives of your work. You should also aim to discuss or comment on the importance of your work, e.g. atmospheric correction is necessary for the calculation of spectral indices.

4. Methodology – You should briefly discuss your chosen study area and explain the processing approach. Try to avoid writing in the first person e.g. "I did x". You may want to use flow charts or diagrams. Do not include chunks of code – you should discuss the theoretical steps so that the method is reproducible regardless of the software/platform used.

5. Results – This section should include your results. Do not just paste the images into this section. The results section should include text highlighting interesting features that will be drawn upon in the discussion section. All figures need to include a figure number and a full caption explaining what the figure shows. All figures need to be referred to from the text. Please see any research journal article for advice on how to do this if you are not sure.

6. Conclusion – Conclude what you have found and discussed and any other information that you feel may be relevant to future work/studies.

7. References

5. Contest Rules

1. Participants can register individually or as teams. But each team must be no more than four members.

2. One participant can take part in one or more groups or teams, while one team can only submit one work.

3. Team members can come from different schools, institutes, universities, departments or classes.

4. Teams can have instructors, but not more than two.

5. The works must be based on the SuperMap software platform.

6. Participants must submit their works on time (for more details, please check the schedule).

7. A team participating in the contest need complete the relevant work according to the requirements of the group it belongs to. Works must be original and must not infringe the copyright of third parties.

8. After the submission of the work, the ownership of the work still belongs to the original author, and the Organizing Committee of the contest has the right to publish and publicize the work.

9. If the works are awarded, they will be publicized on SuperMap official website. By default, the works conform to the open source rules.

10. Notes on copyright: If you refer to other works, codes, models, documents, third-party data, etc., please indicate at the end of the report as references. If the violation of the rights of third parties is committed to the working group, the organizing committee shall have the right to cancel the awards for the work and request the awards, bonuses and certificates of prizes to be returned.

11. The competition principle applies to all competition groups in the competition. Those who violate this principle will be regarded as voluntarily abandoning their qualification.

12. For more details about schedule, rules and award settings of the competition, please visit our official website of the competition.

6. Online Training & Technical Support

(1) Webinar (Live and Recorded)

We will provide 2 batches live webinar for each group, students can ask questions online in the online training.

From May 24th to July 12th, we will provide one hour live webinar on Skype (Account: Binbin He (hebinbin2016@qq.com)) every Friday 3pm-4pm (GMT+8).

May 24th	Web & Online Development Group
May 31st	Application Analysis Group
June 7th	Mapping Group
June 14th	Paper Group
June 21th	Web & Online Development Group
June 28th	Application Analysis Group
July 5th	Mapping Group
July 12th	Paper Group

The recorded video will be uploaded to the official website in time.

If there is any change in timetable, it will be informed in advance on the GIS contest

website (Notification section).

(2) Video

➢ Record of Webinar

will be uploaded to SuperMap GIS Contest registration and information website: https://supermap-giscontest.eventbrite.com, scan the QR Code:

➢ Product Tutorials:

https://www.supermap.com/en/html/SuperMap_GIS_OnlineVideo.html

(3) Wechat

Download WeChat APP in your phone. Then add our technical support by searching the account Hebinbinaixuexi, or scan the QR Code:

(4) Email

You can also email us: global@supermap.com. And we will give you feed back soon.

(5) WhatsApp Forum

QR Code：

7. Awards & Prizes

The Organizing Committee of SuperMap GIS Contest will invite well-known experts and scholars to join the Review Team. In accordance with the principles of openness, fairness and impartiality, Review Team will be responsible for the evaluation of the final competition.

(1) Contest Awards

Team Award

Instructor Award

Organization University Award

Individual Award

(2) Contest Prizes

Web & Online Development Group	Frist Prize	1 group	$ 800
	Second Prize	2 groups	$ 500
	Third Prize	3 groups	$ 200
Mapping Group & Application Analysis Group &Paper Group	Frist Prize	1 group	$ 500
	Second Prize	2 groups	$ 300
	Third Prize	3 groups	$ 200

8. Schedule

Date	Task	Tips
Before May 23th	Registration	https://supermap-giscontest.eventbrite.com
Before August 6th	Submission of the final works	Submission Criteria details are in (2) Instruction of Each Group in Section 3 (Contest Groups).
September	Come to Beijing and take part in GIS contest	to be announced

9. Contact Information

Registration and Information Webpage of SuperMap Contest:
https://supermap-giscontest.eventbrite.com, or scan the QR Code:

Email for Technical Support：global@supermap.com
WeChat Account: Hebinbinaixuexi, or scan the QR Code:

SuperMap Official Website：
➢ Indonesia: www.supermap-id.com
➢ Other Countries: https://www.supermap.com/en/