



China Data Institute

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Getting Old Before Getting Rich: Changes and Challenges in China

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Topics

I. An Overview

- ❑ A General Picture of Aging Planet
- ❑ Growing Aging in China
- ❑ Beyond Aging Population
- ❑ What is So Special about China?
- ❑ The Challenges

II. Theory, Methodology and Data

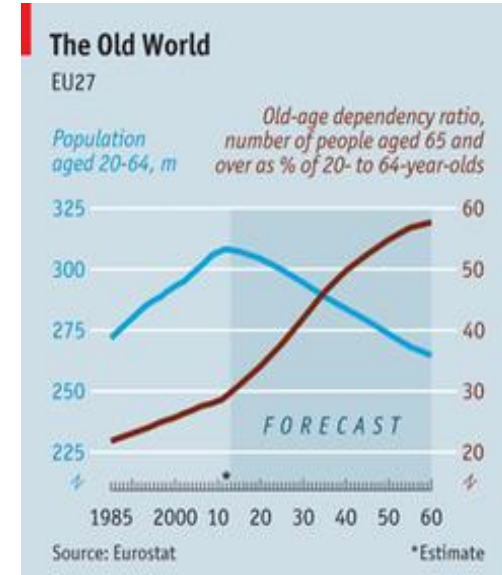
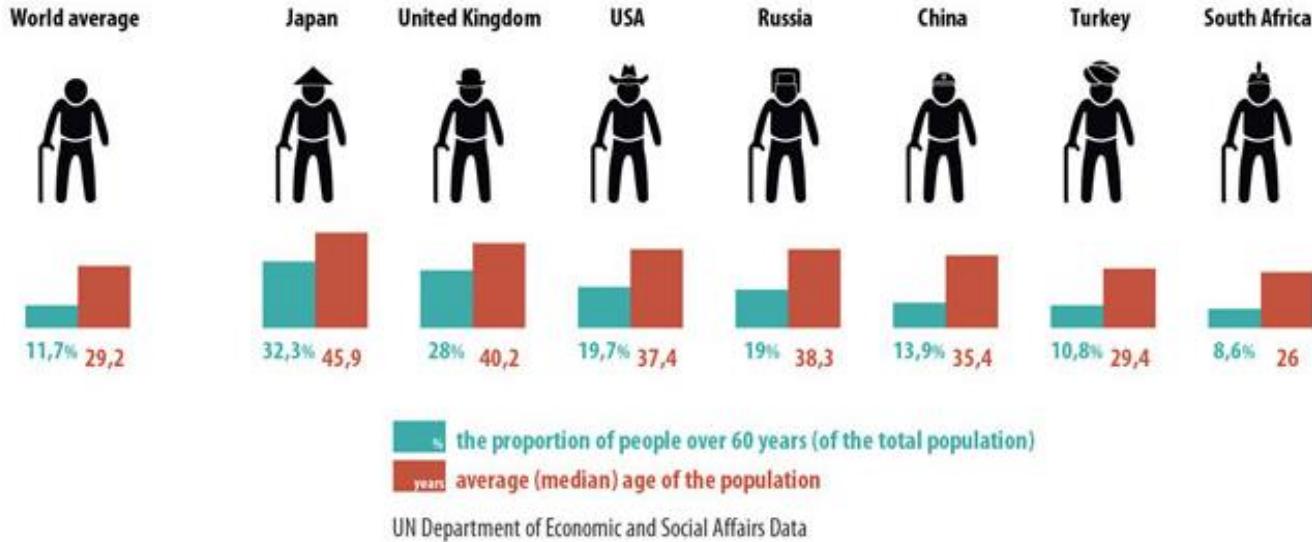
- ❑ The Ecological Theory
- ❑ Measurements of Aging
- ❑ Exploring Aging Planet

III. Looking Forward

- ❑ Future Trends
- ❑ Rethinking Complexity of Our Changing Planet

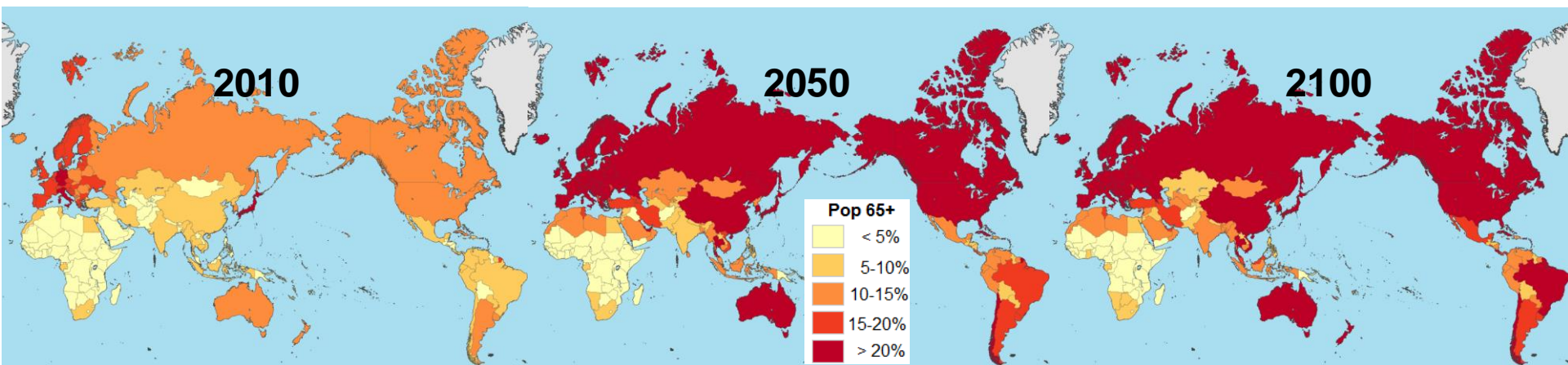
IV. Comparative Studies

A General Picture of Aging Planet



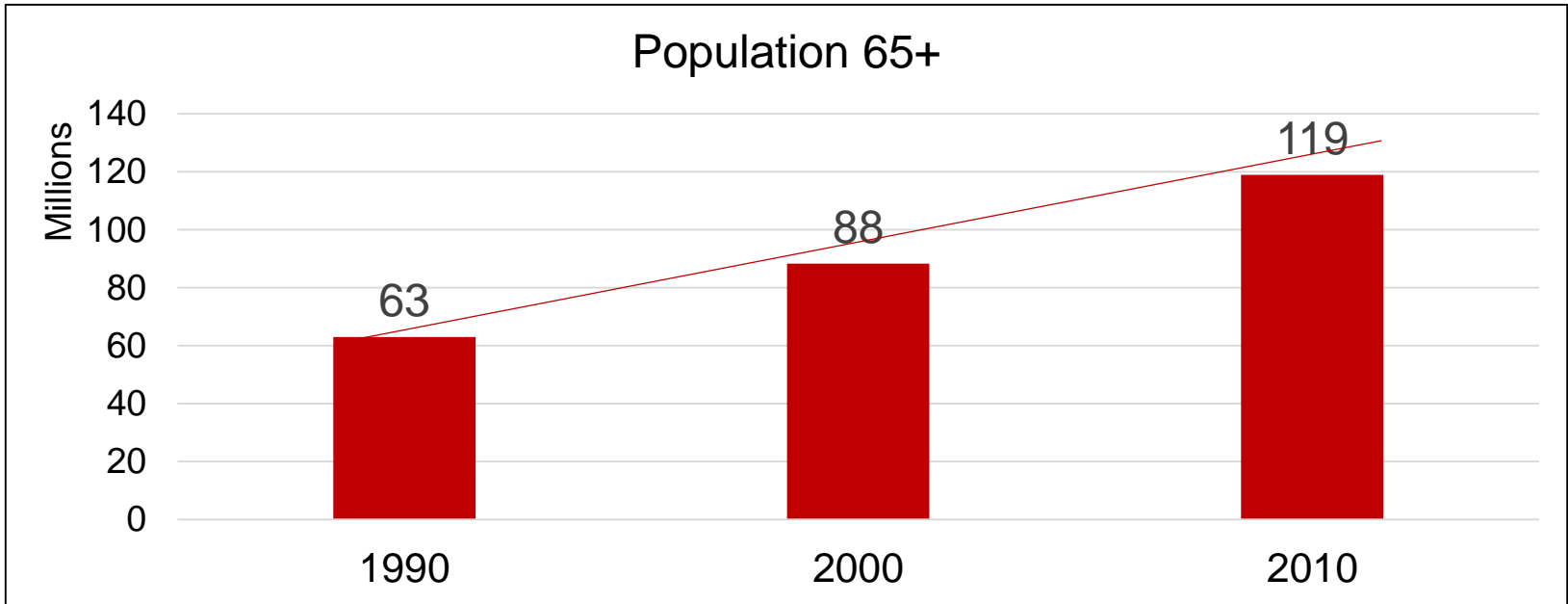
<https://craigyoshihara.wordpress.com/2015/01/24/the-bell-curve-part-2-of-our-sermon-series-the-ism-factor/>

Source: EUROSTAT

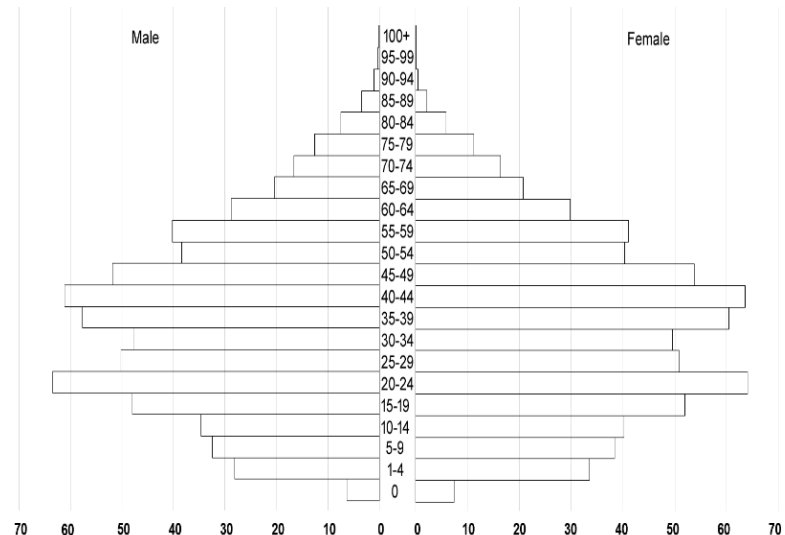


http://www.slate.com/articles/news_and_politics/politics/2014/04/aging_populations_where_people_are_getting_older_mapped.html

Growing Aging Population in China



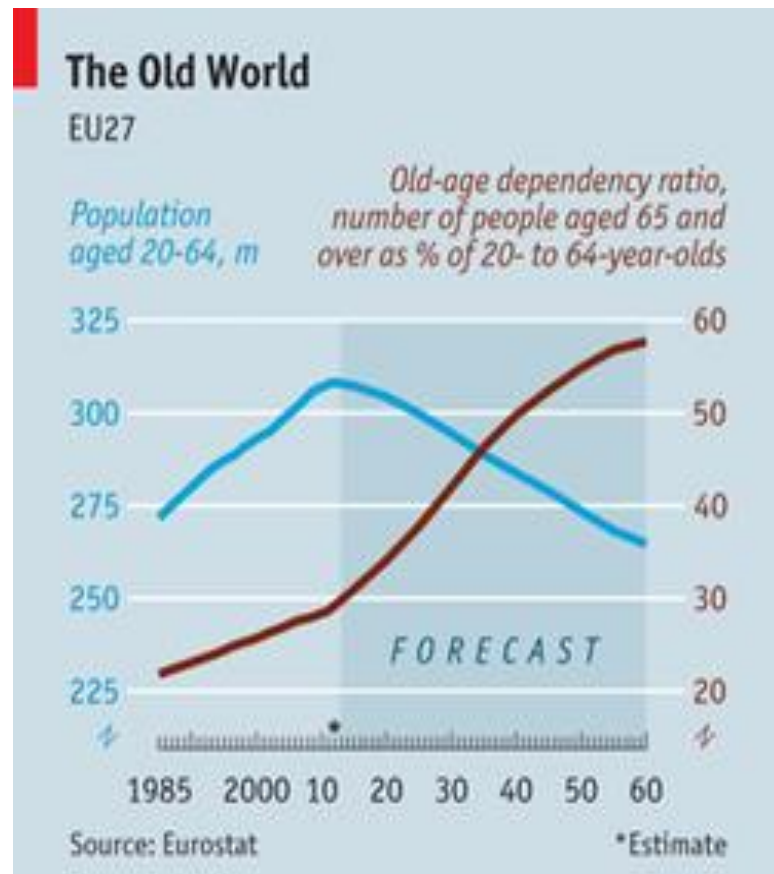
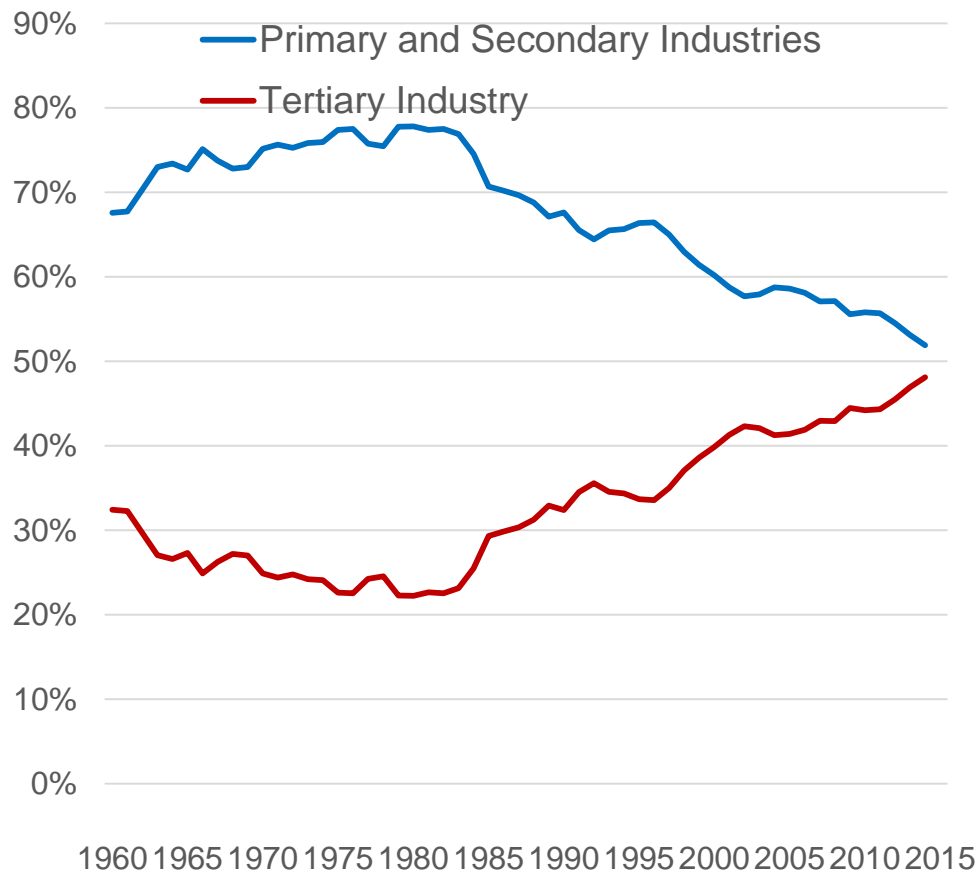
Country	Population 2012 (in million)
P.R. China	1351
India	1237
United States	314
Indonesia	247
Brazil	199
Pakistan	179
Nigeria	169
Bangladesh	155
Russian	144
Japan	128



Beyond Aging Population

- ❑ The aging **economic** structure (virtual & real economy)
- ❑ Exhausted natural **resources** (energy, water, land,)
- ❑ Rapid **urban** expansion (available space)
- ❑ Declining **biological diversity** (Number, variety and variability)
- ❑ Declining **cultural diversity**

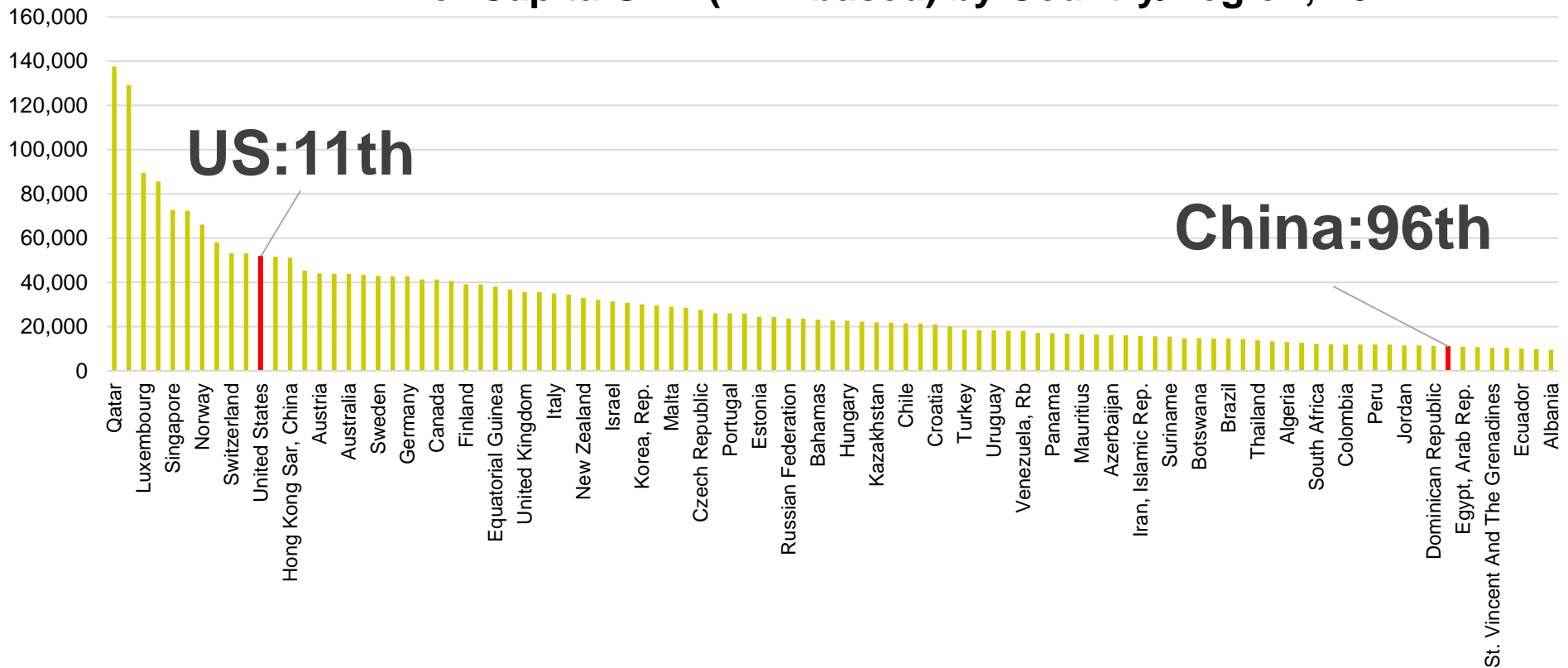
Changes in Population and Economic Structures



What is So Special about China?

- Having the largest elderly population and economic entropy
- Getting old too fast
- Getting Old Before Getting Rich

Per Capita GDP (PPP based) by Country/Region, 2012



The Unprecedented Challenges

- ❑ Labor & resource shortage
- ❑ Broken ecological chains
- ❑ Fragile social & economic infrastructure
- ❑ Increasing social & income inequalities
- ❑ Growing risks to China's stability

The Ecological Theory

- **Basic Assumptions:**
 - Everything is related each other
 - Degenerative system
 - External energy is necessary for any ecosystem
- **Increasing ecological risks:**
 - Environmental risk
 - Health risk
 - Social risk
- **Core Indicators:**
 - Biodiversity
 - Culture diversity

The Measurements of Aging Society

- ❑ **Aging population:**
 - ❑ Dependency ratio: elderly population (60+ or 65+) as percentage of labor force (16-64)
 - ❑ Elder population ratio: elderly population (60+ or 65+) as percentage of total population
 - ❑ The Characteristics Approach
- ❑ **Aging economy:**
 - ❑ Virtual economy as percentage of total economy
- ❑ **Aging city:**
 - ❑ Available land sources as percentage of city area
 - ❑ The percent of urban population
- ❑ **Aging ecosystem:**
 - ❑ Diversities

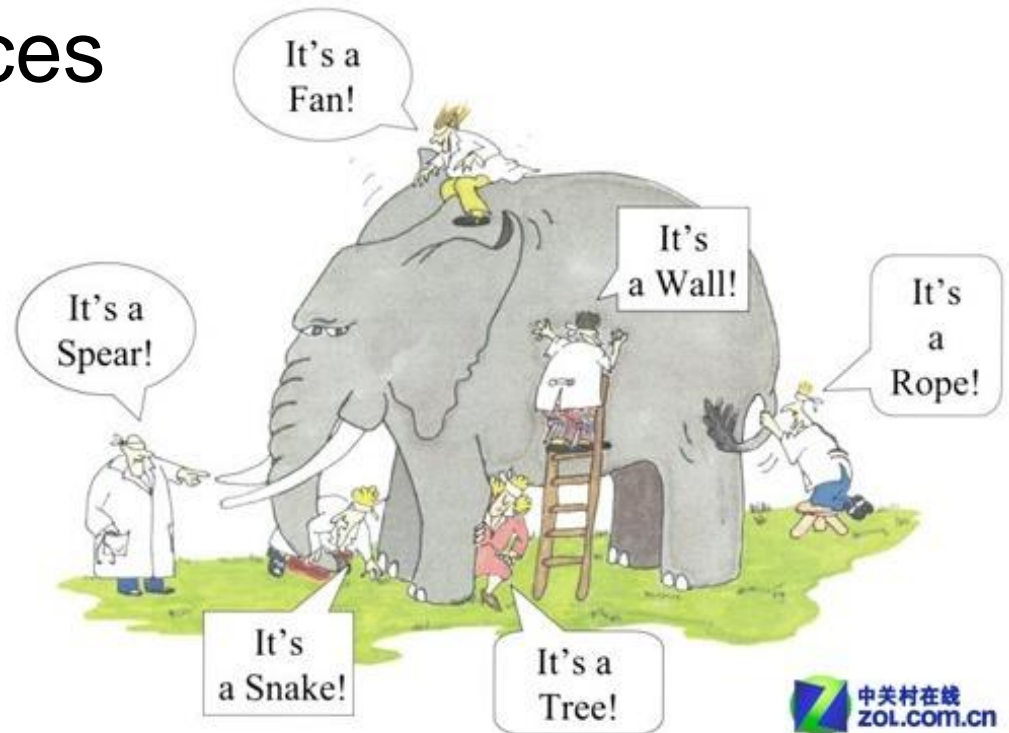
Future Trends

- ❑ Aging population
- ❑ Dependency ratio
- ❑ Intra/inter/international migration
- ❑ Spatial variation
- ❑ Social divide
- ❑ Social conflicts
- ❑ Family value

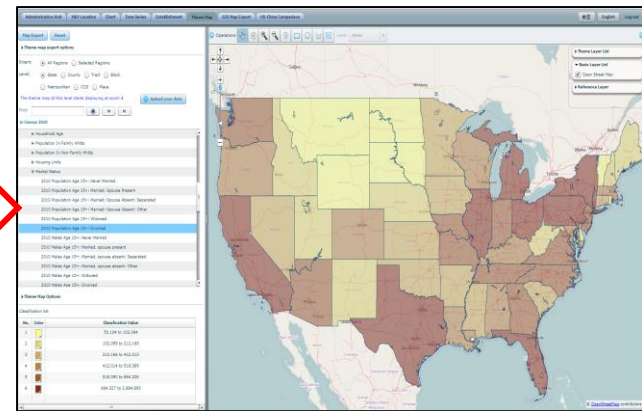
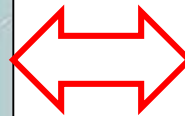


Rethinking Complexity of Our Changing Planet

- ❑ Systematic thinking
- ❑ Evolution & degradation
- ❑ Scarce resources
- ❑ Policy options



Comparative Studies: US & China & World



China and US Geo-Explorers

- The Internet Based Spatial Data services

Statistics



Census

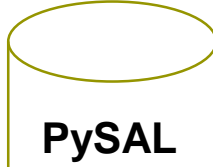


GIS

Data

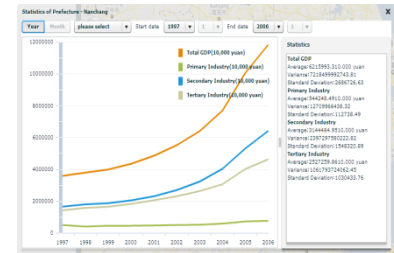


Modules



Output

Graphs

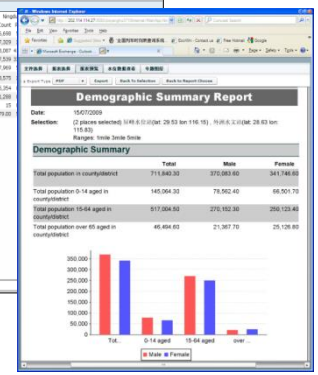


Tables

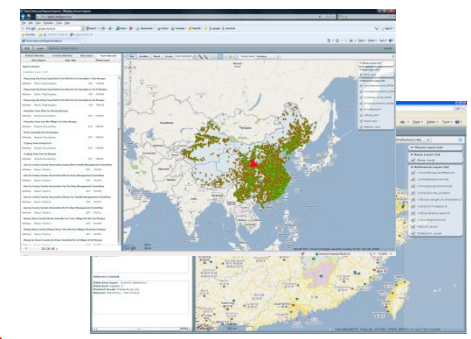
Education and Literacy Comparison Report

Year	14702010
Male	14702010
Female	14702010

Reports



Maps



Data Sources



- **Government Statistics**

- Provincial Statistics (1949 -)
- City Statistics (1996 -)
- County Statistics (1997 -)

- **Population Census**

- Census 1953 (GRID)
- Census 1964 (GRID)
- Census 1982 (GRID)
- Census 1990 (GRID)
- 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)

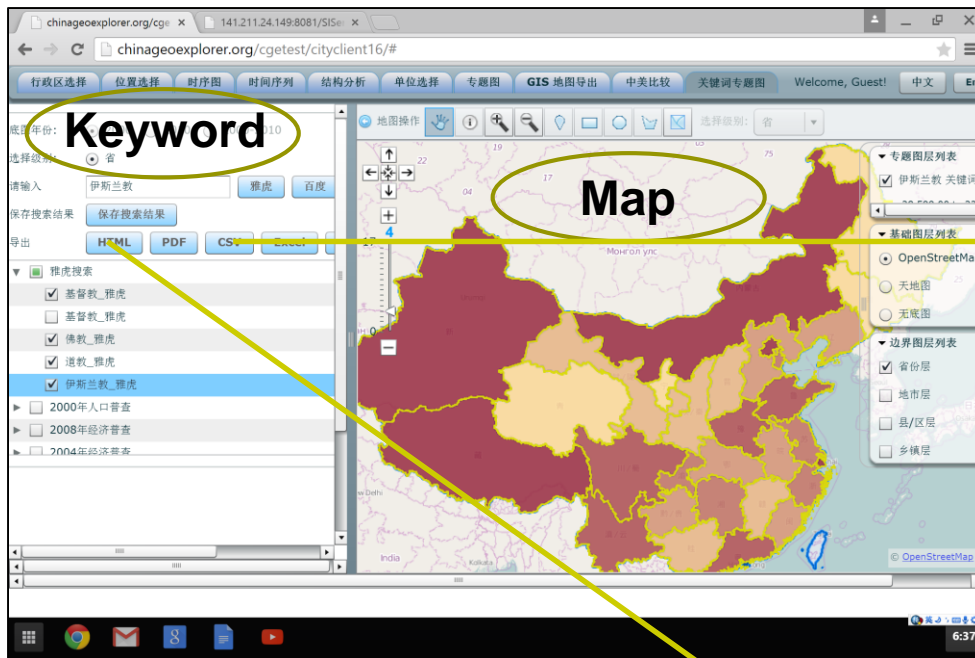
- **Establishments (individual companies and organizations)**

- Industrial Census(1995)
- Basic Unit Census (2001)
- Economic Census (2004/2008)

- **Geography and Environment**

- Land Use data (GRID)
- Night-Time data (GRID)
- Transportation (railway, highway, roads)
- Rivers and Lakes

Big Data Integration for Spatial Data Service



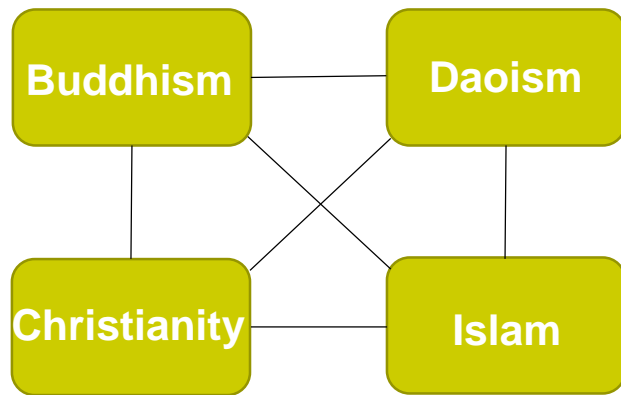
名称	基督教_雅虎	佛教_雅虎	道教_雅虎	伊斯兰教_雅虎
1 北京市	289,000	1,060,000	217,000	126,000
2 上海市	252,000	921,000	169,000	89,100
3 上海市	252,000	921,000	169,000	89,100
4 内蒙古	185,000	910,000	74,800	93,100
5 西藏	175,000	308,000	97,600	61,700
6 山东省	168,000	308,000	97,600	59,600
7 天津市	119,000	490,000	89,500	45,800
8 广东省	116,000	363,000	94,200	50,600
9 四川省	111,000	335,000	108,000	51,700
10 新疆	110,000	412,000	82,500	106,000
11 浙江省	109,000	400,000	92,800	34,800
12 江苏省	99,300	316,000	82,800	46,000
13 重庆市	95,600	401,000	77,100	50,200
14 河南省	88,400	364,000	100,000	51,700
15 福建省	85,100	283,000	85,900	38,000
16 湖南省	80,800	268,000	82,300	48,300
17 山西省	74,100	267,000	81,100	34,700
18 河北省	71,800	285,000	80,000	43,000
19 湖北省	70,100	208,000	87,300	37,500
20 江西省	70,000	284,000	87,200	36,500
21 云南省	68,900	330,000	65,200	44,900
22 陕西省	66,200	221,000	72,600	37,300
23 辽宁省	62,300	168,000	48,500	39,000
24 吉林省	61,400	163,000	45,400	30,300
25 贵州省	57,900	281,000	52,800	39,300
26 广西省	57,800	253,000	51,200	35,700
27 海南省	56,800	190,000	51,000	31,200
28 黑龙江省	53,600	143,000	42,900	30,200
29 甘肃省	51,900	167,000	48,100	36,100
30 青海省	47,400	175,000	39,000	33,600

Results from keyword search:

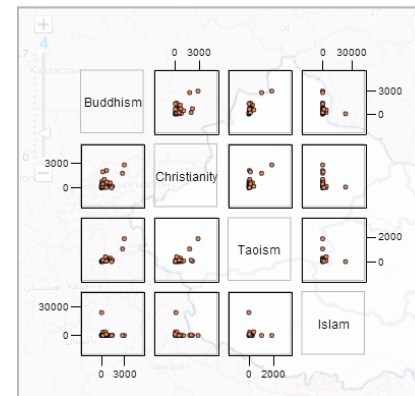
- Non-structural data -> Structural data
- Non-spatial data -> Spatial data
- Text data -> Numeric data
- Unlimited keywords -> Unlimited data
- Complimentary data to baseline data

相关矩阵	基督教_雅虎	佛教_雅虎	道教_雅虎	伊斯兰教_雅虎	蒙古族人口小计	回族人口小计
基督教_雅虎	1.0000	0.9017	0.8730	0.8539	0.2402	-0.2323
佛教_雅虎	0.9017	1.0000	0.8029	0.7753	-0.0707	-0.2482
道教_雅虎	0.8730	0.8029	1.0000	0.7445	-0.0651	-0.2685
伊斯兰教_雅虎	0.8539	0.7753	0.7445	1.0000	0.3377	-0.0241
蒙古族人口小计	0.2402	-0.0707	-0.0651	0.3377	1.0000	-0.0364
回族人口小计	-0.2323	-0.2482	-0.2685	-0.0241	-0.0364	1.0000

Correlation Matrices with Census Data and Internet Search Results



a. Multi-scatterplot of religions from **Census data**



b. Correlation matrix from **the internet search results**

	<i>Buddhism</i>	<i>Christinality</i>	<i>Daoism</i>	<i>Islam</i>
<i>Buddhism</i>	1.00			
<i>Christinality</i>	0.49	1.00		
<i>Daoism</i>	0.41	0.84	1.00	
<i>Islam</i>	0.35	0.22	0.11	1.00

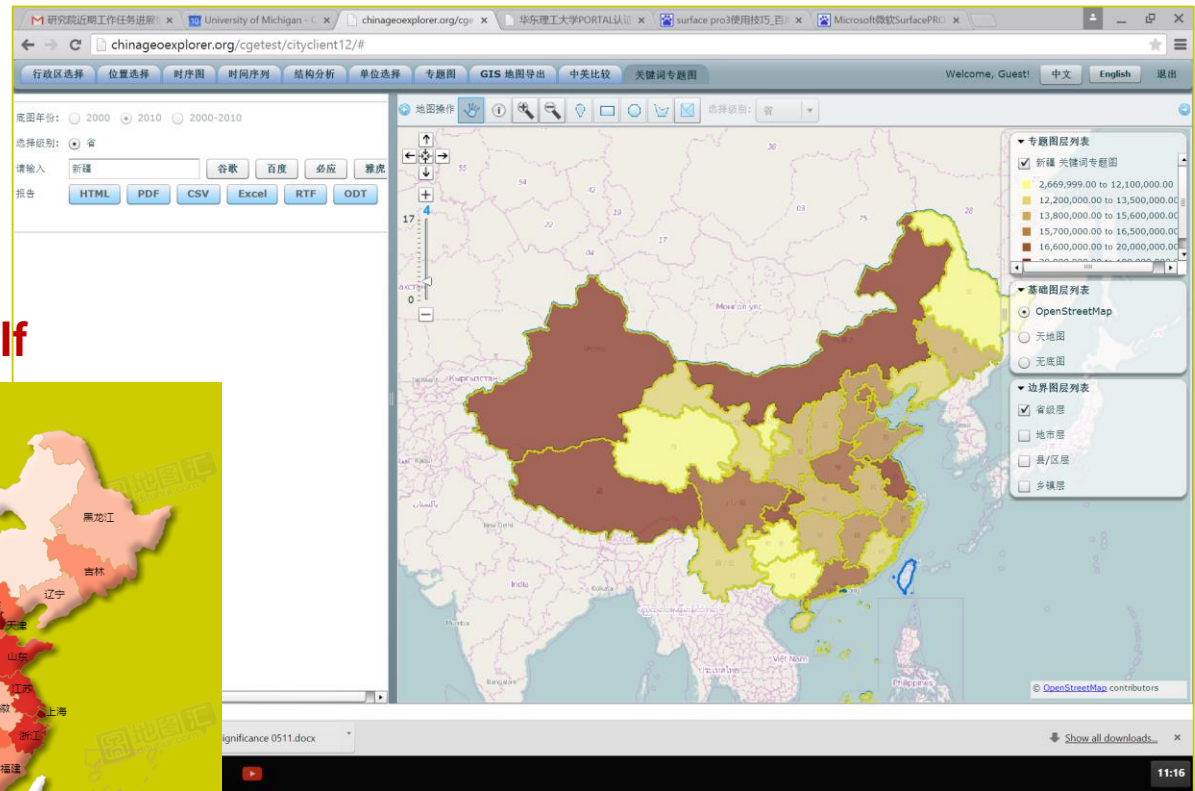
Big Data for Spatial Analysis

Data sources:

- Search engines (google, baidu, yahoo,...)
- Facebook
- Twitter
- Blogs
- WeChat
- QQ
- Users' data

Linkages between Xinjiang and other Provinces

Map of Golf

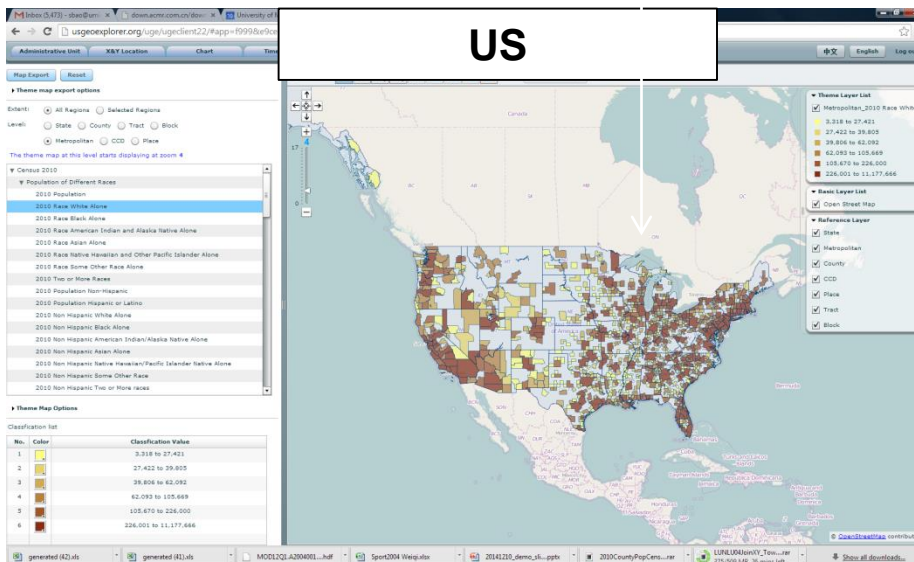


Comparative Analysis of US & China



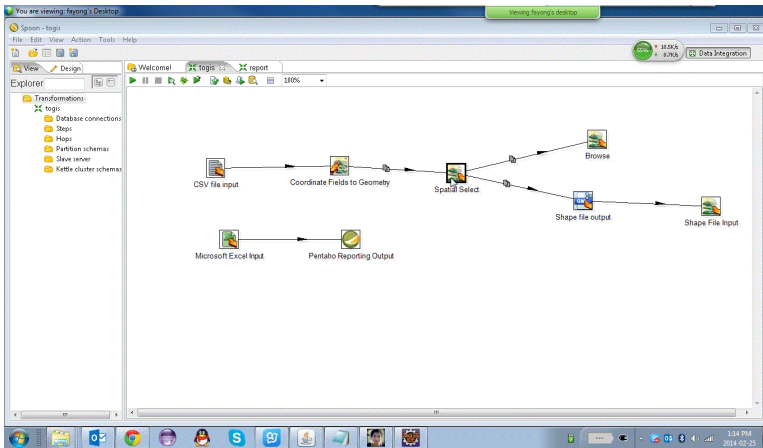
	A	B
1	Selected Distric Score	
2	Jingmen	1.00
3	Changchun	1.00
4	Ningbo	1.00
5	Tonghua	1.00
6	Hulunbeier	1.00
7	Liaoyuan	1.00
8	Haerbin	1.00
9	Baicheng	1.00
10	Siping	0.99
11	Jiamusi	0.99
12	bayannaouer	0.99
13	Qiqihaer	0.99
14	Panjin	0.99
15	Jilin	0.99
16	Mudanjiang	0.99
17	Heihe	0.99
18	Hangzhou	0.99
19	Suihua	0.99
20	Changsha	0.99
21	Shuangyashan	0.99
22	Tieling	0.99
23	Daqing	0.99
24	Beijing (Counties)	0.99
25	Qitaihe	0.99
26	Daxinganlingdiqu	0.99
27	Changzhou	0.99
28	Wuxi	0.99
29	Yingkou	0.99
30	Xian	0.99
31	Chengdu	0.99
32	Wuhan	0.99
33	Shenyang	0.99
34	Jiaxing	0.99
35	Baishan	0.99
36	Alashan	0.99
37	Harbin	0.99

	A	B
1	Selected District: Jingmen	Score
2	Pullman WA	0.99
3	Laramie WY	0.98
4	Athens OH	0.98
5	Silverthorne CO	0.98
6	Huntsville TX	0.97
7	Ithaca NY	0.97
8	State College PA	0.97
9	Susanville CA	0.97
10	Boone NC	0.97
11	Mount Pleasant MI	0.97
12	Starkville MS	0.97
13	Vermillion SD	0.97
14	Ames IA	0.97
15	Lawrence KS	0.96
16	Morgantown WV	0.96
17	Moscow ID	0.96
18	Gainesville FL	0.96
19	Oxford MS	0.96
20	Brookings SD	0.96
21	Carbondale IL	0.96
22	Blacksburg-Christiansburg-Re	0.96
23	Corvallis OR	0.96
24	Stillwater OK	0.96
25	Statesboro GA	0.95
26	Bloomington IN	0.95
27	College Station-Bryan TX	0.95
28	Tallahassee FL	0.95
29	Iowa City IA	0.95
30	Ann Arbor MI	0.95
31	Champaign-Urbana IL	0.95
32	Bozeman MT	0.95
33	Columbia MO	0.95
34	Athens-Clarke County GA	0.95
35	Ellensburg WA	0.95
36	Macomb IL	0.95
37	Manville MO	0.94

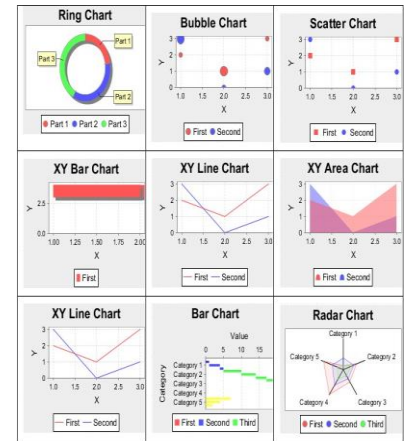
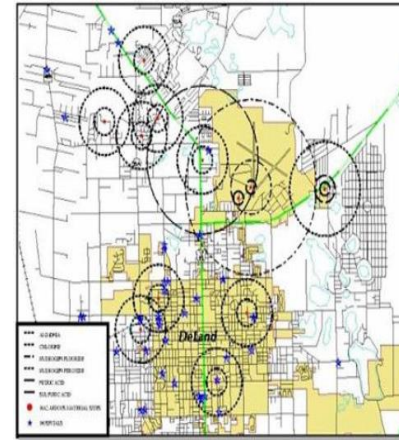


The System of Systems

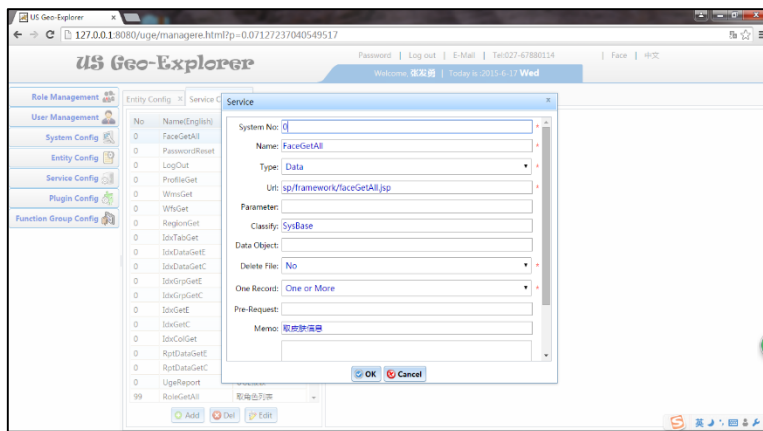
Workflow Based Tool



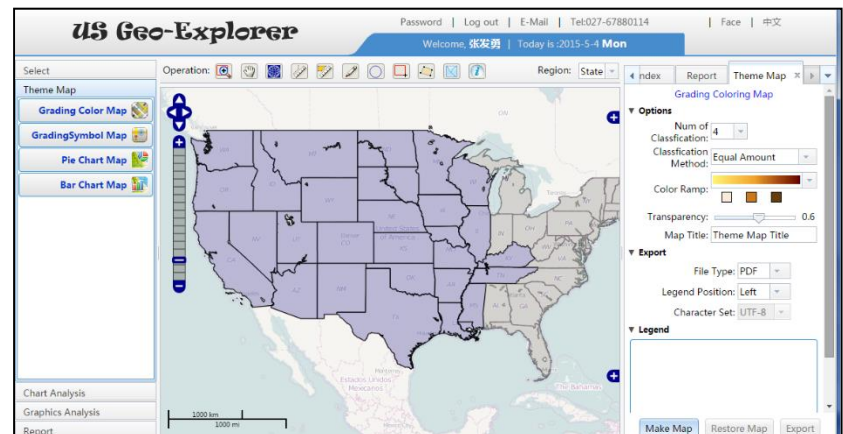
Multiple outputs



System Configuration



Interactive Analysis



New Generation of Spatial Data Service

- Build a human-driven machine learning

- ❑ Template of ecological models (graphic model)

生态系统模型

An graphic model of ecosystem

- ❑ Define multi-scales

系统分层

- ❑ Quantify biological chains

生态链量化

- ❑ Visualize data structures

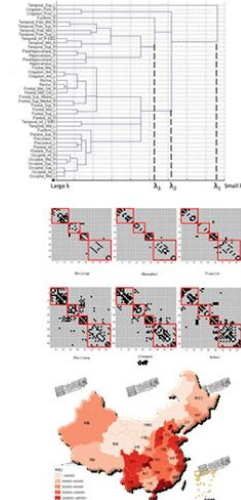
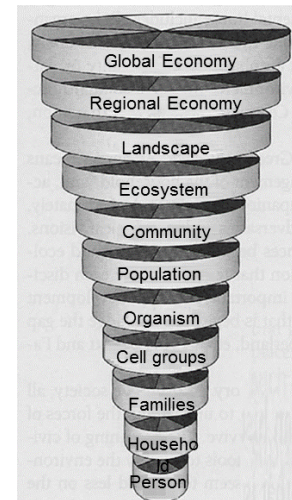
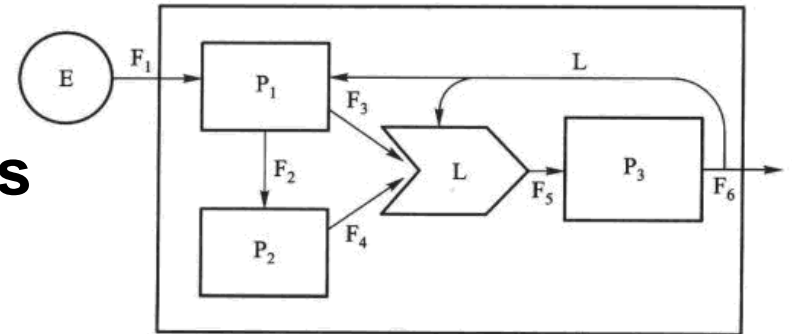
数据结构分析与显示

- ❑ Big data application

大数据应用

- ❑ Space-Time data analysis

时空数据分析



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