A dark blue world map serves as the background. Several thin, light-colored lines originate from a point in East Asia and curve across the map towards other regions, suggesting global data flow or connectivity.

# China Data for Spatial Study and COVID-19 Impact Analysis

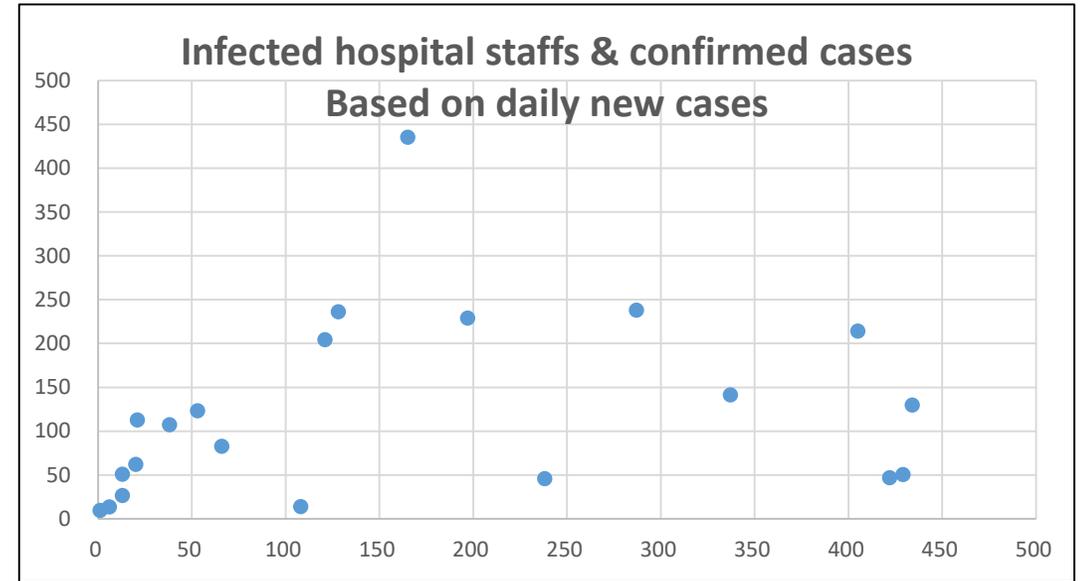
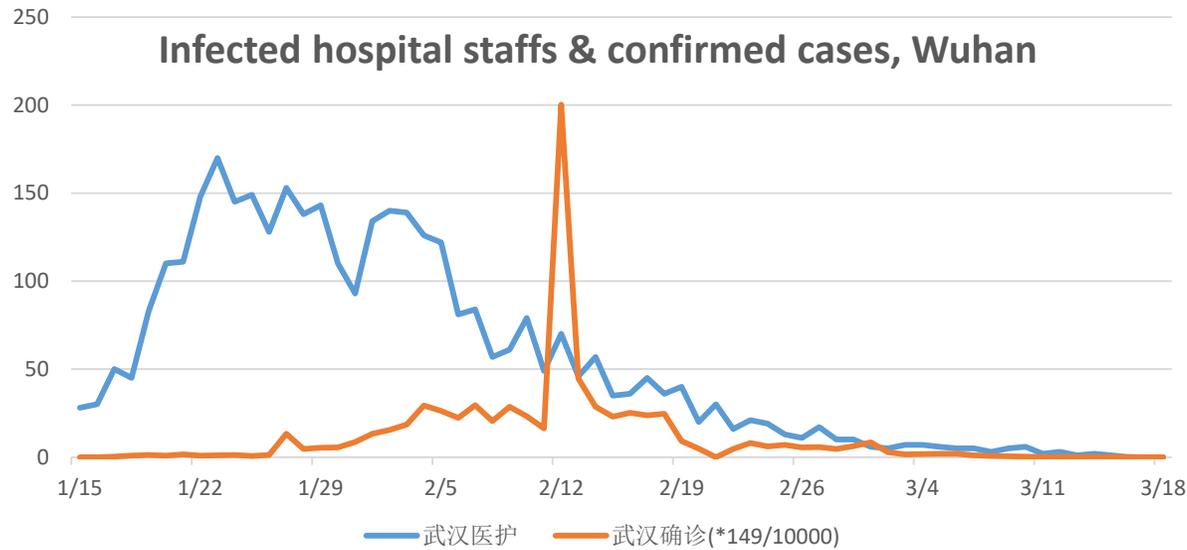
**Shuming Bao**

**China Data Institute & Future Data Lab**

# Topics

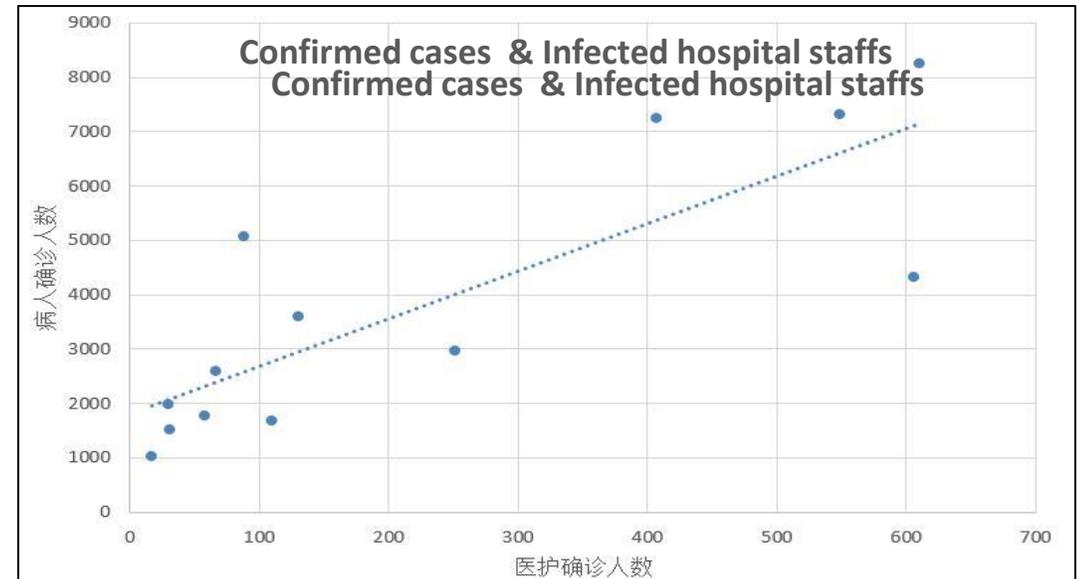
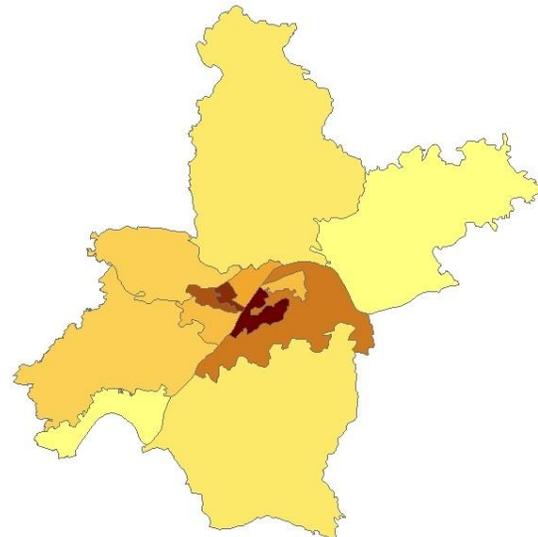
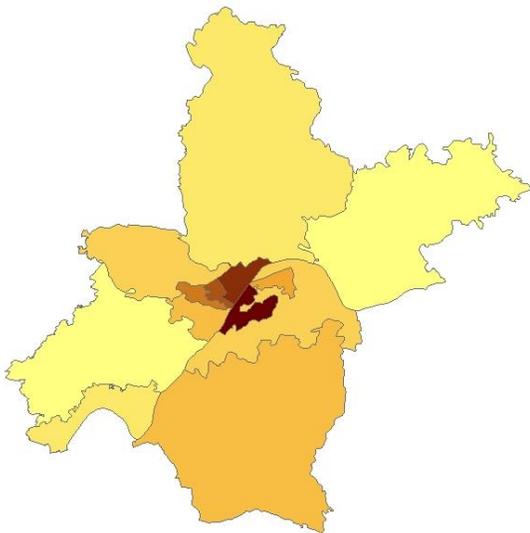
- 1. Background**
- 2. Base Data of China**
- 3. Resources for COVID-19 Research**
- 4. Data Deployment and Sharing**
- 5. Summary and Discussions**

# A Comparison of Time and Spatial Data



Infected hospital staffs, 3/1/2020

Confirmed Cases, Wuhan, 3/1/2020



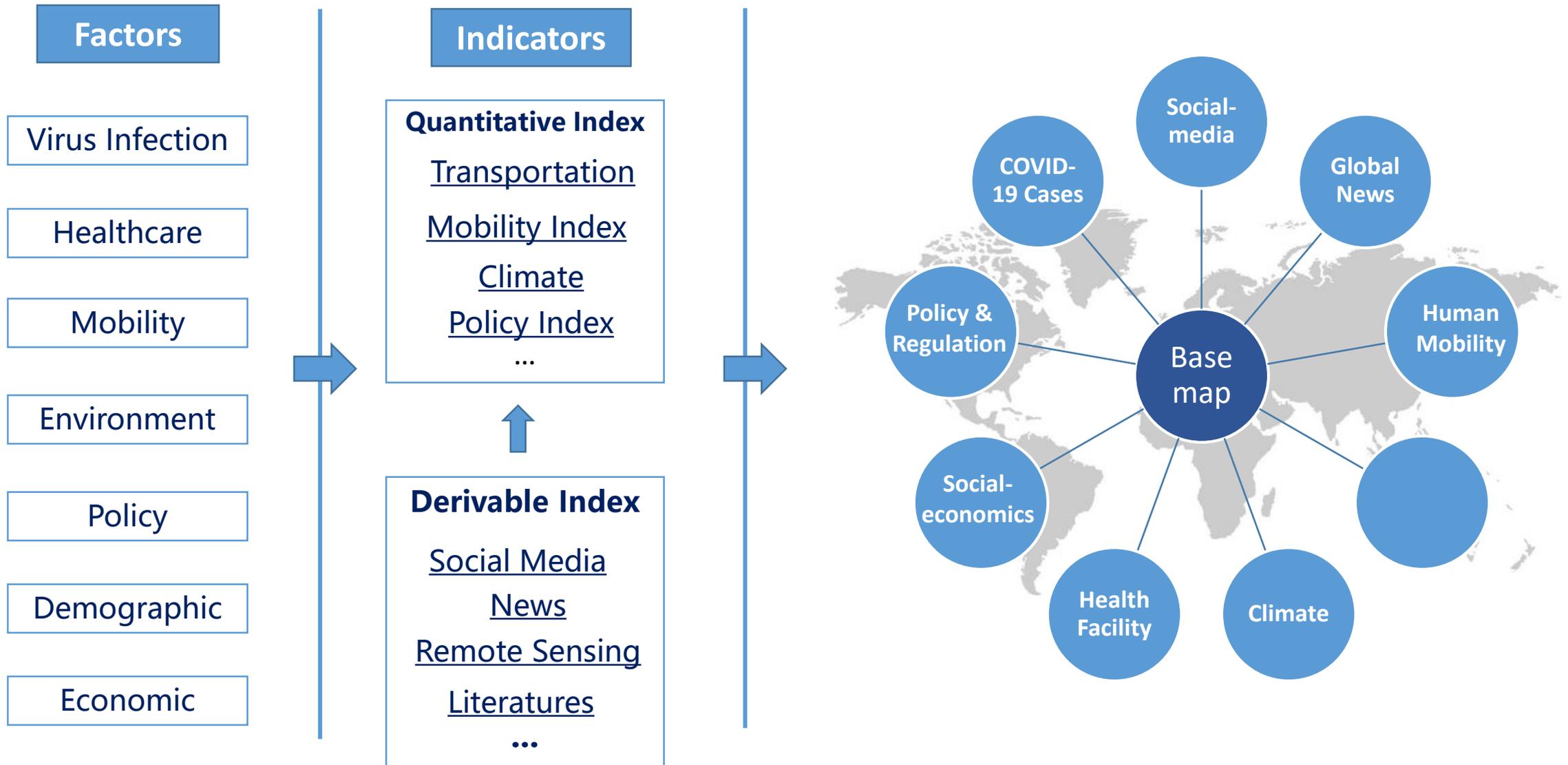
# Why Spatial is Special?

**□ Location**

**□ Time**

**□ Integration**

# China Data for COVID-19 Impact Analysis



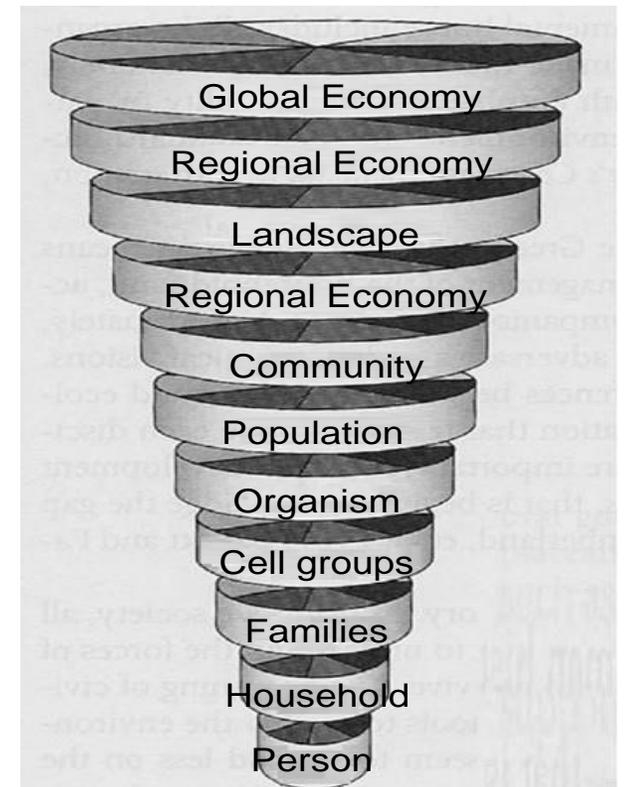
# Principals for Spatial Database Design

## Principals:

- **Comprehensive** data coverage
- **Comparable** spatio-temporal data structure
- **Compatible** multi-source data structure
- **Consistent** multi-scale data structure

## Primary Factors:

- 1.Space (boundaries)
- 2.Time
- 3.Scale (levels)



# Base Data of China



- **Government Statistics**
  - Provincial Statistics (1949 - )
  - City Statistics (1996 - )
  - County Statistics (1997 - )
- **Population Census**
  - Census 1953
  - Census 1964
  - Census 1982
  - Census 1990
  - Census 2000/2010 (province, city, county, township, GRID)
- **Economic Census**
  - Industrial Census 1995 (province, city, county, ZIP)
  - Basic Unit Census 2001 (province, city, county, ZIP)
  - Economic Census 2004/2008 (province, city, county, ZIP)
- **Establishments** (more than 7 millions companies and organizations)
- **Geography and Environment**
  - Land Use data
  - Night-Time data
- **Base Maps**
  - 2000
  - 2010
  - 2000-2010

# Yearly Health Statistics

## NUMBER OF HEALTH INSTITUTIONS

- Hospitals
- Sanatoriums
- Clinics
- Specialized Prevention & treatment Centers & Stations
- Sanitation and Anti-epidemic Institutions
- Maternity and Child Care Centers
- Medicines and Chemical Reagent Test Labs
- Research Institutes of Medical Science
- Other Institutions

## NUMBER OF PERSONS ENGAED IN HEALTH INSTITUTIONS

- Doctors
  - Doctors of Traditional Chinese Medicine
  - Doctors of Western Medicine
  - Paramedics of Western Medicine
- Senior and Junior Nurses

## NUMBER OF BEDS IN HEALTH INSTITUTIONS

- Hospitals(10000 units)
- Sanatoriums(10000 units)
- Other Health Institutions(10000 units)

NUMBER OF PERSONS ENGAED IN HEALTH INSTITUTIONS							
Year	Total(10000 persons)	Medical Technical Personnel(10000 persons)	Doctors(10000 persons)	Doctors of Traditional Chinese Medicine(10000 persons)	Doctors of Western Medicine(10000 persons)	Paramedics of Western Medicine(10000 persons)	Senior and Junior Nurses(10000 persons)
1949	54.1	50.5	36.3	27.6	3.8	4.9	3.3
1950	61.1	55.5	38	28.6	4.1	5.3	3.8
1951	68.5	60.6	39.7	29.6	4.5	5.6	4.6
1952	81.9	69	42.5	30.6	5.2	6.7	6.1
1953	94.3	77.8	44.9	31.6	5.6	7.7	7.9
1954	103.8	85.4	47.6	32.7	6.3	8.6	9.4
1955	105.3	87.4	50	33.2	7	9.8	10.7
1956	120.1	98.8	52.5	33.2	7.2	12.1	11.8
1957	125.4	103.9	54.7	33.7	7.4	13.6	12.8
1958	152.9	132.9	54.4	33.8	7.5	13.1	13.8
1959	163.8	139	59.4	36.1	8	15.3	16
1960	176.9	150.5	59.6	34.6	8.2	16.8	17
1961	178.4	149.2	65.2	35.2	9.9	20.1	19
1962	168.5	141.4	68.8	34.4	12	22.4	20
1963	173	145.3	72.1	33.9	14.3	23.9	21.3
1964	176.7	147.9	73.9	33	16.1	24.8	22.5
1965	187.2	153.2	76.3	32.1	18.9	25.3	23.5
1966	182.7	148.4	70.7	27.6	18.7	24.4	24.4
1967	185.4	150.7	71	27	19	25	26
1968	183.4	149.1	70.1	24.3	20.4	25.4	28.3
1969	181.2	147.1	69.7	22.9	21.2	25.6	29.3
1970	657.2	145.3	70.2	22.5	22.1	25.6	29.5
1971	194.4	155.1	71.2	20.6	24.1	26.5	31.8
1972	216.8	170.8	73.9	20.6	25.6	27.7	33.1
1973	230.6	182.2	78.1	21.6	26.9	29.6	33.5

NUMBER OF HEALTH INSTITUTIONS											
Year	Total (unit)	Hospitals (unit)	At and Above County Level(unit)	Sanatoriums(unit)	Clinics(unit)	Specialized Prevention & treatment Centers & Stations(unit)	Sanitation and Antiepidemic Institutions(unit)	Maternity and Child Care Centers(unit)	Medicines and Chemical Reagent Test Labs(unit)	Research Institutes of Medical Science(unit)	Other Institutions(unit)
1949	3,670	2,600	2,600	30	769	11		9	1	3	247
1950	8,915	2,880	2,880	60	3,356	30	61	426	2	3	2,174
1951	16,181	3,150	3,150	120	8,934	89	68	1,185	2	3	2,630
1952	38,987	3,540	3,540	270	29,050	188	147	2,379	12	3	3,398
1953	52,038	3,580	3,580	520	38,987	255	313	4,046	21	5	4,311
1954	56,610	3,858	3,858	678	42,840	265	328	3,939	23	9	4,870
1955	67,725	3,740	3,740	822	51,600	287	315	3,944	24	13	7,072
1956	107,305	3,903	3,903	799	86,866	637	1,464	4,564	27	28	9,019
1957	122,954	4,179	4,179	835	102,262	626	1,626	4,599	28	38	8,761
1958	196,829	48,580	4,949	695	132,894	667	1,577	4,315	30	108	7,963
1959	231,958	35,535	5,730	910	186,039	671	1,686	3,559	43	316	3,199
1960	261,195	32,333	6,180	1,577	213,823	683	1,866	4,213	50	478	6,332
1961	269,197	38,611	6,498	1,361	217,568	735	2,125	2,911	87	415	5,384
1962	217,985	34,379	5,300	1,266	172,708	678	2,308	2,636	93	171	3,746
1963	215,491	32,706	5,242	1,116	170,717	692	2,382	2,863	96	120	4,799
1964	215,474	36,744	5,355	1,027	167,715	803	2,530	2,966	109	120	3,460
1965	224,266	42,711	5,445	887	170,430	822	2,499	2,910	131	94	3,897
1966	206,613	42,156	5,588	818	153,730	793	2,513	2,684	106	82	3,731
1967	196,455	52,055	5,713	734	134,725	775	2,496	2,331	115	86	3,138
1968	171,494	57,041	5,837	473	108,090	635	1,871	1,536	109	81	1,658
1969	153,891	57,988	5,839	359	90,744	600	1,480	1,058	98	71	1,493
1970	149,823	64,822	6,030	359	79,600	607	1,714	1,124	98	72	1,493
1971	131,367	62,766	6,660	183	62,457	659	2,245	1,005	200	84	1,768
1972	135,127	63,050	6,974	183	66,067	613	2,558	1,005	200	94	1,357
1973	143,733	64,583	7,361	238	72,117	601	2,702	1,446	230	108	1,708
1974	149,965	65,258	7,570	252	76,988	626	2,778	1,745	274	129	1,915
1975	151,733	62,425	7,757	297	80,739	683	2,912	2,128	310	141	2,201
1976	157,959	63,184	7,952	317	85,616	737	2,973	2,239	356	162	2,375
1977	164,199	63,952	8,550	342	90,285	795	2,990	2,353	493	170	2,819
1978	169,732	64,311	8,841	389	94,395	887	2,989	2,571	844	219	3,971
1979	176,793	65,009	9,254	440	99,643	1,066	3,047	2,559	1,159	295	3,575
1980	180,553	65,315	9,478	470	102,474	1,138	3,105	2,745	1,213	282	5,024

# Population Census Data with GIS Maps

> 2,000 demographic variables in population Census

## Geographical Levels:

Country  
|  
Province  
|  
Prefecture  
|  
County  
|  
Township  
|  
1 sq km Grid

## Census data variables:

- General Information
- Nationalities
- Age Structure
- Household Structure
- Education
- Fertility
- Deaths
- Marriage
- Migration
- Housing Status
- Industries and Occupations

# Economic Census Data

> Cover about 900 economic sectors with more than 7 million business units

## Industries

- 852 industries

## Products

- 3 primary products

## Ownerships

- 23 different industries

## Revenue

- 15 revenue ranges

## Employment

- 10 employment ranges

## Employment

1

1-19

20-49

50-99

100-499

500-999

1000-4999

5000-29999

30000-49999

50000+

## Revenue (in 10,000 Yuan)

0-30

30---50

50---100

100--300

300--500

500--1000

1000-3000

3000-5000

5000-10000

10000-30000

30000-50000

50000-100000

100000-150000

150000-200000

200000 and over

# Business Unit Classification

2004, 2008, 2013, and 2018 Business and Private Units								
	2004		2008		2013		2018	
	(in 10,000)	(%)						
1. Legal Units	516.9	100	709.9	100	1085.7	100	2178.9	100
Enterprise	325	62.9	495.9	69.9	820.8	75.6	820.8	85.2
Government	90	17.4	95.9	13.5	103.7	9.6	103.7	4.9
Non-profit org	101.9	19.7	118.1	16.6	161.1	14.8	161.1	1.4
Others								8.4
2. Economic Units	682.4	100	886.4	100	1303.5	100	2455	100
Manufacture	167.5	24.6	230	25.9	287.5	22.1	484.1	19.7
Service	514.9	75.4	656.4	74.1	1015.9	77.9	1970.9	80.3
3. Private Units	3921.6	100	2873.7	100	3279.1	100	6295.9	100
Manufacture	588.7	15	253.8	8.8	188.3	5.7	732.3	11.6
Service	3332.9	85	2619.9	91.2	3090.8	94.3	5563.6	88.4

# Business Classification

## Industrial Classification

1. Farming, Forestry, Animal Husbandry and Fishery
2. Mining and Quarrying
3. Manufacturing
4. Production and Distribution of Electric Power, Gas and Water
5. Construction
6. Transport, Storage and Post
7. Information Transmission, Computer Services and Software
8. Wholesale and Retail Trade
9. Hotel and Restaurants
10. Financial Intermediation
11. Real Estate
12. Scientific Research, Technical Service and Geologic Prospecting
13. Management of Water Conservancy, Environ. and Public Facilities
14. Services to Households and Other Services
15. Education
16. Health, Social Security and Social Welfare
17. Culture, Sports and Entertainment
18. Public Management and Social Organization

## Health Care Services

1. General hospital
2. Traditional Chinese medicine hospital
3. Combined Traditional Chinese and Western Medicine Hospital
4. National Minority Hospital
5. Specialist Hospital
6. Nursing Homes
7. Health Centers and Community Medical Treatment Activities
8. Clinics Medical Treatment Activities
9. Family planning service
10. Maternal and child health service
11. Specialist service for Disease Control and Prevention
12. Vaccination for disease prevention & control service
13. Other health services
14. Social Security
15. Cadres sanatorium
16. Adoption of asylum services
17. No Lodging Social Welfare

# Manufacture of Medical Machinery

- 医疗诊断、监护及治疗设备制造 Medical diagnosis, care and treatment equipment manufacturing
- 口腔科用设备及器具制造 Dental equipment and apparatus used manufacturing
- 实验室及医用消毒设备和器具制造 Laboratory and medical equipment and apparatus disinfection system
- 医疗、外科及兽医用器械制造 Medical, surgical and veterinary equipment manufacturing
- 机械治疗及病房护理设备制造 Treatment and Nursing mechanical equipment manufacturing
- 假肢、人工器官及植（介）入器械 artificial organs and plantations (referred) to enter Devices
- 其他医疗设备及器械制造 Other medical equipment and device manufacturing

	Baoshan	Changning	Changshu	Chongming	Fengxian	Hongkou	Huangpu	Jiading	Jingan	Kunshan	Luwan	Minxing	Nanhui
2008 Daily and medical rubber products manufacturing	4	2	5	0	3	2	0	14	0	4	0	4	4
2008 Medical diagnosis, care and treatment equipment manufacturing	8	0	2	4	9	5	0	12	2	4	2	8	10
2008 Dental equipment and apparatus used manufacturing	1	0	1	2	3	1	0	1	0	2	0	4	4
2008 Laboratory and medical equipment and apparatus disinfection system	6	1	1	1	3	1	0	2	0	2	0	3	2
2008 Medical, surgical and veterinary equipment manufacturing	10	2	6	0	6	3	2	13	0	8	0	8	12
2008 Treatment and Nursing mechanical equipment manufacturing	0	2	0	0	3	2	0	1	0	1	0	3	1
2008 artificial organs and plantations (referred) to enter Devices	3	5	1	0	2	4	0	0	7	0	1	8	2
2008 Other medical equipment and device manufacturing	11	1	9	5	11	4	0	14	0	6	1	16	7

# Manufacture of Medicines

- 化学药品原药制造 The original drug manufacturing chemicals
- 化学药品制剂制造 Chemical agent production
- 中药饮片加工 Pieces of Traditional Chinese medicine processing
- 中成药制造 Traditional Chinese Prepared Medicines
- 兽用药品制造 Veterinary medicine manufacturing
- 生物、生化制品的制造 Biological, chemical and biological products manufacturing
- 卫生材料及医药用品制造 Sanitation Materials and Medical Articles

	Baoshan	Changning	Changshu	Chongming	Fengxian	Hongkou	Huangpu	Jiading	Jingan	Kunshan
2008 The original drug manufacturing chemicals	5	0	12	0	5	1	1	13	0	20
2008 Chemical agent production	5	2	2	1	11	0	0	14	0	9
2008 Pieces of Traditional Chinese medicine processing	1	0	0	1	1	1	1	4	0	0
2008 Traditional Chinese Prepared Medicines	2	0	2	2	3	0	1	5	1	0
2008 Veterinary medicine manufacturing	4	0	1	0	3	0	0	4	0	0
2008 Biological, chemical and biological products manufacturing	9	1	2	0	17	1	1	3	0	9
2008 Sanitation Materials and Medical Articles	15	2	6	4	12	0	0	5	1	13

# China Data Online: <http://china-data-online.com>

## Statistical Database:

- Monthly Statistics
- National Statistics
- Provincial Statistics
- City Statistics
- County Statistics
- Monthly Industrial Data
- Yearly Industrial Data
- Statistics on Map
- Statistical Yearbooks

## Census Database:

- Census Maps
- Population Census 1982
- Population Census 1990
- Population Survey 1995, 2005
- Province Census 2000
- County Census 2000
- Economic Census 2004

The screenshot shows the homepage of the China Data Online website. The header includes the logo for the ALL CHINA DATA CENTER (ACMR) and the text 'China Data Online 中国数据在线'. A navigation menu contains links for Home, Data Products, Database Demo, Dictionary, Support, Contact, Q&A, Citations, My Account, and Logout. The main content area is divided into three primary sections, each highlighted with a red border:

- CHINA SPATIAL DATA**: Includes links for China Geo-Explorer II, China Geo-Explorer I, and China Map Library.
- CHINA STATISTICS**: Includes links for Monthly Statistics, National Statistics, Provincial Statistics, City Statistics, County Statistics, Monthly Industrial Data, Yearly Industrial Data, Statistics on Map, Statistical Datasheets, and Statistical Charts.
- CENSUS DATA**: Includes links for Census Maps, All Census Data, Economic Census 2004, Industrial Census 1995, Census 1982, Census 1982 (10%), Census 1990, Census 1995 (1%), Province 2000, County 2000, Census 2005 (1%), and Census Data Search.

Below these sections is a 'FREE CHINA MAPS' section with links for 2000 Population Census, Pop & Env (1990-1999), Pop & Env (2000), and Atlas of Industrial Census.

On the right side of the page, there is a sidebar with a blue header 'Investment in Fixed Assets for the First Ten Months of 2019'. Below this is a pie chart titled 'Investment in Fixed Asset From Jan to Oct in 2019' showing the following data:

Industry	Percentage
Primary industry	2.23%
Secondary industry	29.76%
Tertiary industry	68.02%

Below the pie chart is a section titled 'Latest China Statistical News' with several news items, including 'Industrial Production Operation in October 2019 (11/15/2019)', 'Total Retail Sales of Consumer Goods in October 2019 (11/15/2019)', 'Investment in Fixed Assets for the First Ten Months of 2019 (11/15/2019)', and 'Producer Prices for the Industrial Sector for October 2019 (11/11/2019)'.

# Unique Features of China Spatial Data

- ❑ The mostly complete collection in China's history
- ❑ Detailed data for nation, province, city, county, district and township
- ❑ Complete coverage for all provinces, cities, counties, and townships
- ❑ All data are comparable across time and region with the adjusted base map (2000, 2010)
- ❑ Most data in CGE are unique and not available in official publications
  - Population census data were compiled from the source data directly
  - Economic census data were compiled from the establishment data aggregated at province, city, county and ZIP level
  - All data have been integrated with GIS maps

# Recent Data Updates of China Geo-explorer

- 2017 City statistics
- 2018 Economic Census data
- Nighttime light data (1992-2018)
- Daily COVID-19 data (confirmed cases, death, recovery)

# China Geo-Explorer

Administrative Units – Location – Chart – Time Series  
– Establishment – GIS Map Export – Map Library

Base Year:  2000  2010  2000-2010

Group:  Single group  Multi-groups

Level:  Province  City  County  Town  Any area

**Region** | Customized Report | Standard Report | [Upload your data](#)

**China (Province)** | [Back to the Upper Level](#)

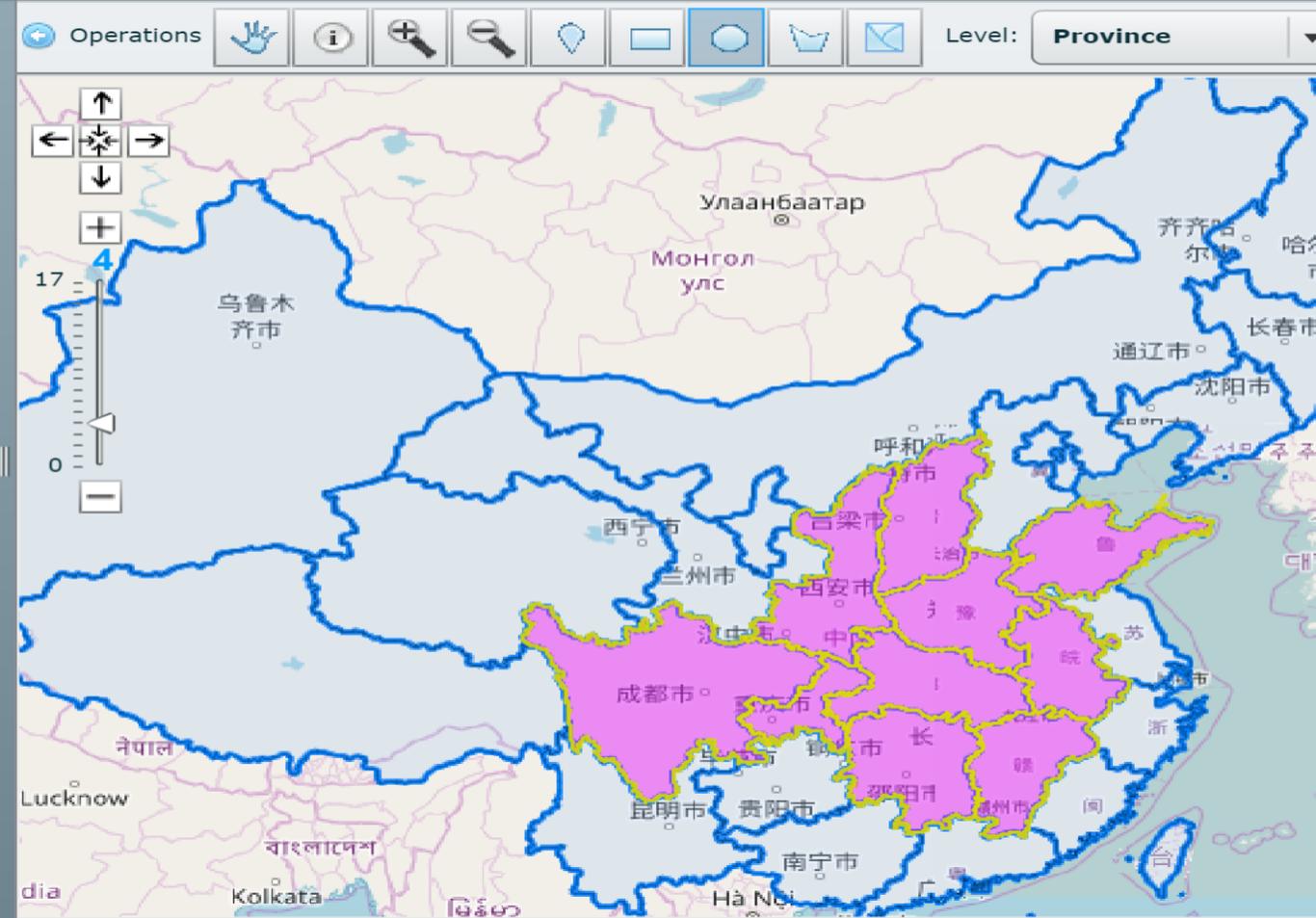
Beijing  
Fujian  
Gansu

[Add](#) | [Add All](#) | [Remove](#) | [clear](#)

Selection

Anhui  
Chongqing  
Henan  
Hubei  
Hunan  
Jiangxi  
Shaanxi

Selection count: 10



# Administrative Units

Administrative Unit | X&Y Location | Chart | Time Series | Establishment | Theme Map | GIS Map Export | China-US Comparison | Map Library | Welcome, UM Asia Library! | 中文 | English | Log out

Base Year:  2000  2010  2000-2010  
Group:  Single group  Multi-groups  
Level:  Province  City  County  Town  Any area

Region | Customized Report | Standard Report | Upload your data

HTML | PDF | CSV | Excel | RTF | ODT

6 index selected

Report type:  Summary Report  Compare Report  Original Report

Find:

- Census 2000
- Economic Census 2008
- COVID-19 Daily Cases
- Economic Census 2018
- Economic Census 2013
- Census 2000
- Economic Census 2008
- Economic Census 2004
- Basic Unit Census 2001
- Industry Census 1995
- Land Cover (sq. km)

Operations | Level: Province

Theme Layer List  
Basic Layer List:  OpenStreetMap,  TianDiTu,  No BaseMap  
Boundary Layer List:  Province Layer,  Prefecture Layer,  County Layer,  Township Layer

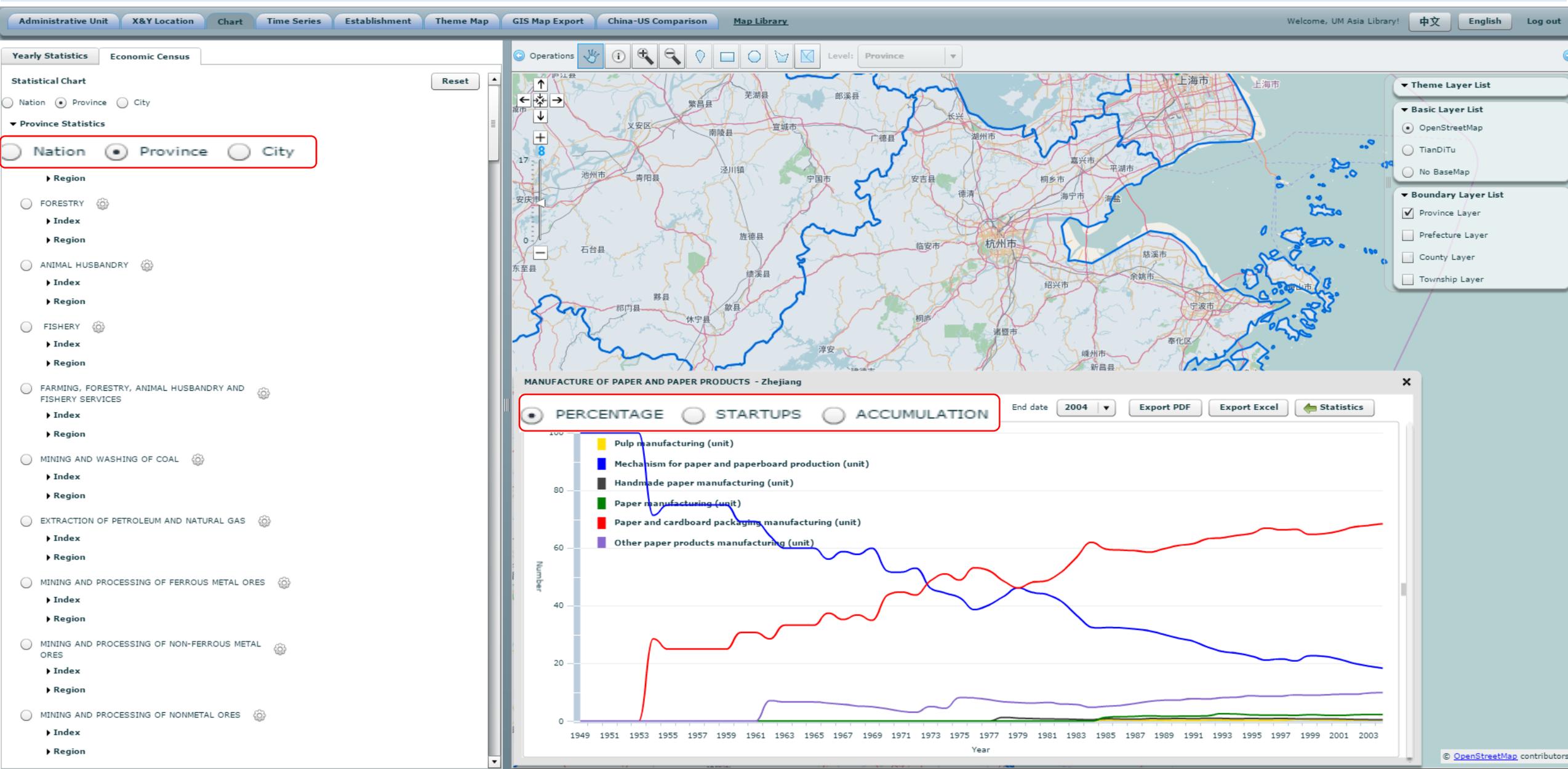
temp\_report (43).xls [Compatibility Mode] - Excel

	Anhui	Beijing	Chongqing	Fujian	Gansu	Guangdong	Guangxi
2000 Total Population							
2000 Urban Population	58,999,948	13,569,194	30,512,763	34,097,947	25,124,282	85,225,007	43,854,538
2000 Rural Population	15,766,389	10,522,464	10,095,512	14,306,812	6,018,417	47,432,392	12,350,296
2008 Number of All Units	43,233,559	3,046,730	20,417,251	19,791,135	19,105,865	37,792,615	31,504,242
2004 Number of All Units	204,959	267,757	139,006	232,466	94,260	617,717	154,443
2001 Total Industrial Units	230,706	262,847	137,536	226,827	135,138	567,862	194,852
2001 Total Industrial Units	177,879	245,599	89,639	155,771	82,817	400,227	121,763

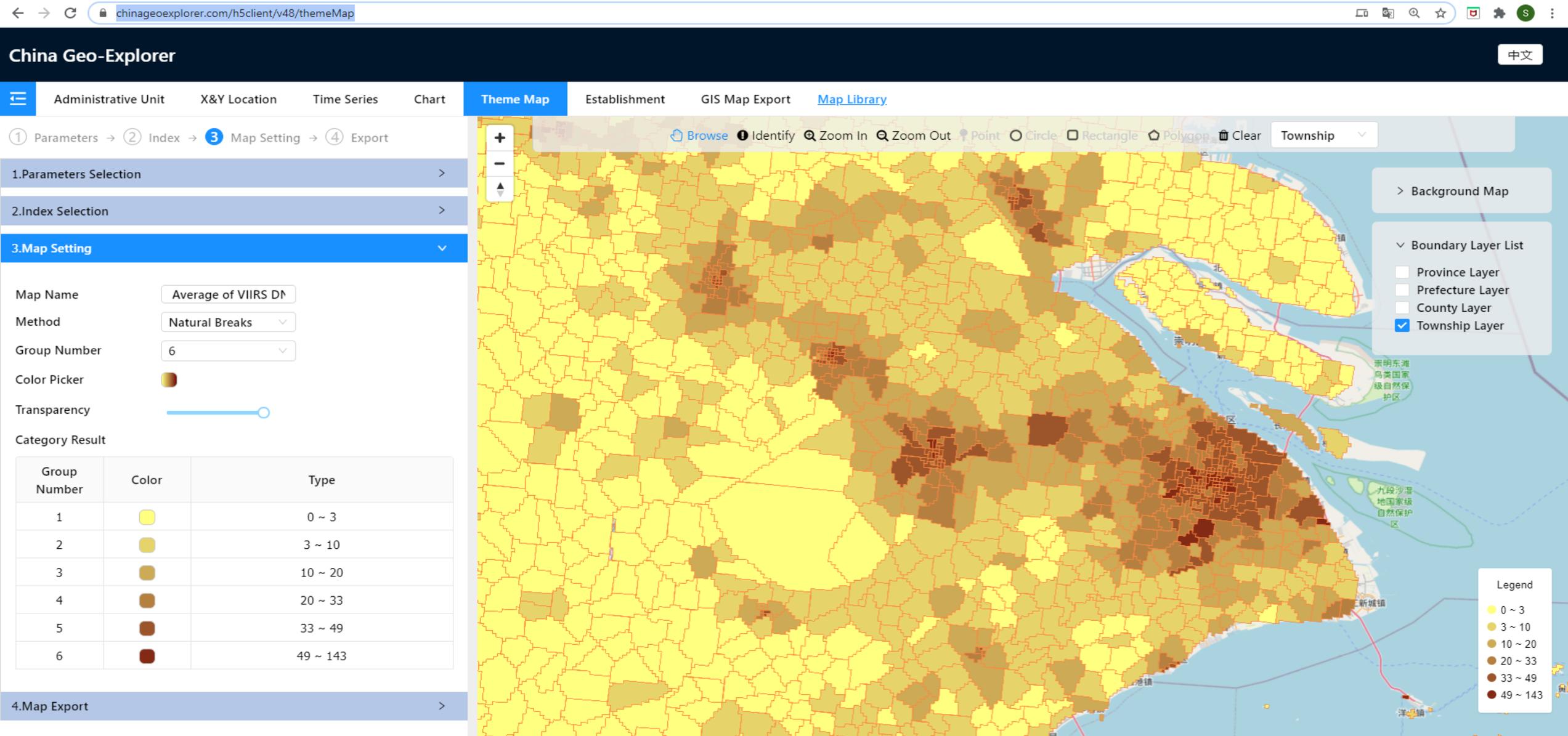
report name



# Charts Analysis (Structural Analysis)

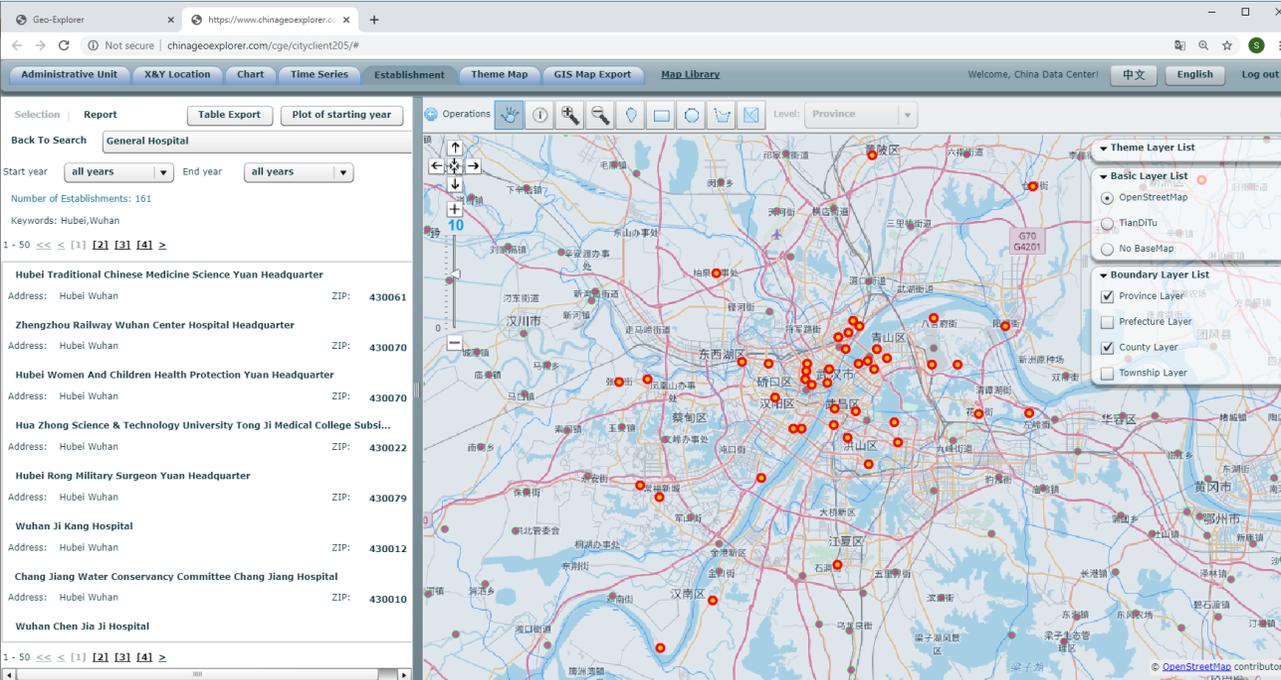


# Nighttime Light Data by Township

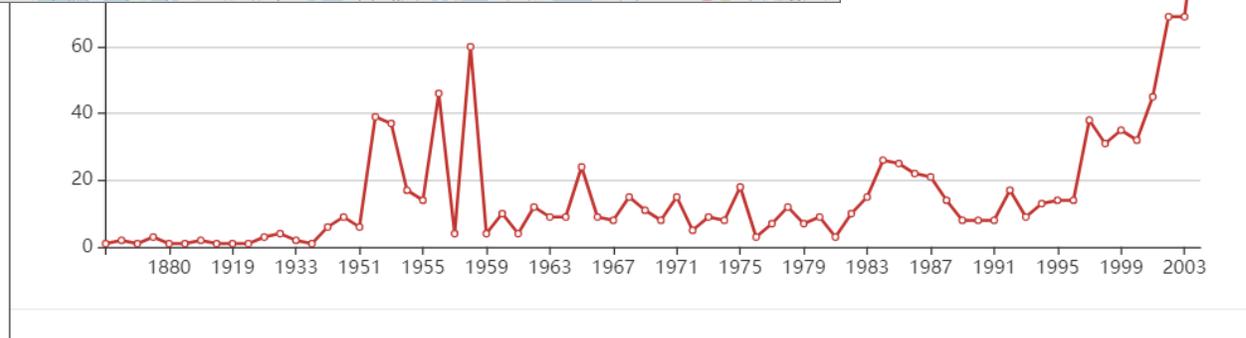


# Hospital Data from Economic Census (2004 & 2008)

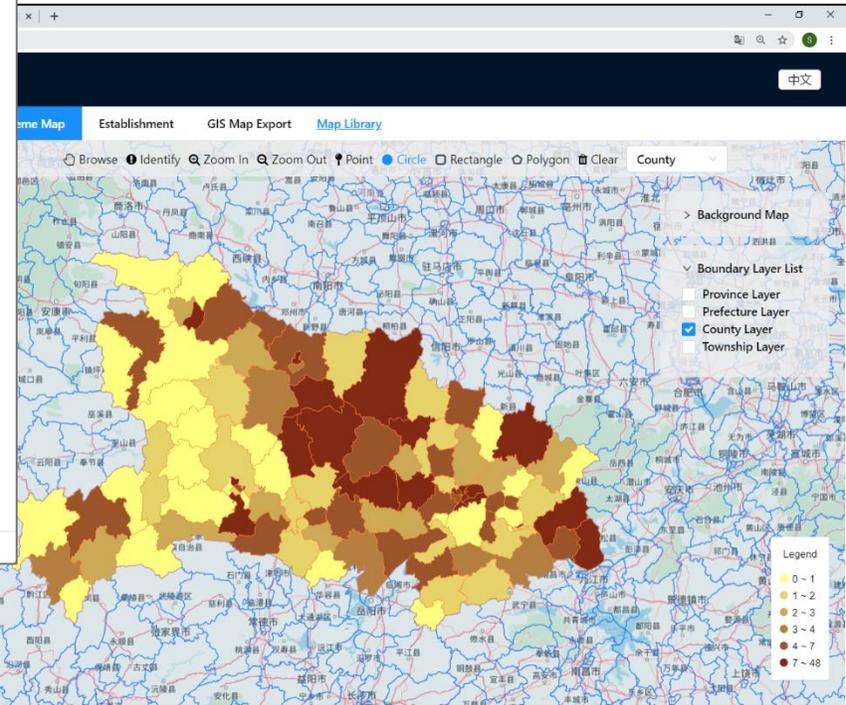
## Locations of general hospitals in Wuhan



## New hospitals by year

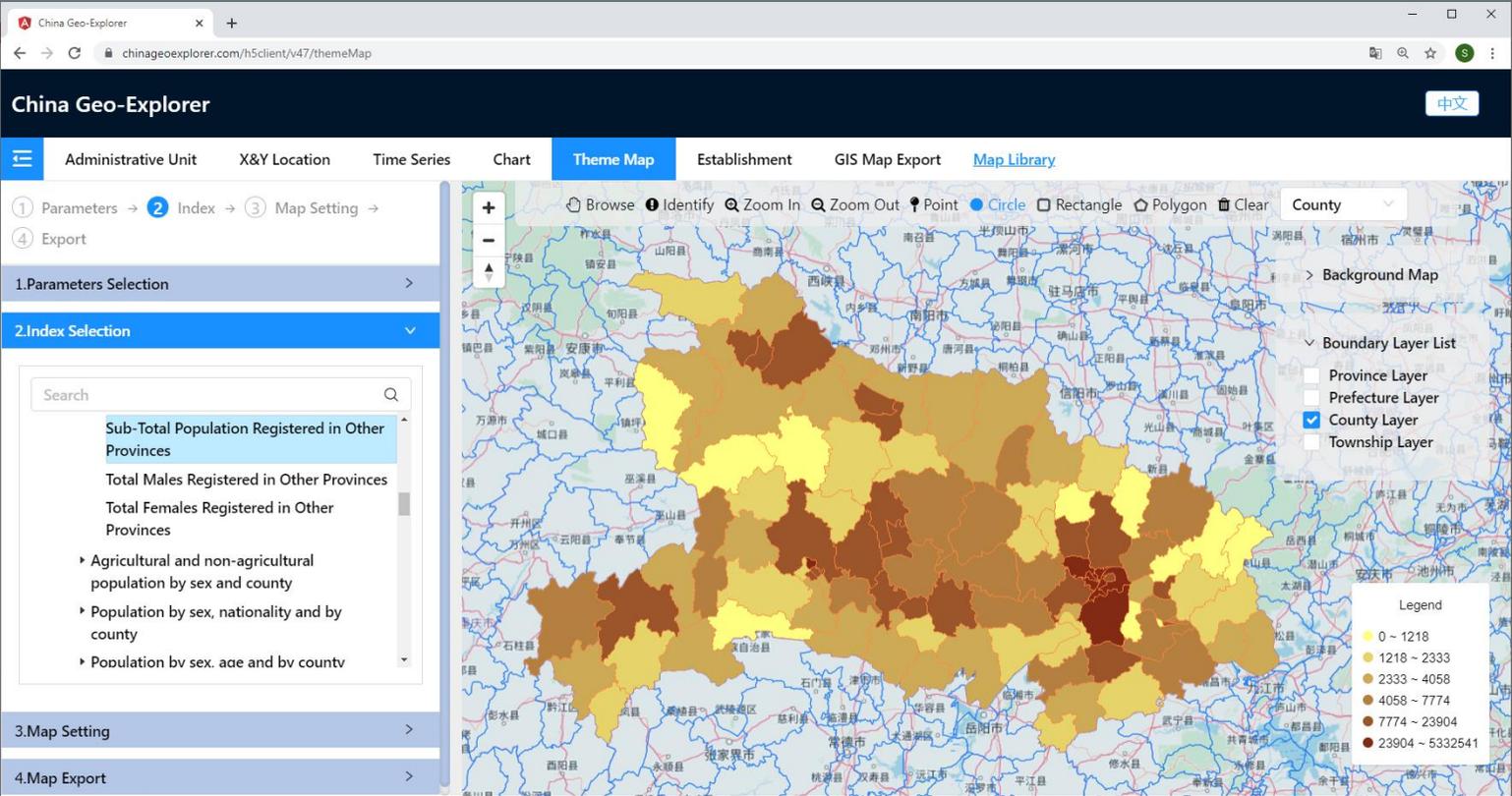


## Hospitals by Counties

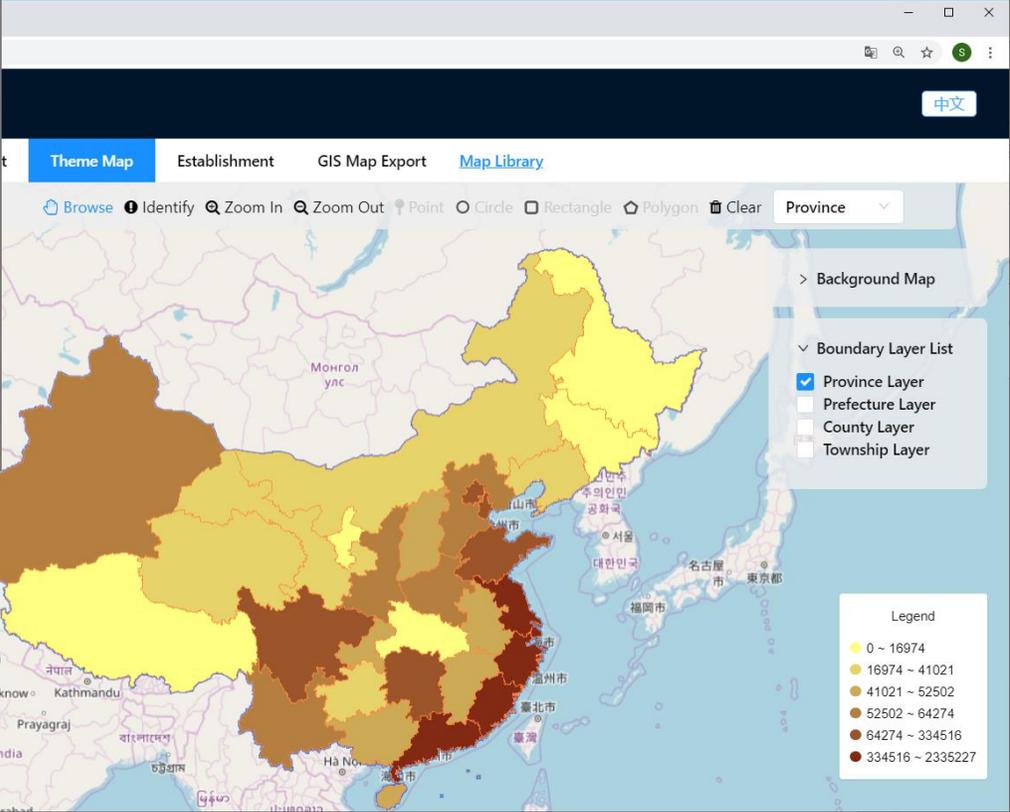


# Migration Data from 2010 Population Census (> 6 ms & < 5 ys)

## Migration from other provinces to Hubei



## Migration from Hubei to other provinces

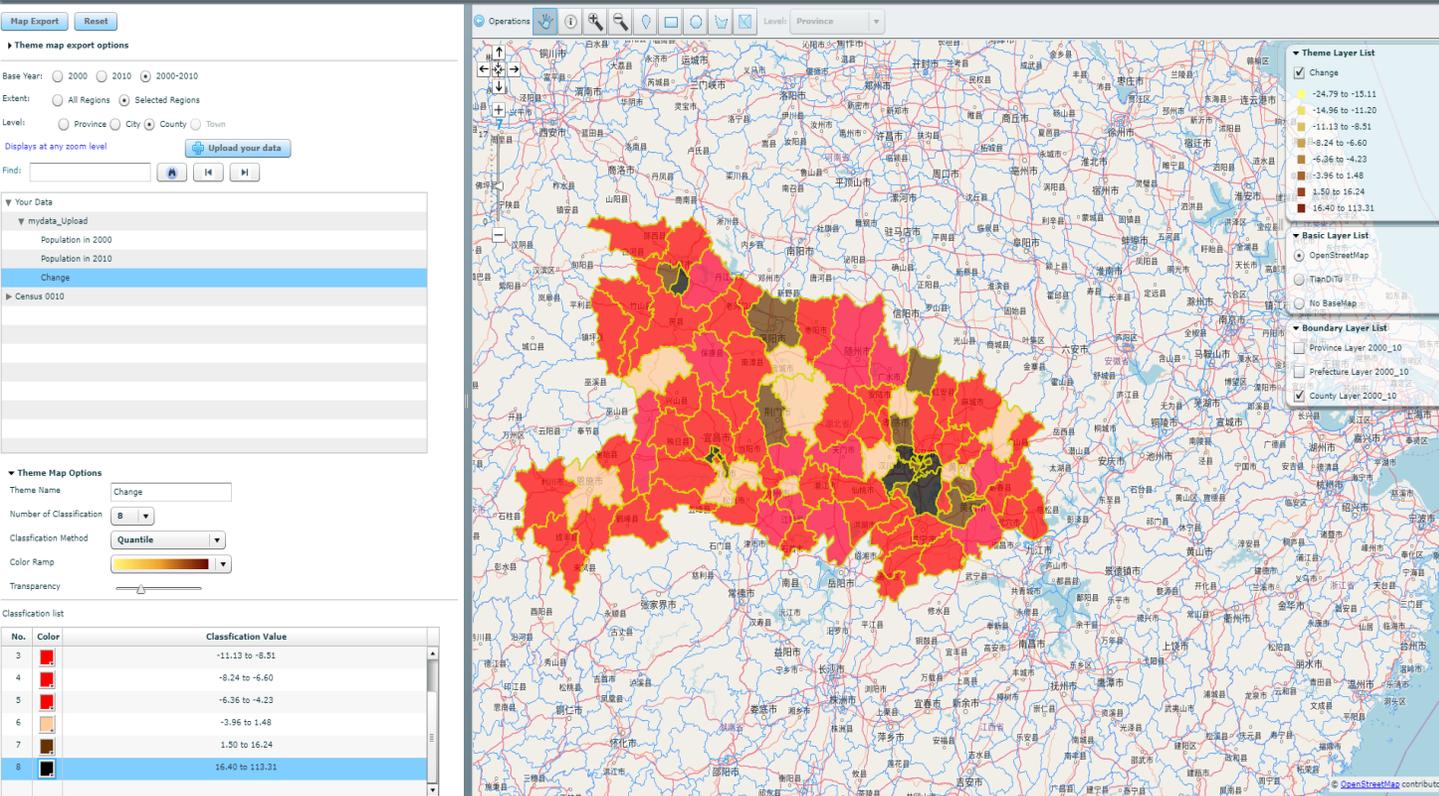


- Total Male from Hubei by Household Registration Places
- Total Female from Hubei by Household Registration Places
- Population from Hunan by Household Registration Places
- Total Male from Hunan by Household Registration Places

- 3.Map Setting
- 4.Map Export

# Population Changes from 2000 to 2010

## Population Changes by County: 2000 - 2010



Variable ID	Variable Name	Variable Description
	English name of Province	
	Four digit code of City in number	
	Chinese name of City	
	English name of City	
	Six digit code of County in number	
	Chinese name of County	
	English name of County	
	Urban Population in 2000	
	Urban Population in 2010	
	Rural Population in 2000	
	Rural Population in 2010	
	Total Number of Households in 2000	
	Total Number of Households in 2010	
	Total Number of Family Households in 2000	
	Total Number of Family Households in 2010	
	Total Number of Collective Households in 2000	
	Total Number of Collective Households in 2010	
	Total Population in 2000	
	Total Population in 2010	
	Total Male in 2000	
	Total Male in 2010	
	Total Female in 2000	
	Total Female in 2010	
	Total Population with Household Registration by County in 2000	
	Total Population with Household Registration by County in 2010	
	Total Population from Different Household Registration Places in 2000	
	Total Population from Different Household Registration Places in 2010	
	Total Population Registered in This County (City) by County in 2000	
	Total Population Registered in This County (City) by County in 2010	
	Total Population Registered in Other Counties or Cities of Same Province in 2000	
	Total Population Registered in Other Counties or Cities of Same Province in 2010	
	Total Population Registered in Other Provinces in 2000	
	Total Population Registered in Other Provinces in 2010	
	Total Agricultural Population in 2000	
	Total Agricultural Population in 2010	
	Total Non-agricultural Population in 2000	
	Total Non-agricultural Population in 2010	

23	A101005_00	2000年男性人口数合计
24	A101005_10	2010年男性人口数合计
25	A101006_00	2000年女性人口数合计
26	A101006_10	2010年女性人口数合计
27	A103001_00	2000年户籍人口数
28	A103001_10	2010年户籍人口数
29	A104001_00	2000年户口登记地在乡镇街道的总人口合计
30	A104001_10	2010年户口登记地在乡镇街道的总人口合计
31	A104004_00	2000年户口登记地在本县(市、区)的人口小计
32	A104004_10	2010年户口登记地在本县(市、区)的人口小计
33	A104007_00	2000年户口登记地在本省其他县(市、区)的人口小计
34	A104007_10	2010年户口登记地在本省其他县(市、区)的人口小计
35	A104010_00	2000年户口登记地在省外的人口小计
36	A104010_10	2010年户口登记地在省外的人口小计
37	A105004_00	2000年农业户口人口小计
38	A105004_10	2010年农业户口人口小计
39	A105007_00	2000年非农业户口人口小计
40	A105007_10	2010年非农业户口人口小计

# Panel Data for Spatial Modeling

Browser tabs: M Inbox (17,603) - sbao@ x | Geo-Explorer x | chinageoexplorer.org/c x | chinageoexplorer.org/r x | 141.211.24.149/SIServe x

Address bar: Not secure | 141.211.24.149/SIServerResearch//tempReport/597336bd-e3a1-4a8e-8835-65619db5d2e9/temp\_report.html

## Time-series Report

Date: 19/08/2018  
 Selection: (4 selected) zhejiang , tianjin ,

### Original Variables

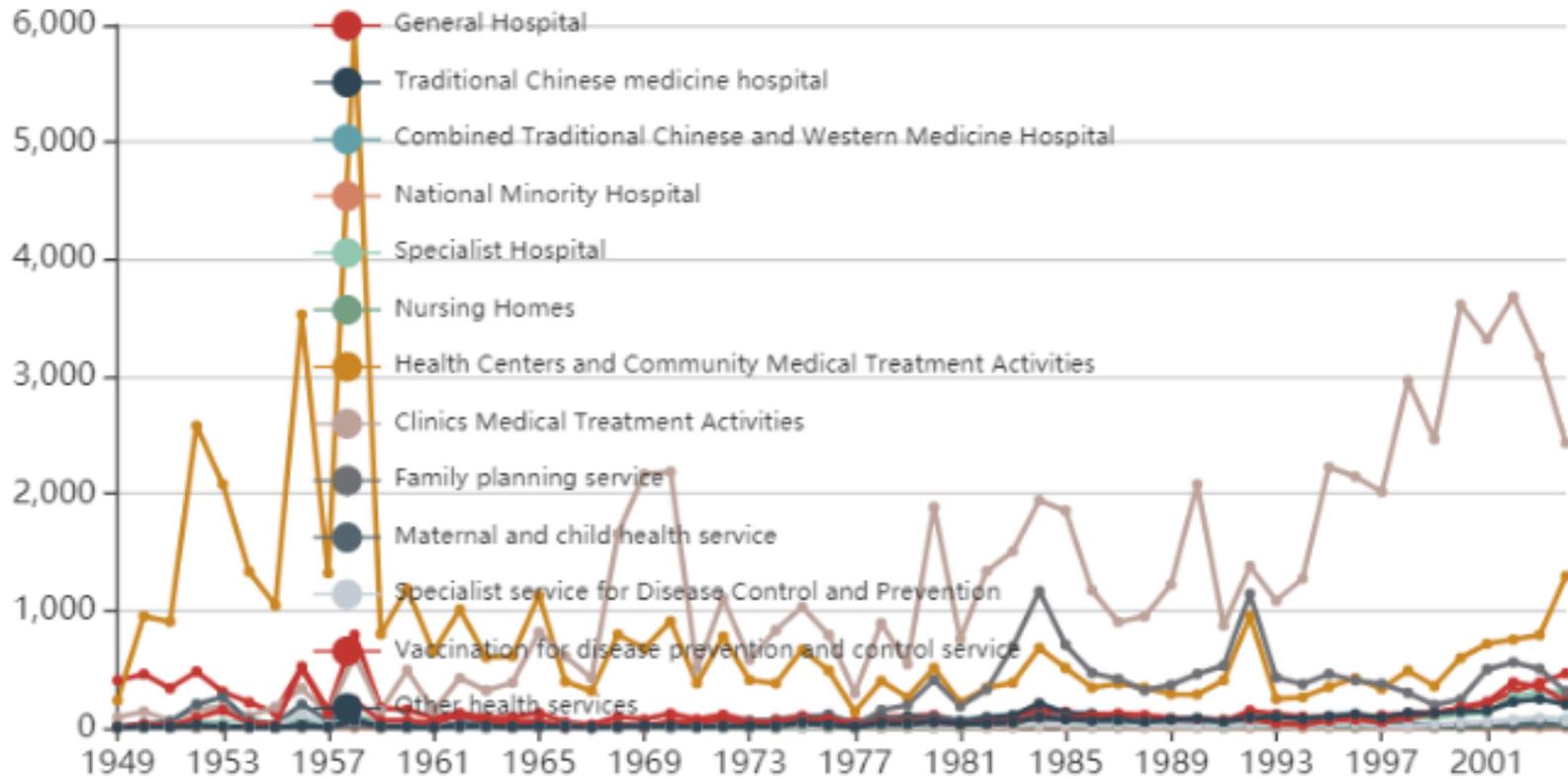
### Spatially Weighted Variables

	name	year	Gross Domestic	Primary Industry	Secondary Industry	Gross Domestic	Primary Industry	Secondary Industry
1	tianjin	2009	7,521.9	128.8	3,987.8	15,159.8	1,324.7	7,640.2
2	tianjin	2010	9,224.5	145.6	4,840.2	18,081.4	1,526.9	9,226.2
3	tianjin	2006	4,344.3	118.2	2,488.3	9,570.7	918.0	4,939.7
4	tianjin	2007	5,050.4	110.2	2,892.5	11,455.6	1,050.3	5,902.5
5	tianjin	2008	6,354.4	122.6	3,821.1	13,626.3	1,241.1	7,117.9
6	tianjin	2011	11,307.3	159.7	5,928.3	21,441.7	1,762.1	10,970.9
7	zhejiang	2010	27,722.3	1,360.6	14,297.9	17,809.7	1,551.2	8,940.6
8	zhejiang	2011	32,318.8	1,583.0	16,555.6	21,163.0	1,798.8	10,653.4
9	zhejiang	2006	15,742.5	925.1	8,509.6	9,421.9	946.0	4,764.4
10	zhejiang	2007	18,780.4	986.0	10,148.5	11,259.4	1,083.4	5,669.9
11	zhejiang	2008	21,486.9	1,095.4	11,580.3	13,348.6	1,287.2	6,812.6
12	zhejiang	2009	22,990.3	1,163.1	11,908.5	14,943.3	1,347.8	7,377.5
13	yunnan	2010	7,224.2	1,108.4	3,223.5	12,753.8	1,372.5	6,304.8
14	yunnan	2011	8,893.1	1,411.0	3,780.3	15,398.3	1,639.1	7,734.8
15	yunnan	2006	3,981.3	749.8	1,712.6	6,481.9	835.0	3,042.2
16	yunnan	2007	4,741.3	837.4	2,051.1	7,801.2	985.9	3,683.3
17	yunnan	2008	5,700.1	1,020.9	2,451.1	9,276.7	1,187.1	4,471.8
18	yunnan	2009	6,169.8	1,067.6	2,582.5	10,583.4	1,190.0	5,030.8
19	xinjiang	2008	4,203.4	691.1	2,086.7	678.7	83.0	322.6
20	xinjiang	2006	3,045.3	527.8	1,459.3	465.3	60.3	205.6
21	xinjiang	2007	3,523.2	628.7	1,647.5	562.9	69.2	258.1
22	xinjiang	2009	4,277.1	759.7	1,929.6	761.3	85.6	356.0
23	xinjiang	2010	5,437.5	1,078.6	2,592.2	929.0	101.8	454.3
24	xinjiang	2011	6,610.1	1,139.0	3,225.9	1,138.1	114.8	592.0

# Policy Impacts on Health Care

PERCENTAGE  STARTUPS  ACCUMULATION

Start Date  End Date  [EXPORT PDF](#) [EXPORT EXCEL](#)



## Statistics

### General Hospital

Average: 167.83928571428572

Variance: 21525.884885204086

Standard Deviation:

146.71702316092734

### Traditional Chinese medicine hospital

Average: 38.625

Variance: 1664.734375

Standard Deviation: 40.80115653998058

### Combined Traditional Chinese and Western Medicine Hospital

# Resources for COVID-19 Research

## Resources for COVID-19 and Global Research

<https://projects.iq.harvard.edu/chinadatalab/resources-covid-19>

**Goal:** to provide an information infrastructure for the global study of novel coronavirus (COVID-19)

### Objectives:

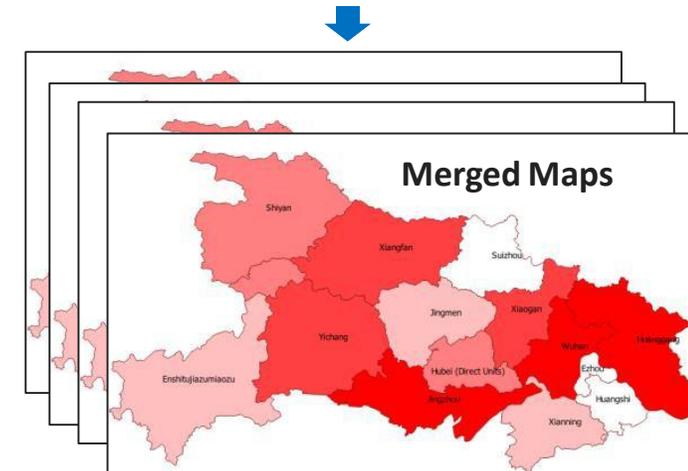
- ◆ To establish a **permanent collection** for the COVID-19 study at local, regional and global levels with information collected and integrated from different sources
- ◆ To facilitate the quantitative research on spatial spread and impacts of COVID-19 study with advanced **methodology and technology**
- ◆ To promote collaborative research in the COVID-19 study with the **cloud platform**
- ◆ To promote the use and sharing of data sources in **teaching and research** with DataVerse/WorldMap/CDL
- ◆ To build the **capacity** for future collaborative projects

# Data Collections

ID	Data Sets
1	Coronavirus cases
2	Population mobility
3	Health facilities
4	Traces
5	Flights
6	High-speed train
7	Global News
8	Social media
9	Policies
10	Meteorological data
11	Air Quality
12	Socioeconomic Data



ID	GBProv	Prov_CN	Prov_EN	GBCity	City_CN	City_EN	Heal2/1/2020	Dead_2/1/2020	Heal2/4/2020	Dead_2/4/2020	
173	42	湖北	Hubei	4203	武汉市	Wuhan	NA	313	803	NA	362
174	42	湖北	Hubei	4202	黄石市	Huangshi	NA	2	568	NA	2
175	42	湖北	Hubei	4201	十堰市	Shiyan	NA	0	118	NA	8
176	42	湖北	Hubei	4205	宜昌市	Yichang	NA	8	496	NA	8
177	42	湖北	Hubei	4206	襄阳市	Xiangfan	NA	1	778	NA	2
178	42	湖北	Hubei	4207	鄂州市	Ezhou	NA	38	367	NA	38
179	42	湖北	Hubei	4208	荆门市	Jingmen	NA	14	522	NA	18
180	42	湖北	Hubei	4209	孝感市	Xiaogan	NA	22	342	NA	18
181	42	湖北	Hubei	4210	黄冈市	Huangang	NA	19	545	NA	23
182	42	湖北	Hubei	4211	鄂州市	Ezhou	NA	0	48	NA	0
183	42	湖北	Hubei	4212	黄冈市	Huangang	NA	7	711	NA	8
184	42	湖北	Hubei	4213	黄冈市	Huangang	NA	0	68	NA	0
185	42	湖北	Hubei	4214	黄冈市	Huangang	NA	0	76	NA	8
186	42	湖北	Hubei	4215	黄冈市	Huangang	NA	0	118	NA	8
187	43	湖南	Hunan	4301	长沙市	Changsha	NA	NA	NA	NA	NA
188	43	湖南	Hunan	4302	长沙市	Changsha	2	164	0	0	0
189	43	湖南	Hunan	4303	株洲市	Zhuzhou	1	38	2	2	2
190	43	湖南	Hunan	4304	衡阳市	Hengyang	3	23	4	4	4
191	43	湖南	Hunan	4305	衡阳市	Hengyang	4	38	5	5	5
192	43	湖南	Hunan	4306	邵阳市	Shaoyang	1	68	2	2	2
193	43	湖南	Hunan	4307	邵阳市	Shaoyang	3	68	2	2	2
194	43	湖南	Hunan	4308	常德市	Changde	0	36	0	0	0
195	43	湖南	Hunan	4309	岳阳市	Yueyang	1	68	1	1	1
196	43	湖南	Hunan	4310	岳阳市	Yueyang	1	68	1	1	1



# COVID-19 Cases

**Data Source:** Ding Xiang Yuan: <https://github.com/BlankerL/DXY-COVID-19-Data>

**Base Maps:** China Data Institute, comparable 2000-2010 maps by province and prefecture city

<https://chinadatecenter.net/Data/ServiceContent.aspx?id=1623>

**Download:** Harvard DataVerse: "China COVID-19 Daily Cases with Basemap", <https://doi.org/10.7910/DVN/MR5IJN>

**Formats:** rar, zip, tab (txt)

## Index:

- New cases
- Accumulated cases
- New deaths
- Accumulated deaths
- New recoveries
- Accumulated recoveries
- Imported cases

## Base Data:

GB code of Province	Total Population with Local Household Registration (exclude those whole family going out ) in 2000
Total Number of Households in 2000	Total Population with Local Household Registration (exclude those whole family going out ) in 2010
Total Number of Households in 2010	Total Population Moved in from Other Townships of the Same County (City) in 2000
Total Number of Family Households in 2000	Total Population Moved in from Other Townships of the Same County (City) in 2010
Total Number of Family Households in 2010	Total Population Moved in from Other Counties or Cities of the Same Province in 2000
Total Number of Collective Households in 2000	Total Population Moved in from Other Counties or Cities of the Same Province in 2010
Total Number of Collective Households in 2010	Total Population Moved in from Other Provinces in 2000
Total Population in 2000	Total Population Moved in from Other Provinces in 2010
Total Population in 2010	Total Agricultural Population in 2000
Total Males in 2000	Total Agricultural Population in 2010
Total Males in 2010	Total Non-agricultural Population in 2000
Total Females in 2000	Total Non-agricultural Population in 2010
Total Females in 2010	

# Population Mobility Data

**Data Source:** Baidu, <https://qianxi.baidu.com/>

**Base Map:** 2000-2010 Prefecture City Maps, <https://chinadatacenter.net/Data/ServiceContent.aspx?id=1623>

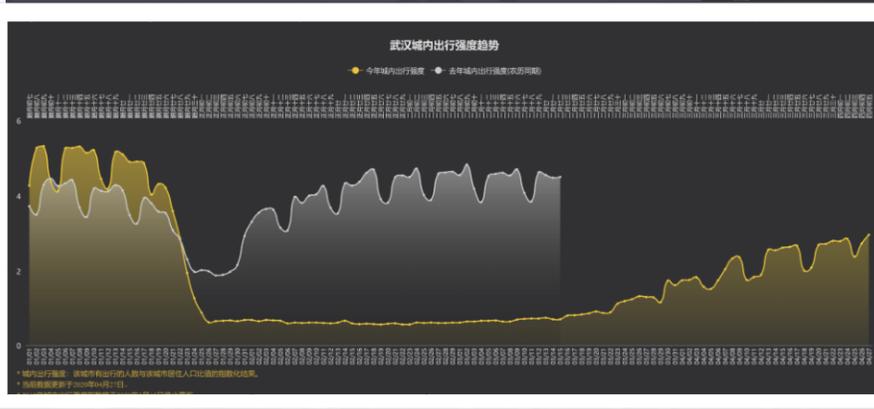
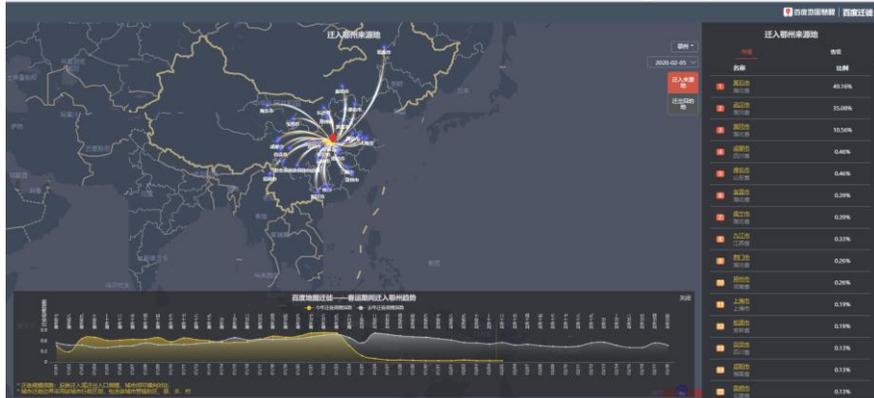
**Download:** Harvard DataVerse 每日人口迁徙数据表 "Baidu Mobility Data", <https://doi.org/10.7910/DVN/FAEZIO>

**Format:** tab (txt)

**Index:** (1) % population flow from other provinces and cities (top100)

(2) % population flow to other provinces and cities (top100)

(3) The scales of population flow (in and out)



mobility.xlsx - Excel

地区	北京市	天津市	河北	山西	内蒙古	辽宁	吉林	黑龙江	上海市	江苏	浙江	安徽	福建	江西	山东	河南	
北京市		17.46	41.12	11.05	9.59	9.71	6.82	9.61	2.2	1.91	1.82	2.28	2.93	1.48	8.49	6.82	
天津市	7.79		17.51	3.35	3.01	3.87	3.1	5.27	0.55	0.71	0.54	0.8	1.08	0.38	5.27	2.05	
河北																	
山西																	
内蒙古																	
辽宁																	
吉林																	
黑龙江																	
上海市	1.62	0.83	0.58	1.41	0.75	2.3	1.79	2.18		28.36	22.4	9.73	5.41	4.22	3.08	3.78	
江苏																	
浙江																	
安徽																	
福建																	
江西																	
山东																	
河南																	
湖北																	
湖南																	
广东																	
广西																	

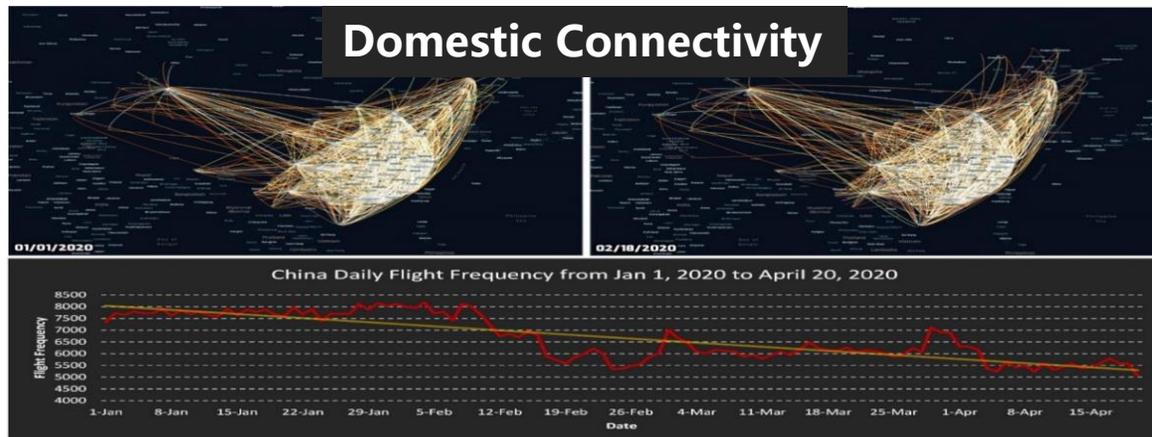
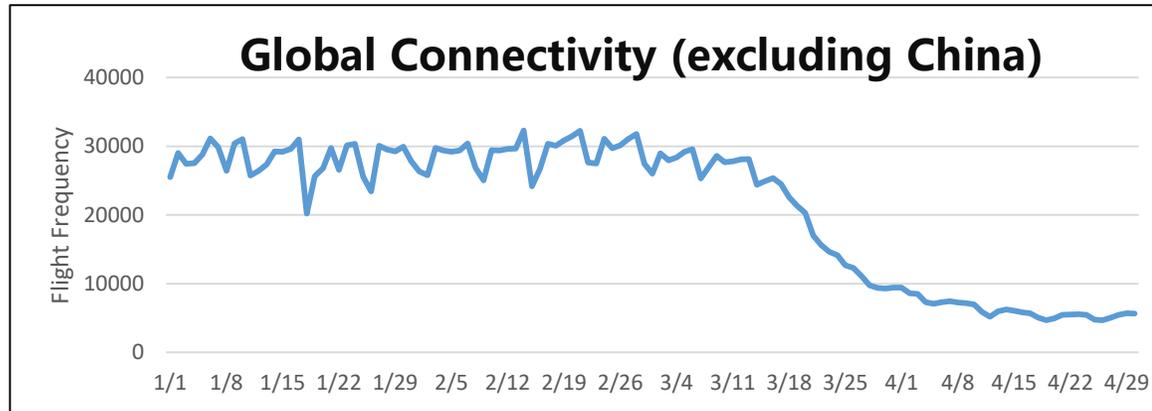
baidu\_in\_20200101

# Flight Data

## Data Sources:

- China Flights: VariFlight ADS-B (Automatic Dependent Surveillance - Broadcast) (<https://flightadsb.variflight.com/>)
- International Flights: OpenFlights (<https://openflights.org/data.html>)

Format: xlsx, csv



## Index

- Actual arrival time
- Actual departure time
- Aircraft code
- Time zone of arrival
- Estimated arrival time
- Estimated departure time
- Arrival airport code
- Chinese name of arrival airport
- English name of arrival airport
- Flight status code
- Flight 2-digits number
- Flight 3-digits number
- Departure airport code
- Departure airport Chinese
- Departure airport English
- Flight code
- Departure time zone
- Planned arrival time

# Meteorological and Weather Data

## Data Sources:

- Air Quality Data: <https://quotsoft.net/air/>
- Meteorological data: <ftp://ftp.ncdc.noaa.gov/pub/data/noaa/isd-lite>
- Climate Data: <https://www7.ncdc.noaa.gov/CDO/cdo>

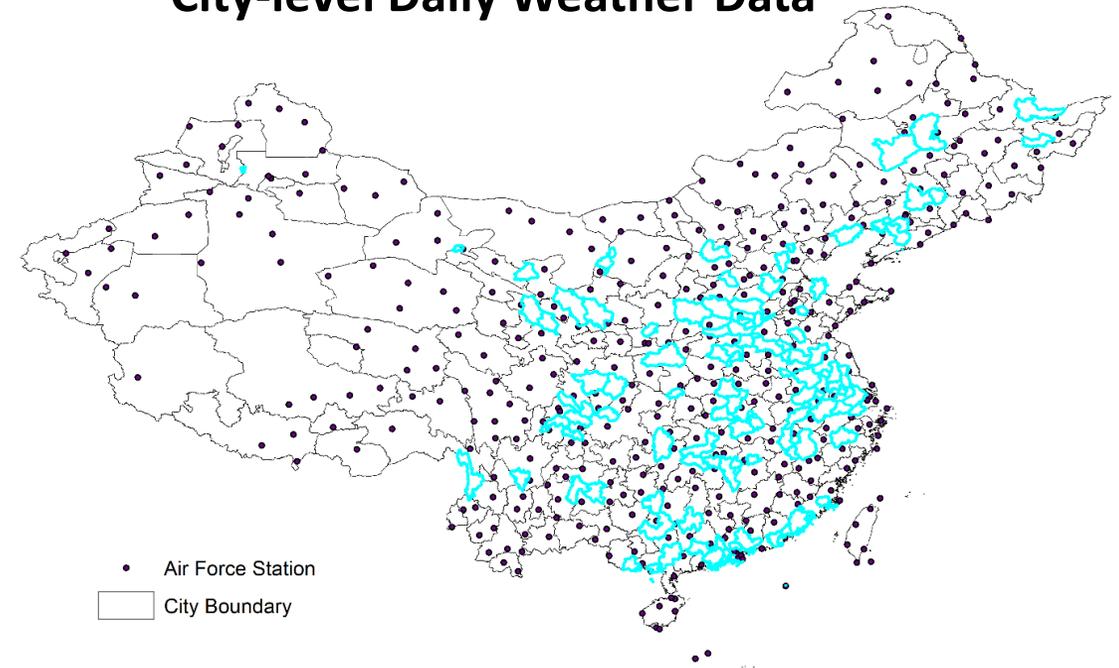
**Download:** Harvard DataVerse: <https://doi.org/10.7910/DVN/XETLSS>

**Format:** xlsx

## Climate Data

Variable Name	Description	Unit
CO	content of carbon monoxide in the air	mg/m <sup>3</sup>
SO <sub>2</sub>	content of sulfur dioxide in the air	μg/m <sup>3</sup>
NO <sub>2</sub>	content of nitrogen dioxide in the air	μg/m <sup>3</sup>
O <sub>3</sub>	content of ozone in the air	μg/m <sup>3</sup>
PM <sub>2.5</sub>	suspended particulates smaller than 2.5μm	μg/m <sup>3</sup>
PM <sub>10</sub>	suspended particulates smaller than 10 μm	μg/m <sup>3</sup>

## City-level Daily Weather Data



# Global News

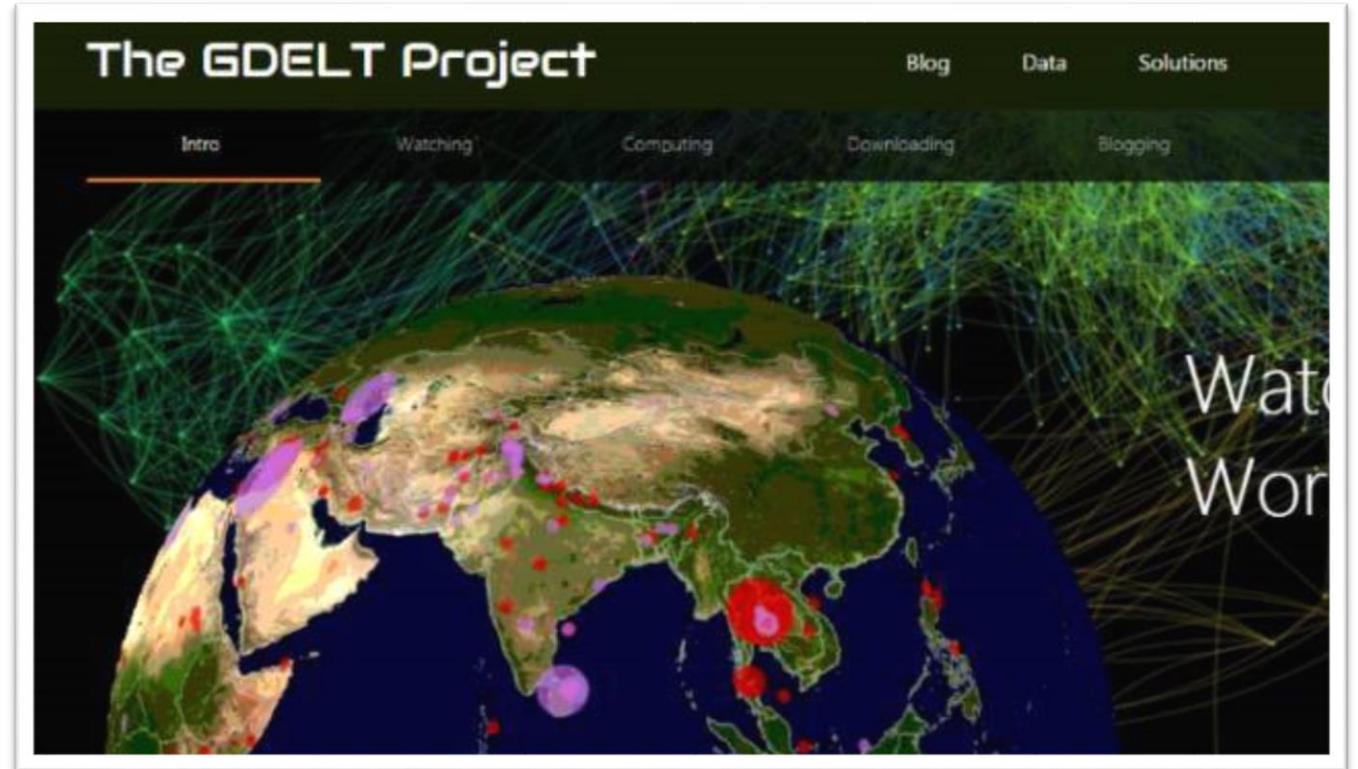
- **Source:** Google
- **Data:** <https://www.gdeltproject.org>
- **Format:** json
- **Category:** Media

## Index:

- Date
- Website
- Actor
- Event
- Tone
- Title
- Person
- Image
- Theme
- Country
- Geo
- ...

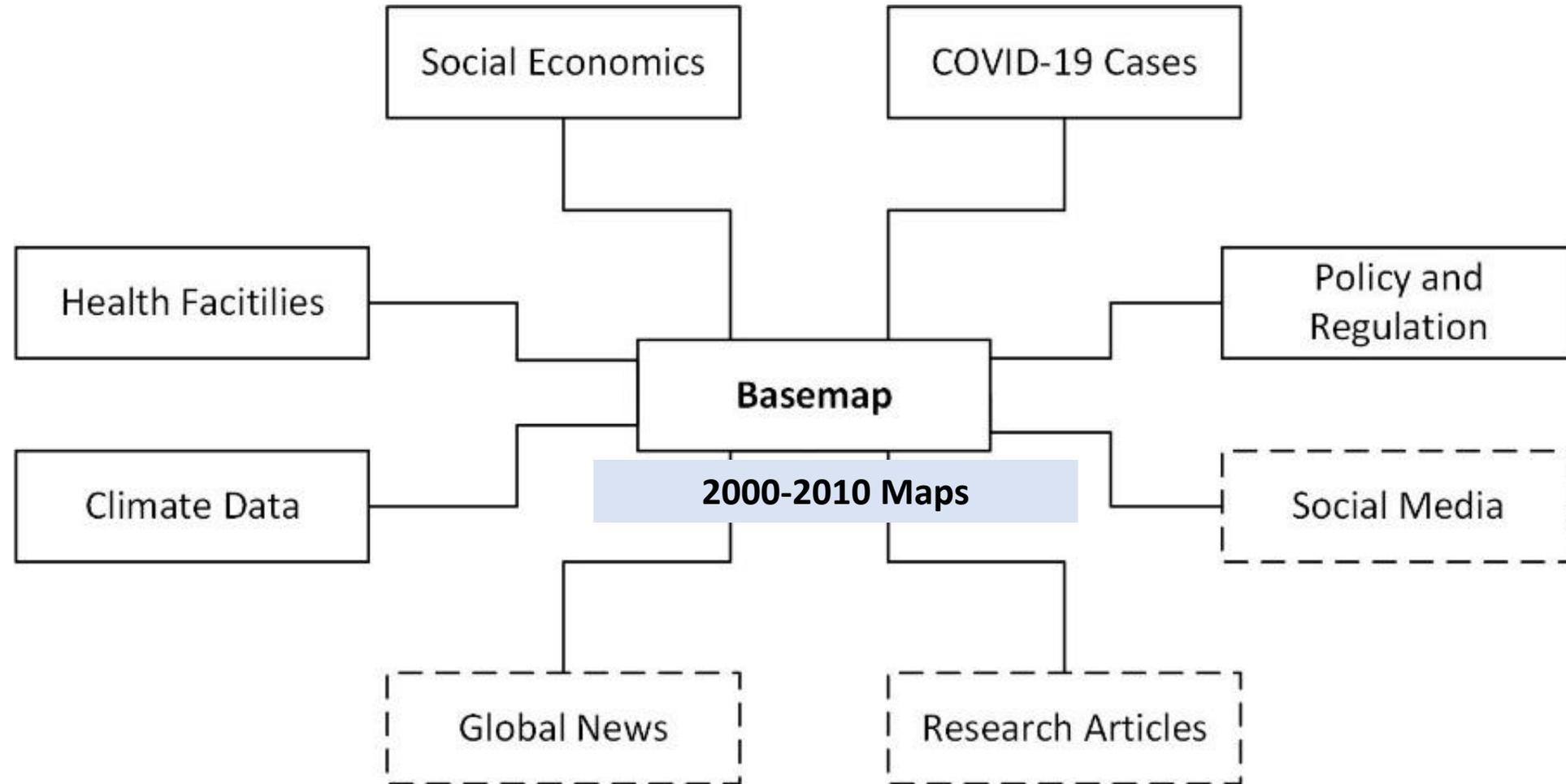
## Derivable Index:

- Policy index
- Emotion index
- Association index



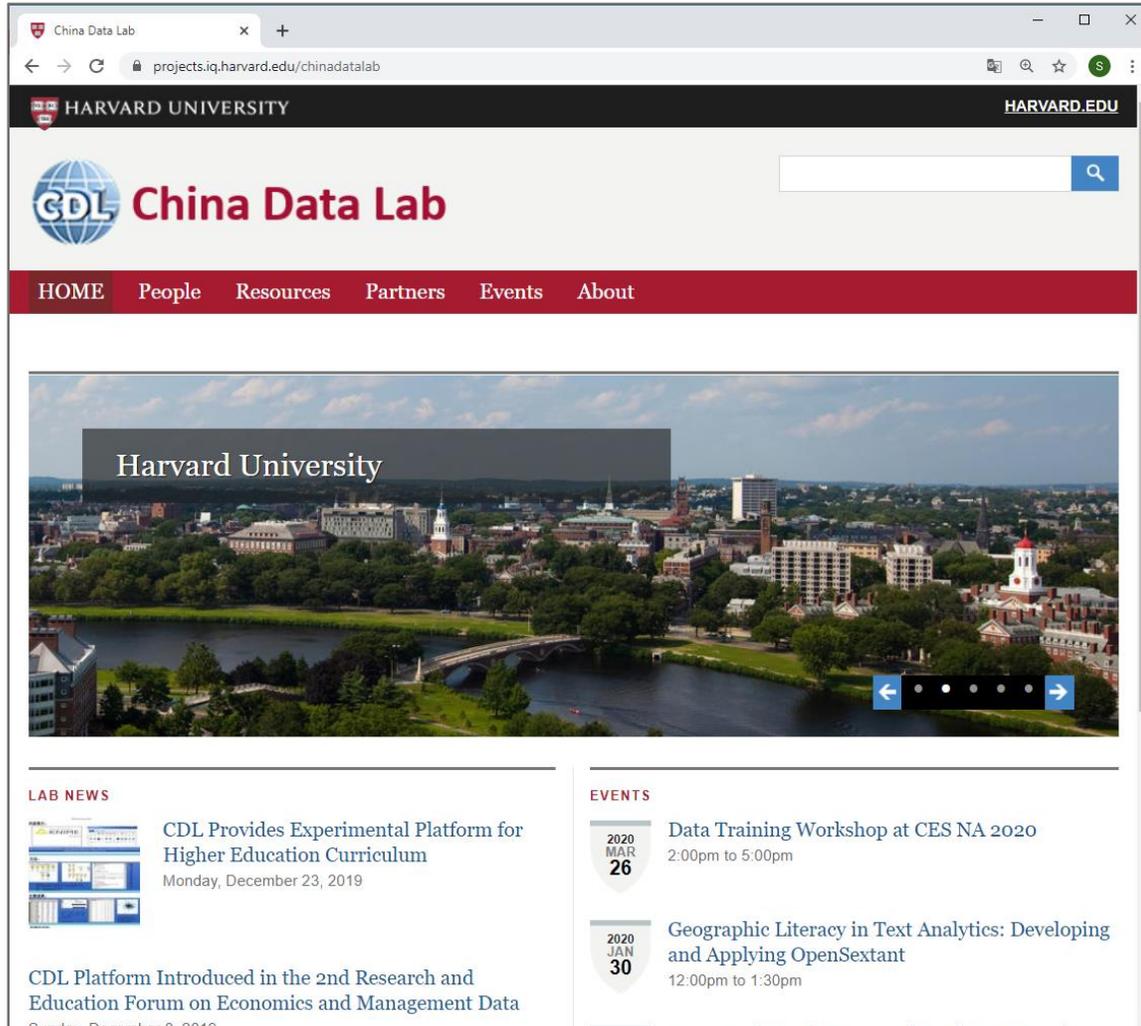
The GDELT Project monitors the world's broadcast, print, and web news from nearly every corner of every country in over **100** languages and identifies the people, locations, organizations, themes, sources, emotions, counts, quotes, images and events driving our global society every second of every day, creating a free open platform for computing on the entire world

# Data Integration

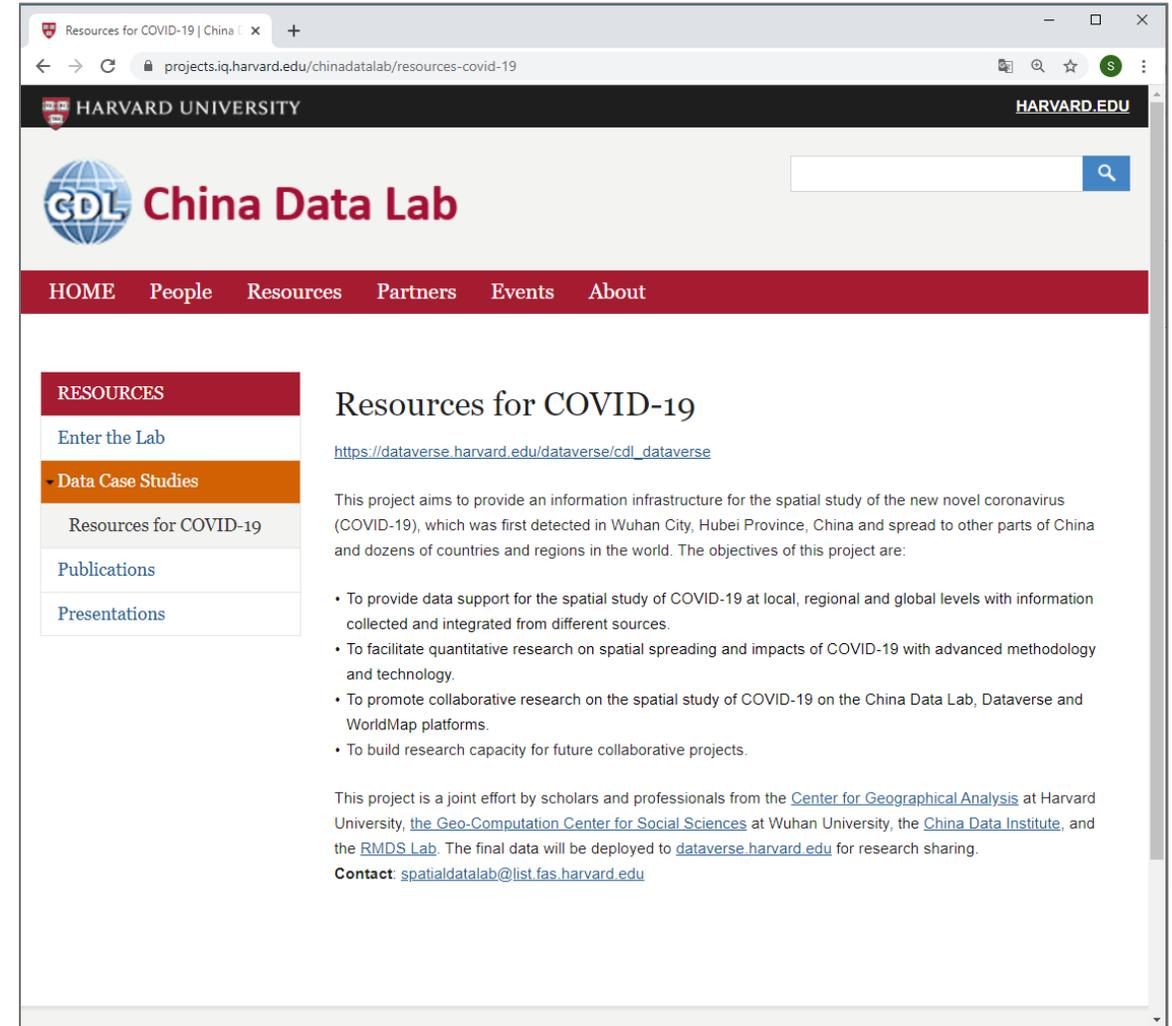


# Resources Center for COVID-19

<http://chinadatalab.net>



The screenshot shows the main homepage of the China Data Lab. At the top, there is a navigation bar with 'HARVARD UNIVERSITY' and 'HARVARD.EDU' on the left and right, and a search bar in the center. Below this is the 'CDL China Data Lab' logo. A red navigation bar contains the links: HOME, People, Resources, Partners, Events, and About. The main content area features a large image of Harvard University with the text 'Harvard University' overlaid. Below the image are two columns of content: 'LAB NEWS' and 'EVENTS'. The 'LAB NEWS' section includes a news item titled 'CDL Provides Experimental Platform for Higher Education Curriculum' dated Monday, December 23, 2019. The 'EVENTS' section lists two upcoming events: 'Data Training Workshop at CES NA 2020' on March 26, 2020, from 2:00pm to 5:00pm, and 'Geographic Literacy in Text Analytics: Developing and Applying OpenSextant' on January 30, 2020, from 12:00pm to 1:30pm.



The screenshot shows the 'Resources for COVID-19' page. The layout is similar to the homepage, with a navigation bar and a search bar. The main content area is titled 'Resources for COVID-19' and includes a sub-section 'RESOURCES' with a list of links: 'Enter the Lab', 'Data Case Studies', 'Resources for COVID-19', 'Publications', and 'Presentations'. The 'Data Case Studies' link is highlighted. Below the list is a paragraph of text: 'This project aims to provide an information infrastructure for the spatial study of the new novel coronavirus (COVID-19), which was first detected in Wuhan City, Hubei Province, China and spread to other parts of China and dozens of countries and regions in the world. The objectives of this project are:'. This is followed by a bulleted list of objectives: 'To provide data support for the spatial study of COVID-19 at local, regional and global levels with information collected and integrated from different sources.', 'To facilitate quantitative research on spatial spreading and impacts of COVID-19 with advanced methodology and technology.', 'To promote collaborative research on the spatial study of COVID-19 on the China Data Lab, Dataverse and WorldMap platforms.', and 'To build research capacity for future collaborative projects.'. At the bottom, there is a paragraph stating: 'This project is a joint effort by scholars and professionals from the Center for Geographical Analysis at Harvard University, the Geo-Computation Center for Social Sciences at Wuhan University, the China Data Institute, and the RMDs Lab. The final data will be deployed to dataverse.harvard.edu for research sharing.' and a contact email: 'Contact: [spatialdatalab@list.fas.harvard.edu](mailto:spatialdatalab@list.fas.harvard.edu)'.

# Data Deployment and Sharing

<https://dataverse.harvard.edu/dataverse/2019ncov>



## The Dataverse Project

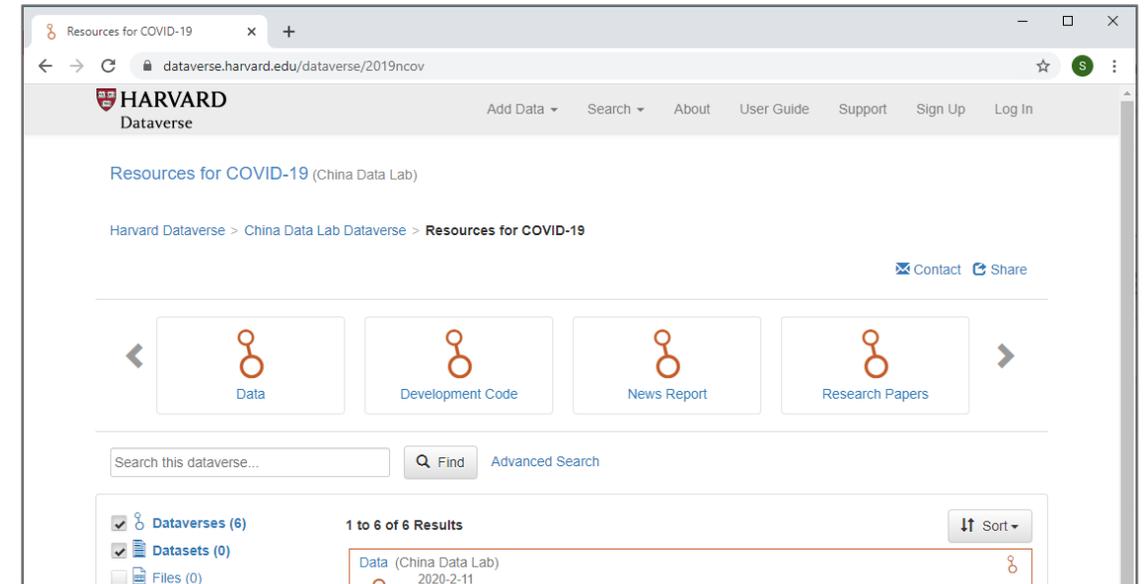
### Open source research data repository software

Enjoy full control over your data. Receive *web visibility, academic credit, and increased citation counts*. A personal dataverse is easy to set up, allows you to display your data on your personal website, can be branded uniquely as your research program, makes your data more discoverable to the research community, and satisfies data management plans. [Want to set up your personal dataverse?](#)

Researchers

Seamlessly manage the submission, review, and publication of data associated with published articles. Establish an *unbreakable link* between *articles in your journal* and *associated data*. Participate in the open data movement by using Dataverse as part of your journal data policy or list

Journals



Resources for COVID-19

dataverse.harvard.edu/dataverse/2019ncov

HARVARD Dataverse

Add Data Search About User Guide Support Sign Up Log In

Resources for COVID-19 (China Data Lab)

Harvard Dataverse > China Data Lab Dataverse > Resources for COVID-19

Contact Share

Data Development Code News Report Research Papers

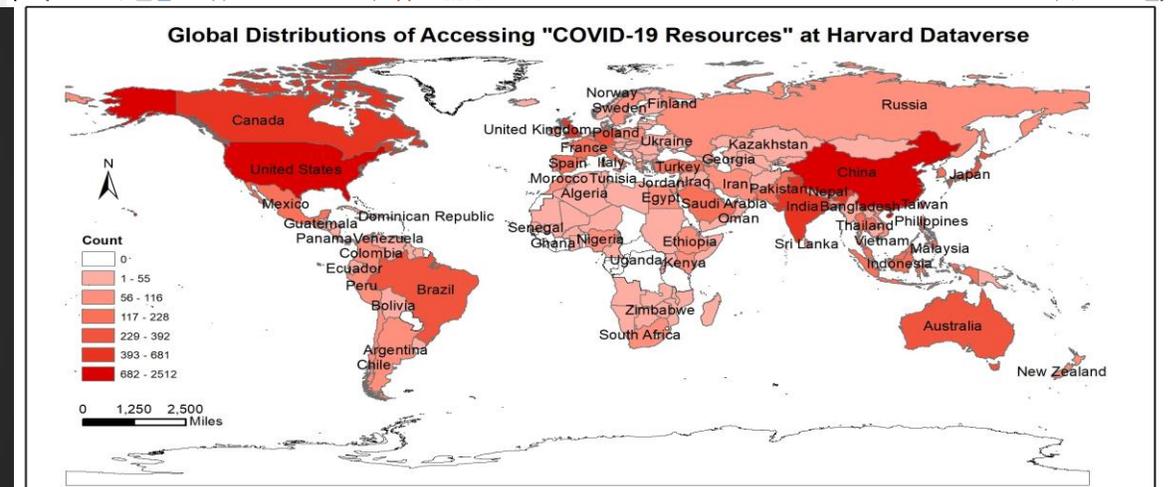
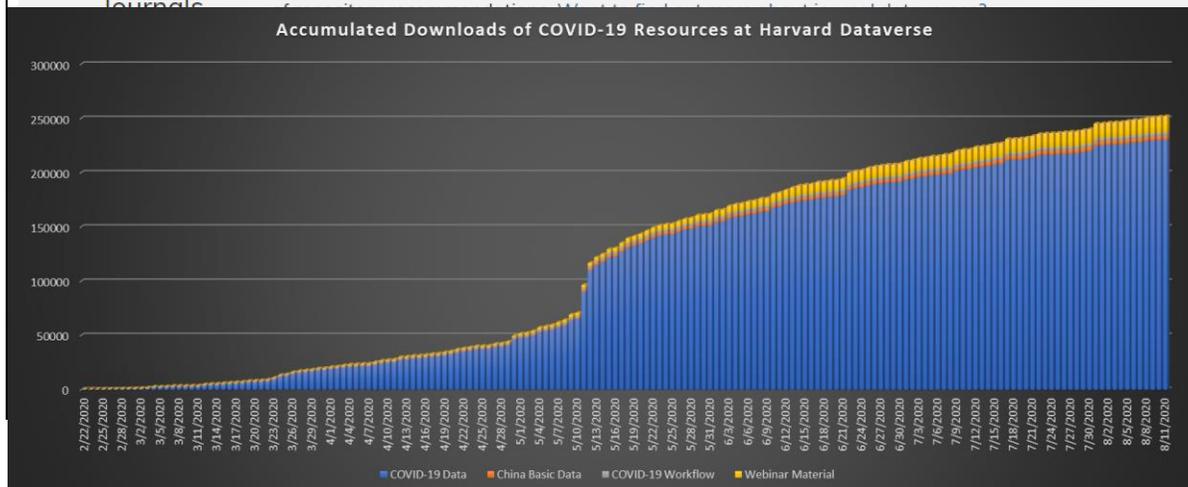
Search this dataverse... Find Advanced Search

Dataverses (6) 1 to 6 of 6 Results Sort

Datasets (0)

Files (0)

Data (China Data Lab) 2020-2-11





# Summary and Discussions

- **Base data**
- **Curated data**
- **Derived data**
- **Data puzzle**
- **Data training**

# PLANS: WORKFLOWS FOR COVID-19 MODELING

COVID-19 Data + Spatial Data + Statistical Analysis + Statistical Graphs + Spatial Stats  
+ Covid-19 Modeling + Visualization and Outputs

KNIME

Read data from R ncov2019

Pivot table - 0:99 - Pivoting (Data Pivoting)

File Hilite Navigation View

Table "default" - Rows: 34 Spec - Columns: 191

Row ID	S province	I 2020-...	I 2020
Row0	上海	1	6
Row1	云南	0	1
Row2	内蒙古	?	?

Transposed Table - 0:17 - Transpose (transpose)

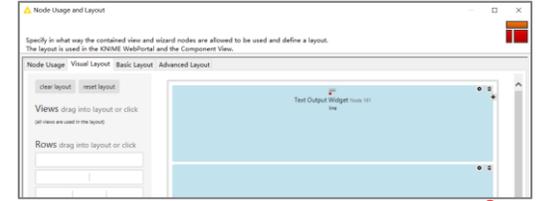
File Hilite Navigation View

Table "default" - Rows: 191 Spec - Columns: 34 Properties

Row ID	? Row0	? Row1	? Row2	
province	上海	云南	内蒙古	北
2020-01-20	1	0	?	5
2020-01-21	6	1	?	16
2020-01-22	16	?	?	14

Expression

```
1 log($$CURRENT_COLUMN$$)
```



Read data from R package ncov2019

```
R Script
1 # call more functions
2 #library
3 require(ncov2019)
4 # English data
5 y<- load_ncov2019(lang='en')
6 # 中文数据
7 y1<-load_ncov2019(lang='zh')
```

R Source (Workspace) R To R

Read ncov19 packages city | province

```
1 # call more functions
2 # English data
3 city<-y1[[c(1:7)]]
4 prov<-summary(y1)
5 prov<-prov[prov$country=="中国",]
6 city$time<-as.character(city$time)
7 prov$time<-as.character(prov$time)
```

Data Tranpose-Province

Data Output - 0:98 - R to Table (province)

Row ID	S time	S country	S province	I cum_c	I
1	2019-12-01	中国	湖北	1	0
2	2019-12-02	中国	湖北	1	0
3	2019-12-03	中国	湖北	1	0
4	2019-12-04	中国	湖北	1	0
5	2019-12-05	中国	湖北	1	0
6	2019-12-06	中国	湖北	1	0
7	2019-12-07	中国	湖北	1	0
8	2019-12-08	中国	湖北	1	0

R to Table String to Date&Time Pivoting

Data Tranpose

Column Resorter Math Formula (Multi Column) RowID

Province Name

Text Anotation

Heatmap Text Output Widget

heatmap

Statistical Analysis for Component

Line Plot (Plotly) Text Output Widget

All province Line Plot (Plotly) line

wuhan Line Plot (Plotly)

All but wuhan

Data Tranpose for Component

Transpose RowID Row Filter Transpose

add days as column Extract row 1 transpose

Insert Column Header Column Auto Type Cast String to Date&Time Sorter

delete 1st row Column type Node 156

Data Tranpose-City- Chinese Version

R to Table Column Filter Row Filter String to Date&Time Pivoting Column Resorter String Manipulation String Manipulation

city Delete Country Delete Importing cases duplicated 京 duplicated 川

Duplicated region name

R Snippet String Manipulation R Snippet Missing Value GroupBy

R for duplicated 川 duplicated 京 R for duplicated 京 NA DUPLICATED NAME

Choose Region

Row Filter Transpose multiple Input

HUBEI

Global Cases

R View (Table)

R To R R to Table String to Date&Time Pivoting Transpose Math Formula (Multi Column)

Global province Node 283 Node 285

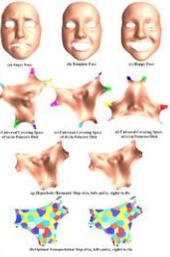
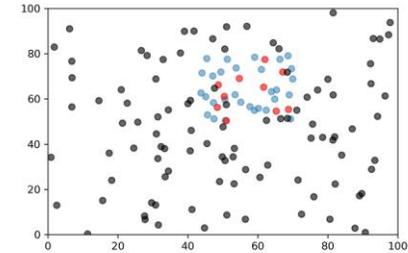
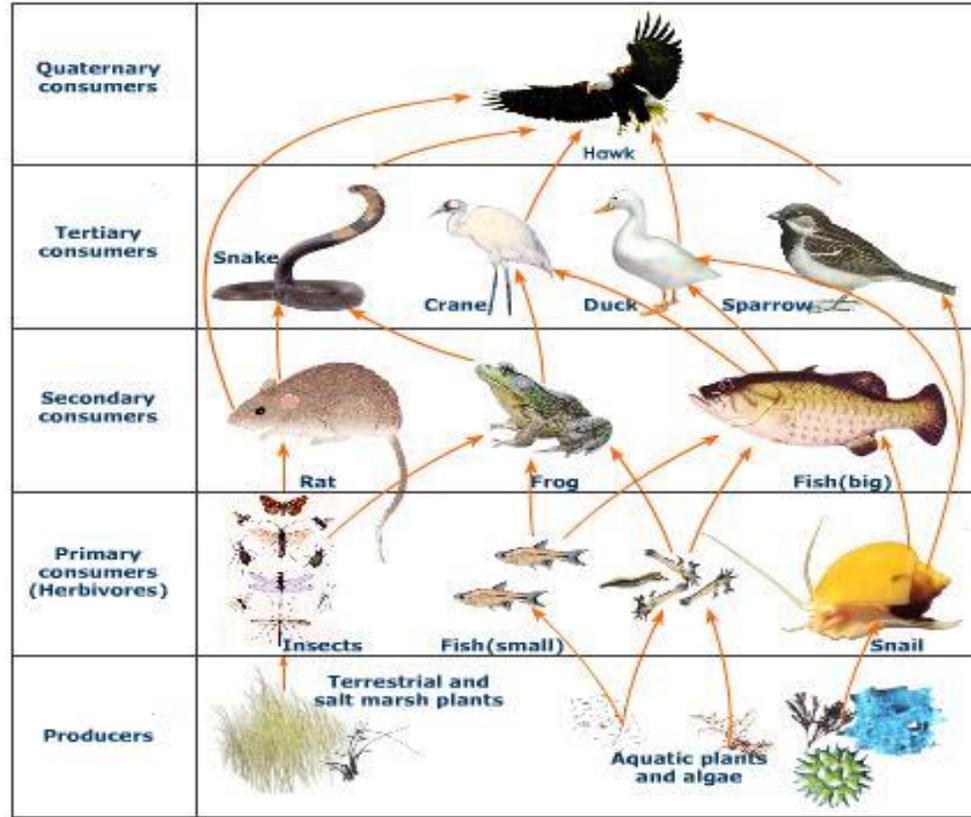
Pivot table - 0:213 - Pivoting

File Hilite Navigation View

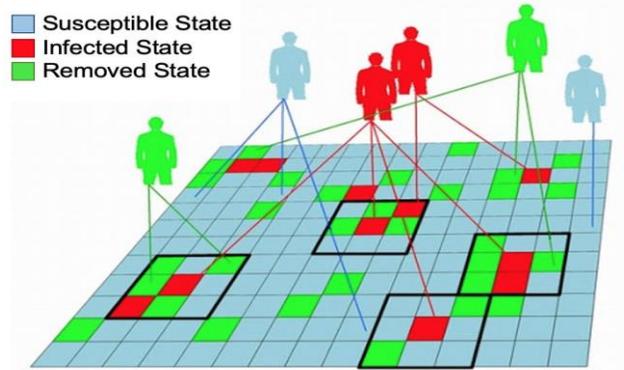
Table "default" - Rows: 605 Spec - Columns: 192 Properties Flow Variables

Row ID	S province	S city	I 2020-...	I 2020-...	I 2020-...	I
Row570	陕西	杨凌	?	?	?	?
Row571	陕西	杨凌示范区	?	?	?	?
Row572	陕西	榆林	?	?	?	?
Row573	陕西	汉中	?	3	4	6
Row574	陕西	渭南	?	1	3	3

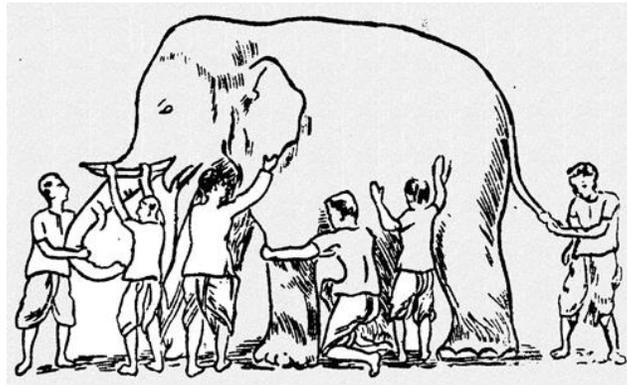
# Plans: Information Integration for Panorama Puzzle



■ Susceptible State  
■ Infected State  
■ Removed State



Geo-Computation



<http://blog.sciencenet.cn/blog-847068-692745.html>

**BIG DATA**



# Plans: Training Workshops and Webinar Series

[https://dataverse.harvard.edu/dataverse/cdl\\_training](https://dataverse.harvard.edu/dataverse/cdl_training)

- [Webinars on Data and Tool Introduction](#)
- [Webinar for COVID-19 Data Analysis“](#)
- [Webinars for Literature Review on COVID-19](#)
- [Webinars on Modeling COVID-19 Pandemic: Resources, Methodology and Applications](#)

# Acknowledgement: Institutional Member Support

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Deakin University  
Leibniz University Hanover  
Nankai University

# Related Web Sites

**Resources for COVID-19 Study**

**<http://chinadatalab.net>**

**China Data Online**

**<Http://china-data-online.com>**

**[office@chinadatacenter.net](mailto:office@chinadatacenter.net)**