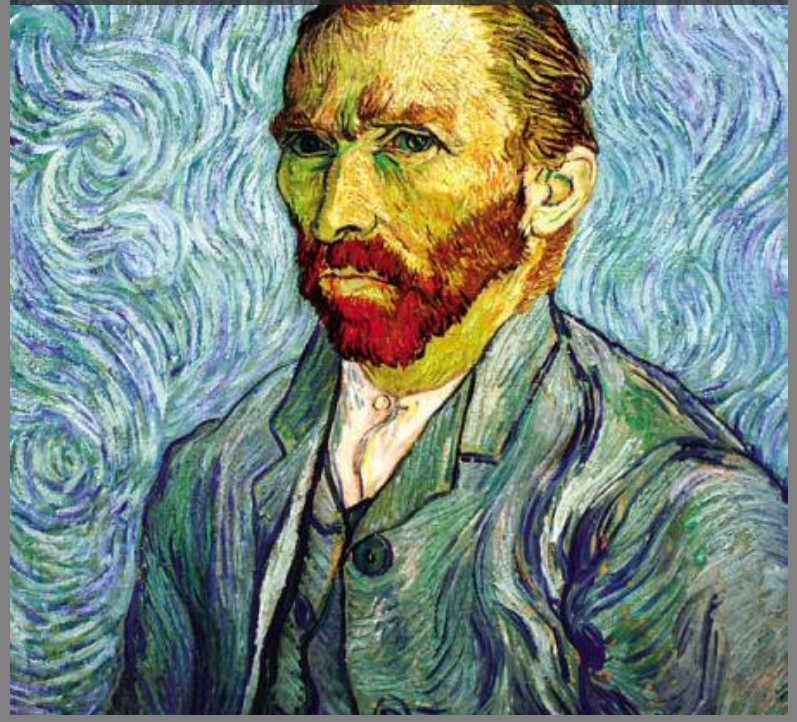
城市数据画像

王静远
北京航空航天大学

人物画像



城市画像

PRODUCED BY BIGSCITY

[城市数据画像]

用数据的手段全方位展示城市动态

数据支撑平台
Data Platform

出租GPS定位轨迹数据 **60GB/天**

地铁一卡通客流数据 **10GB/天**

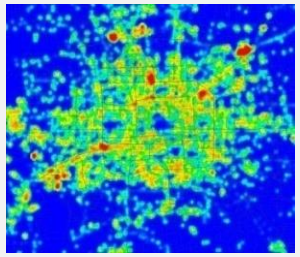
地理位置微博数据 **150GB/天**

手机信令与位置数据 **1TB/天**

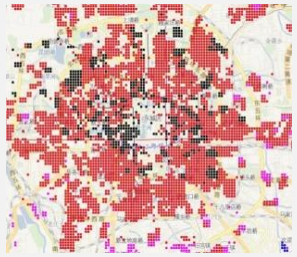
工商业POI地点数据 **600万条**

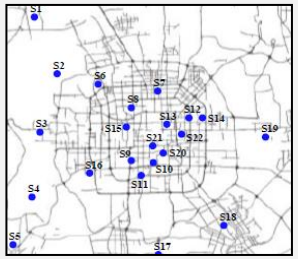
服务器集群 + 分布式文件系统+ 大数据管理软件

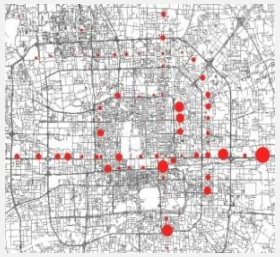
人口数据



经济数据







浮动车数据

浮动车GPS

安装了车载GPS定位装置并行驶在城市主干道上的公交汽车和出租车。

北京	>20000辆
上海	>20000辆
省会	>5000 辆
地级市	>1000 辆

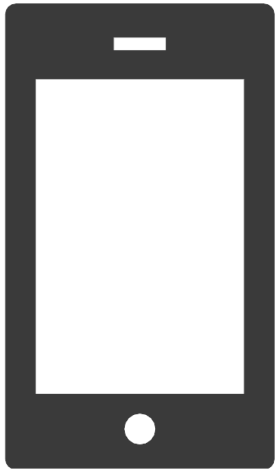
市政一卡通数据

城市公交

北京每天使用一卡通的公共交通出行者超过
1300万人次

北京公交出行：
从2007年29.8%
提升到
2014年的48%

手机信令数据



手机信令

手机通话的
基站位置数据

覆盖1千万名用户

每小时6千万记录

微博定位数据

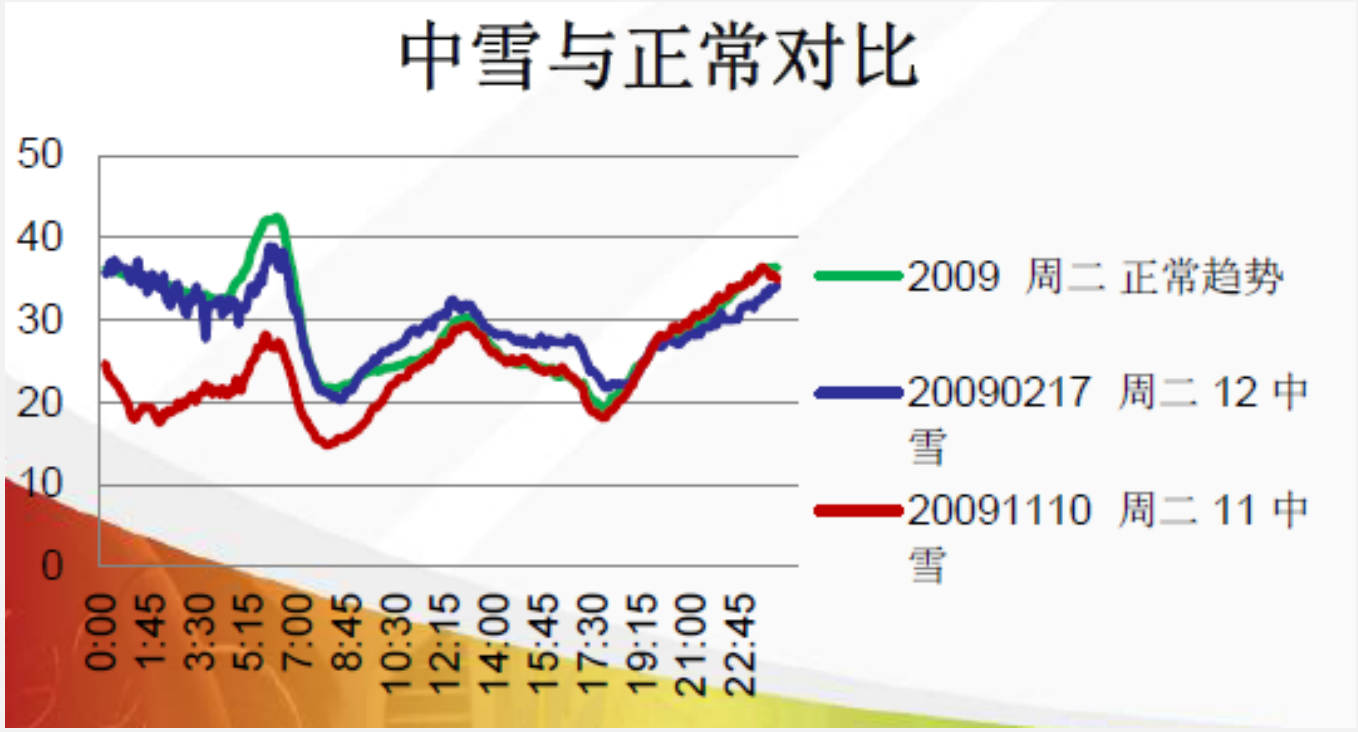
微博定位

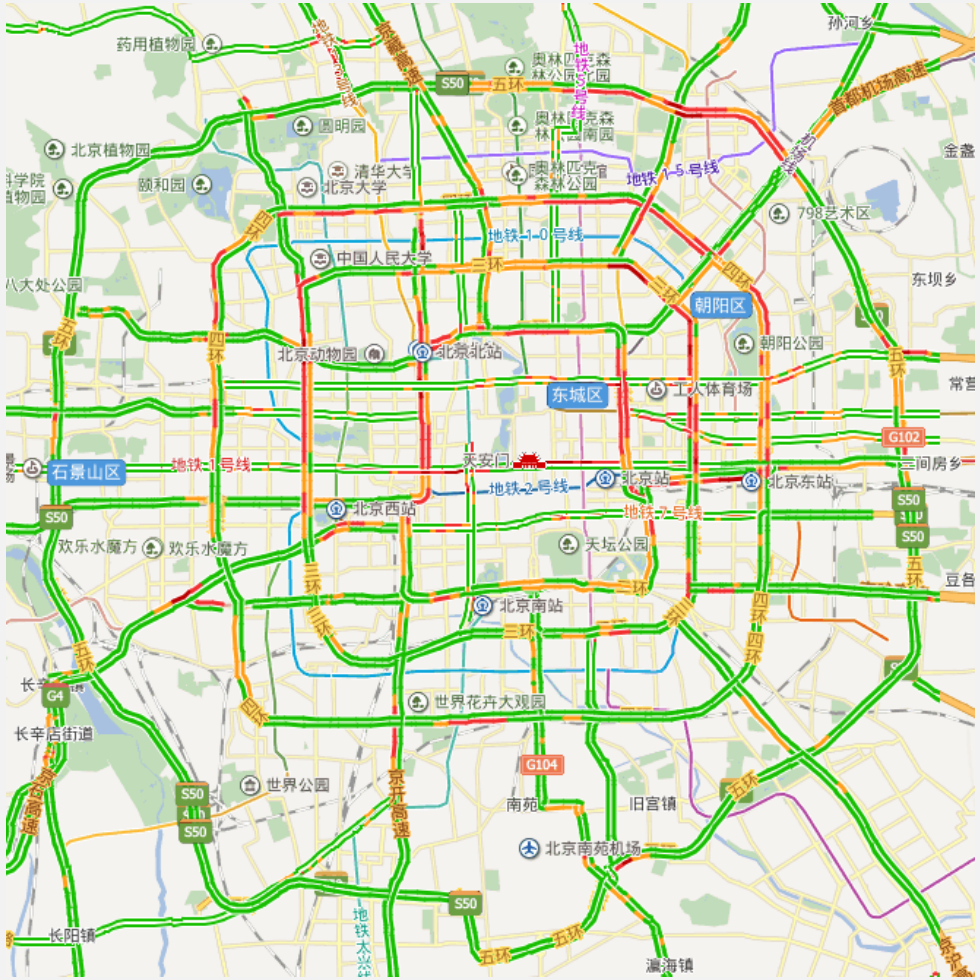
利用移动设备发送微博时经常会带有地理坐标

爬取2014年北京市带有地理位置的微博数据300万条

[交通画像]

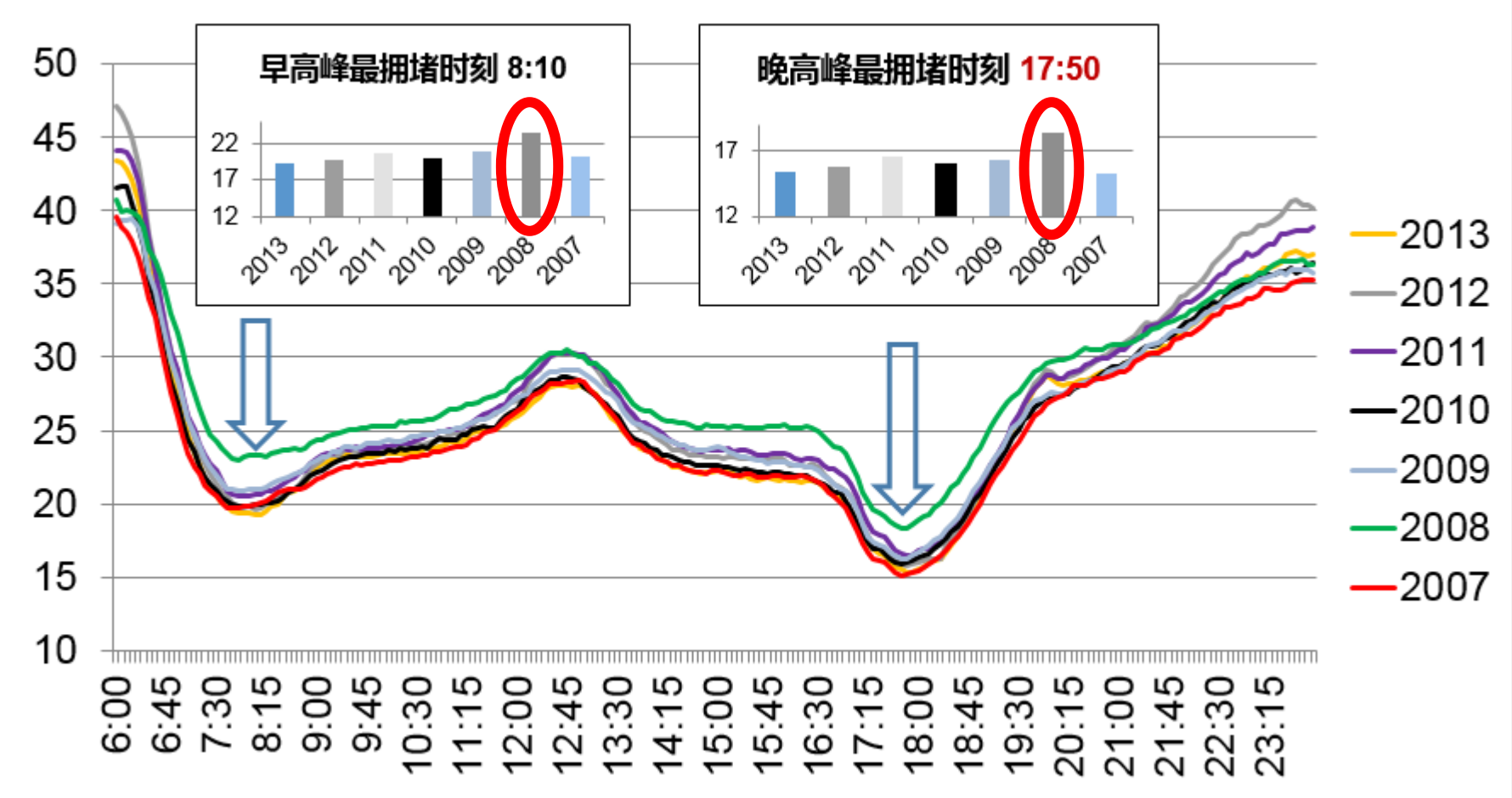
实时路况计算





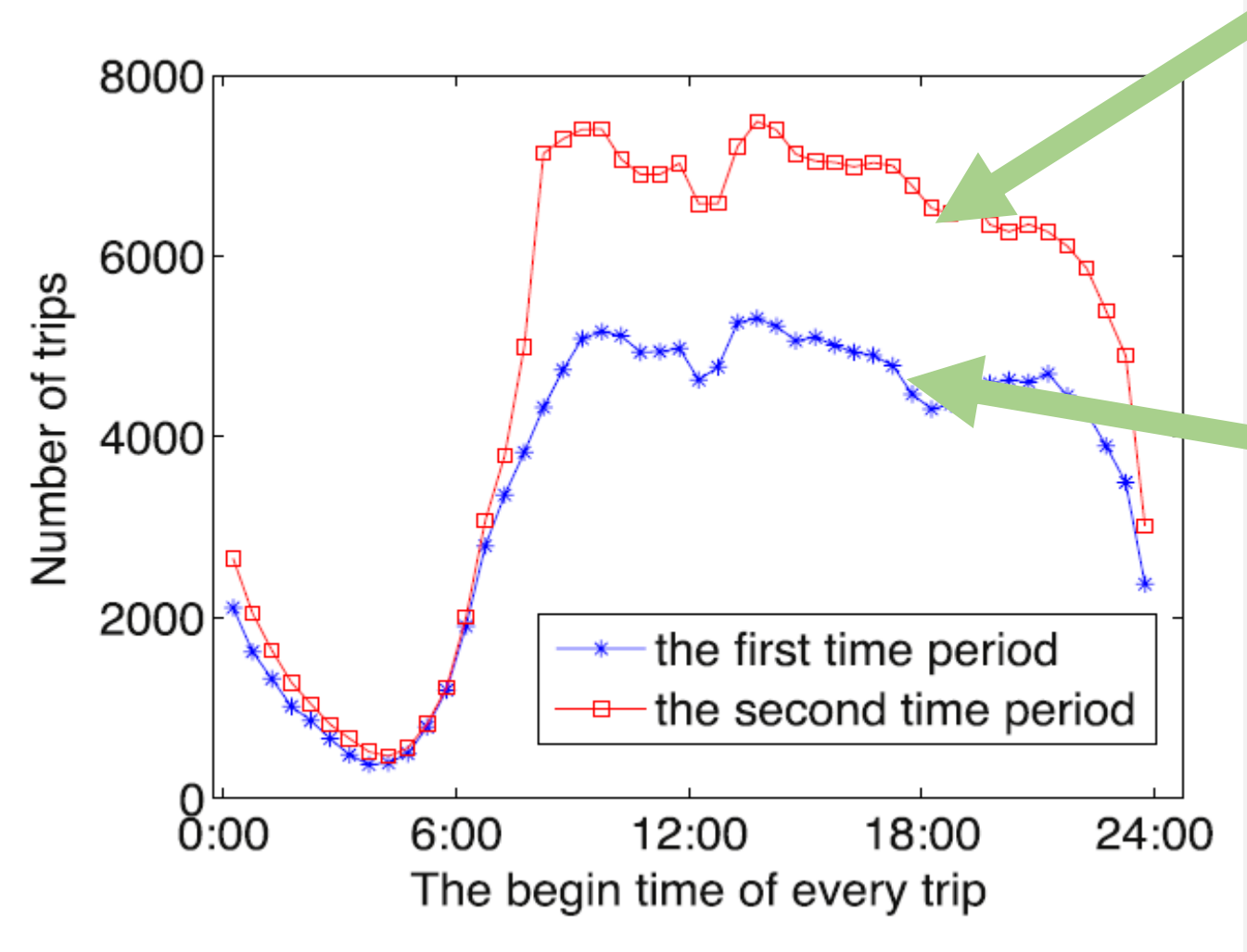
GPS轨迹点→数据降噪→路网匹配→数据补充→路况计算

通过历史数据看北京**交通限行**



08年开始限行后交通明显改善，但限行收效正逐年降低

数据解读**打车软件**



打车软件出现后

打车软件出现前

2014年春节前后，打车软件出现

打车软件提升了40%的出租车运输能力！

[客流画像]

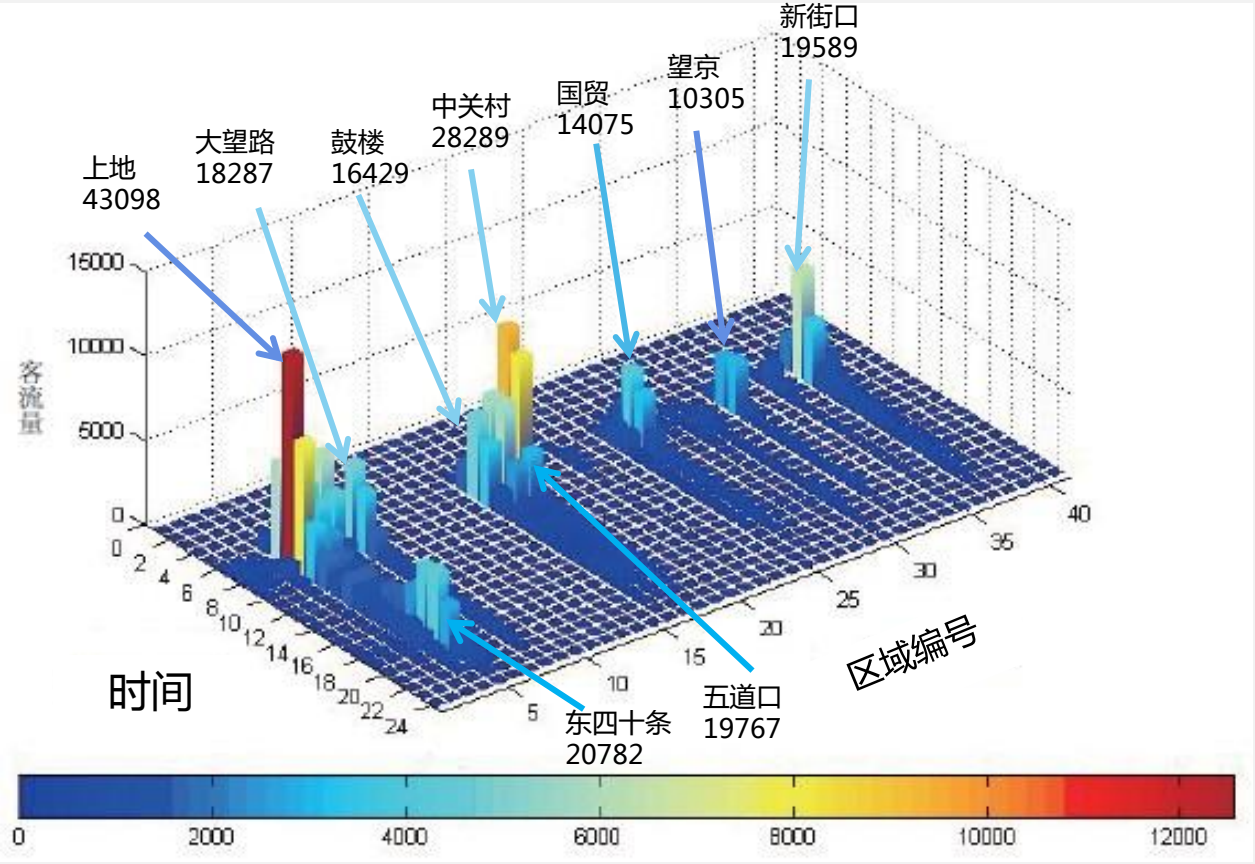
公交客流的聚集

公交站点分布（规划客流）

早高峰实际客流

晚高峰实际客流

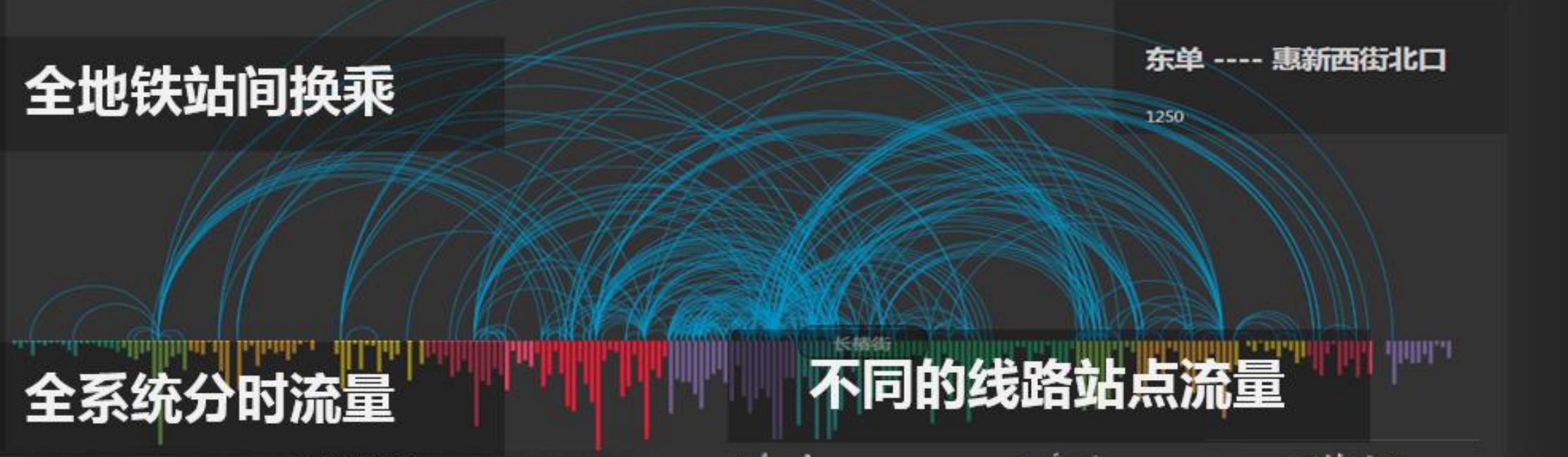
如何改进公交线路



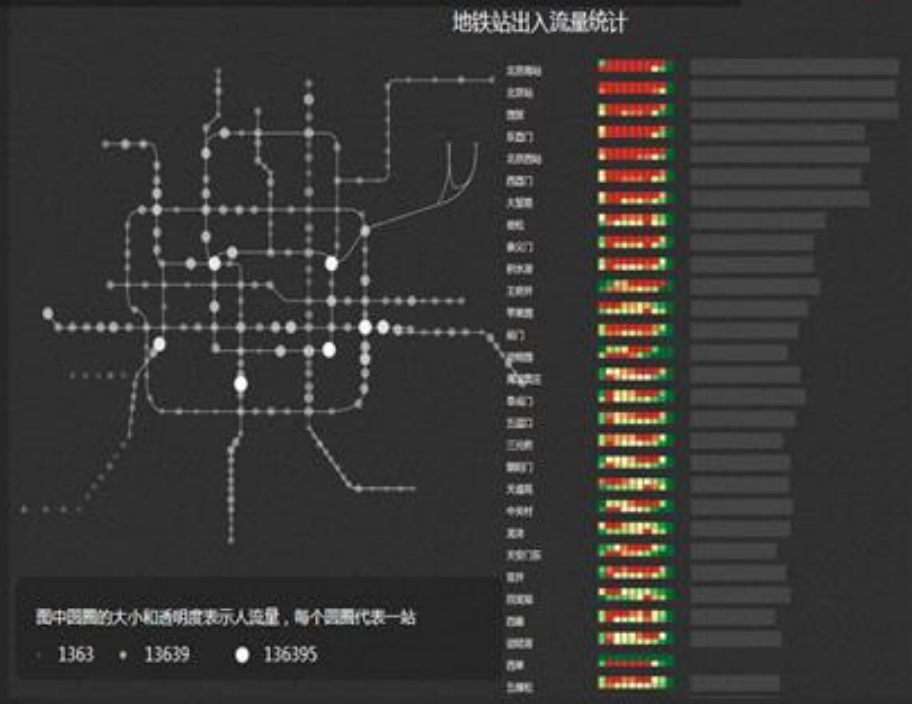
- 天通苑早高峰要运送**14万**人
- 平均**1辆/分钟**驶出天通苑
- 约需**2000辆**公交车

- 住户主要通往全市**38**个区域
- **仅有8个区域是主要目的地**

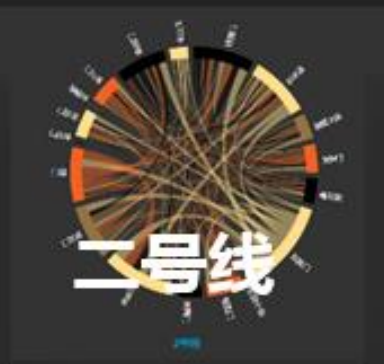
全地铁站间换乘

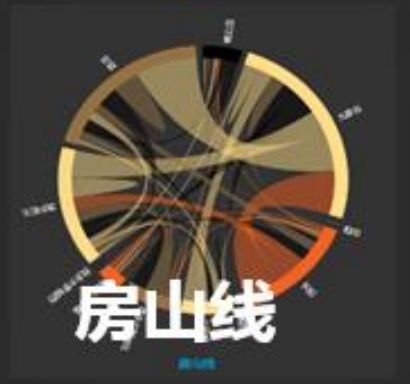


全系统分时流量

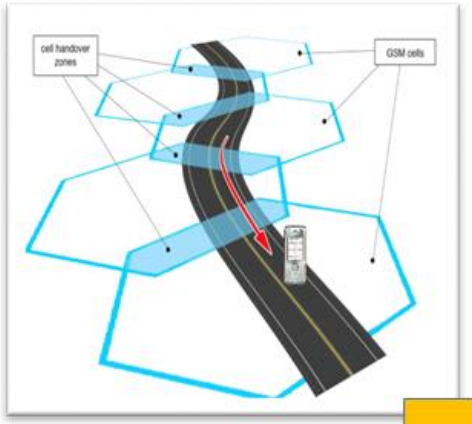


不同的线路站点流量





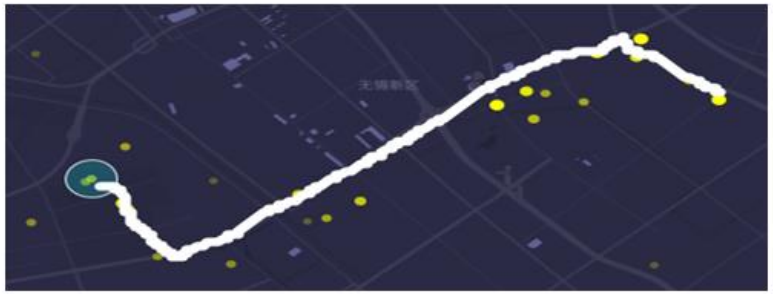
[人口画像]



手机信令

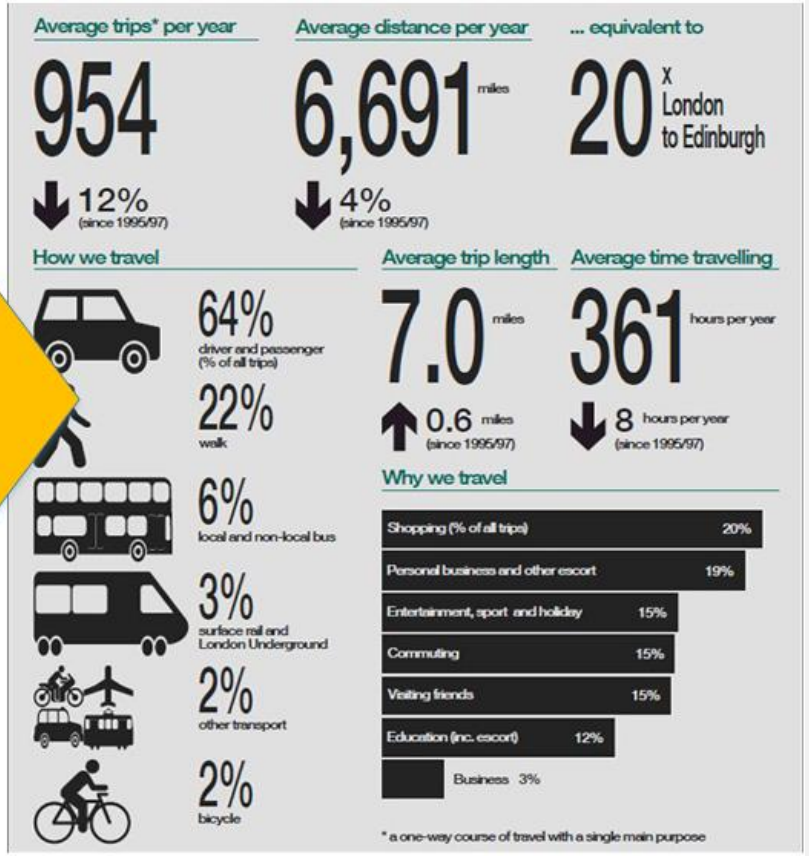
1) 恢复出行轨迹

2) 生成出行路径

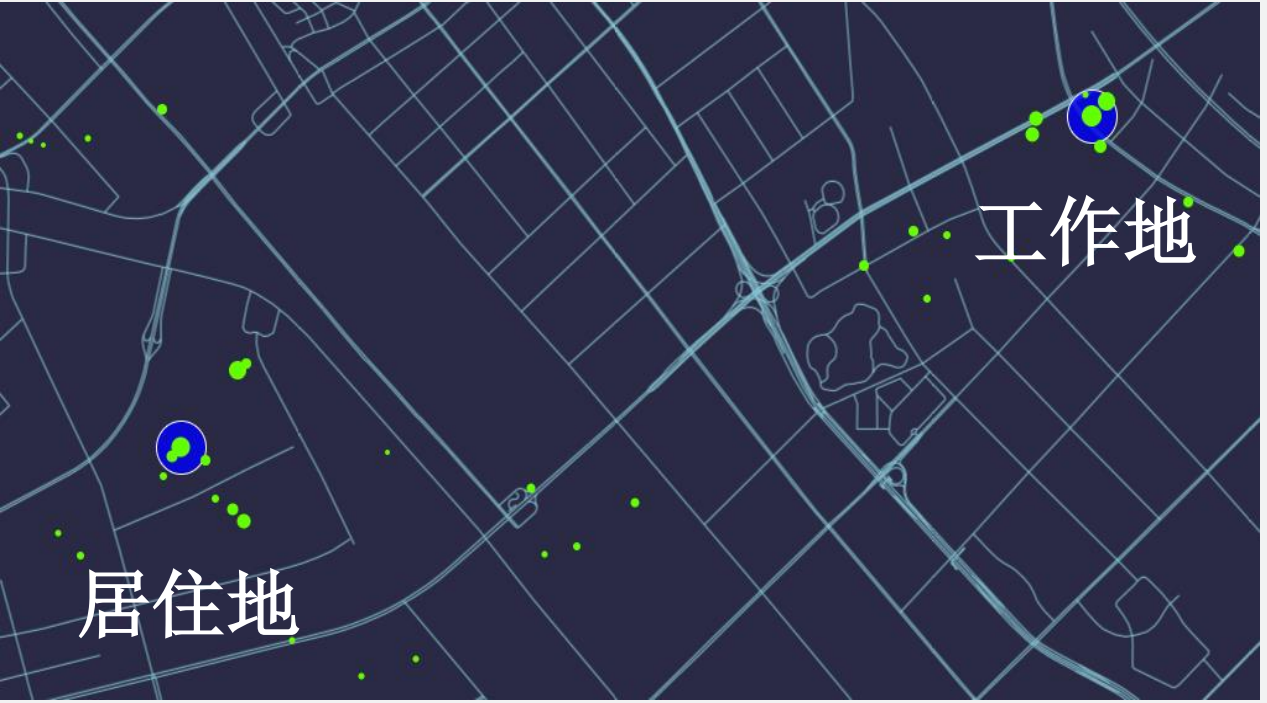


3) 推断出行方式

4) 生成调查报告



出行调查


工作地
居住地

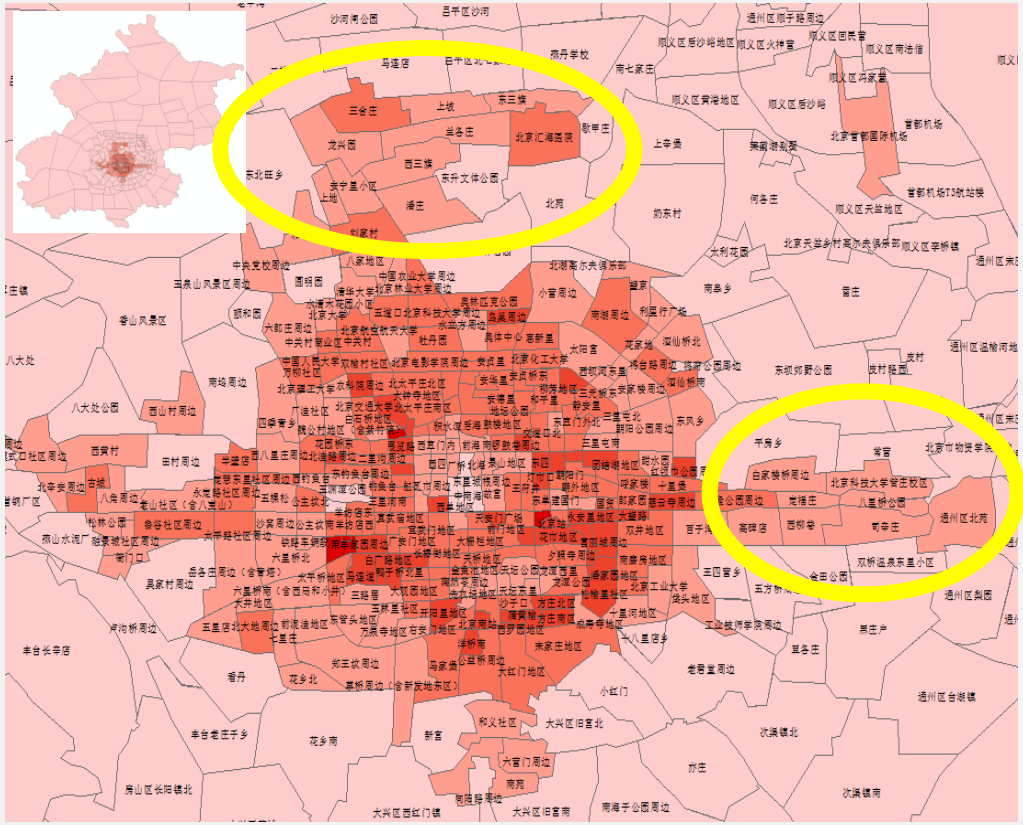
工作地
居住地
15
54
2
0
83
35
27
4
49
40
57
66
18
11
13
34
46

工作地
居住地
15
54
18
11
13
34
46
0
83
35
27
4
49
40
57
66

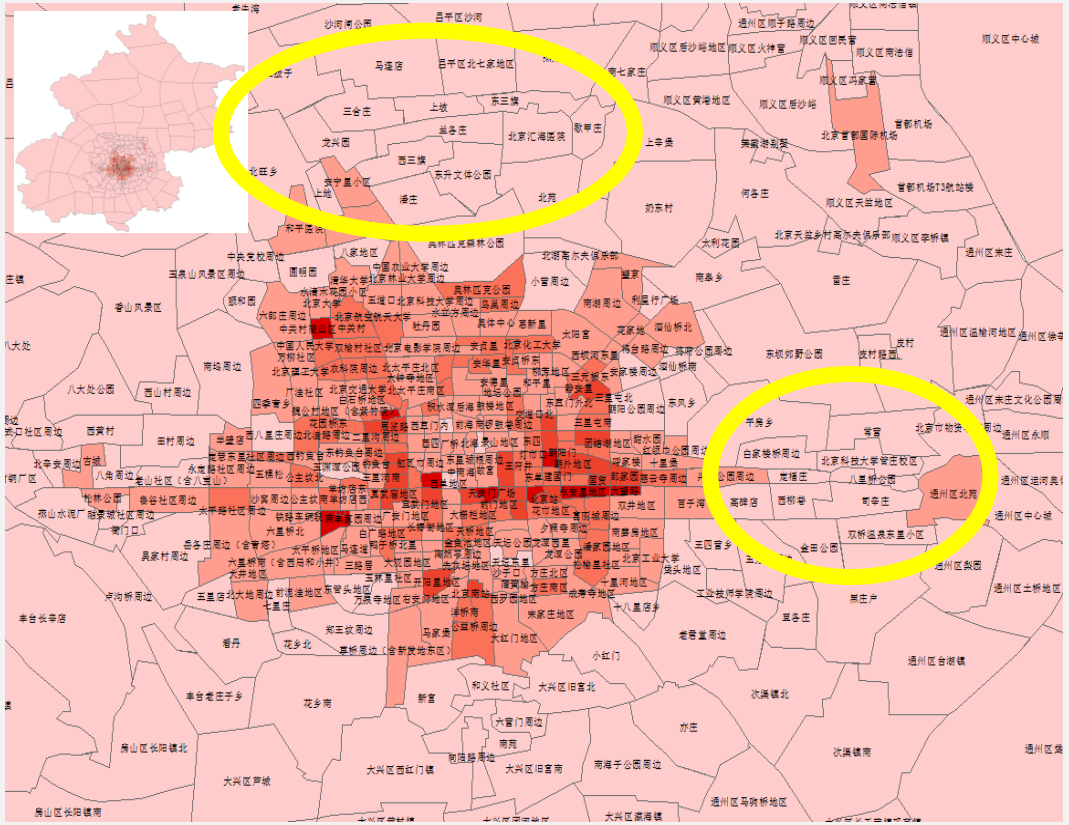
工作地
居住地

北京市民的**职住分布**

居住地分布

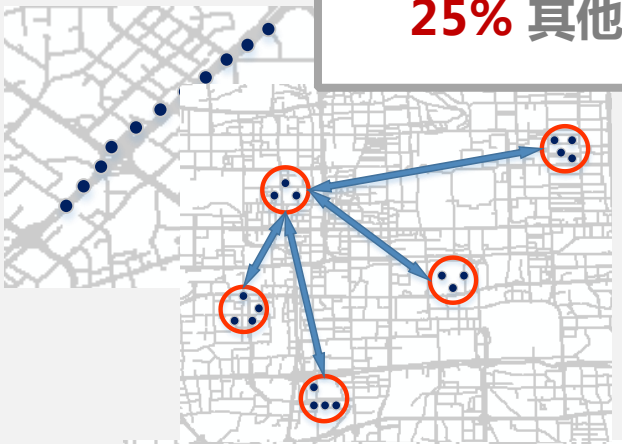


工作地分布

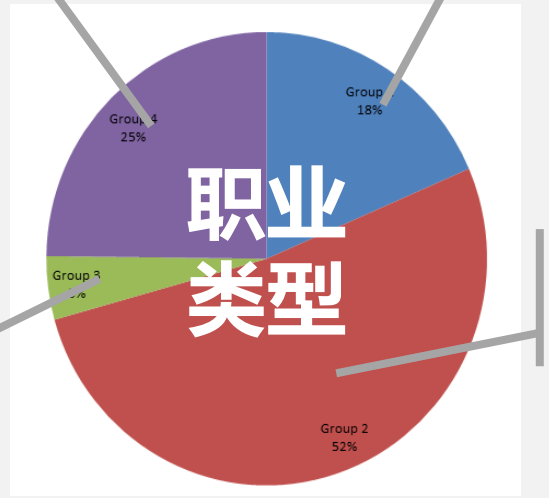


影响交通的职业构成

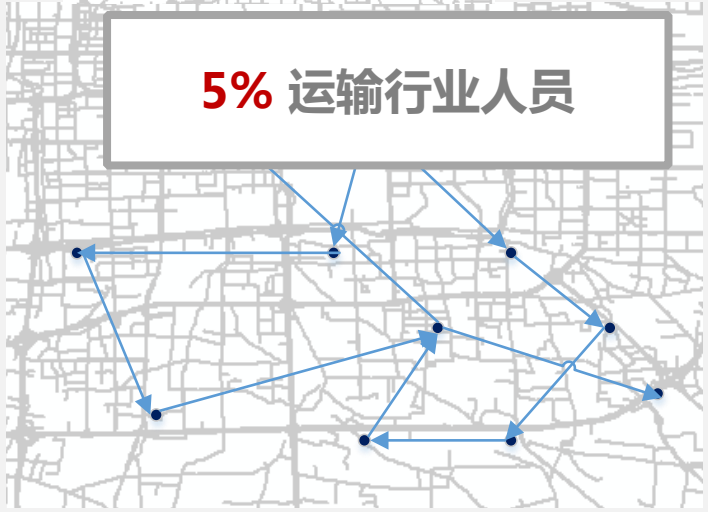
25% 其他类型



18% 居家人员

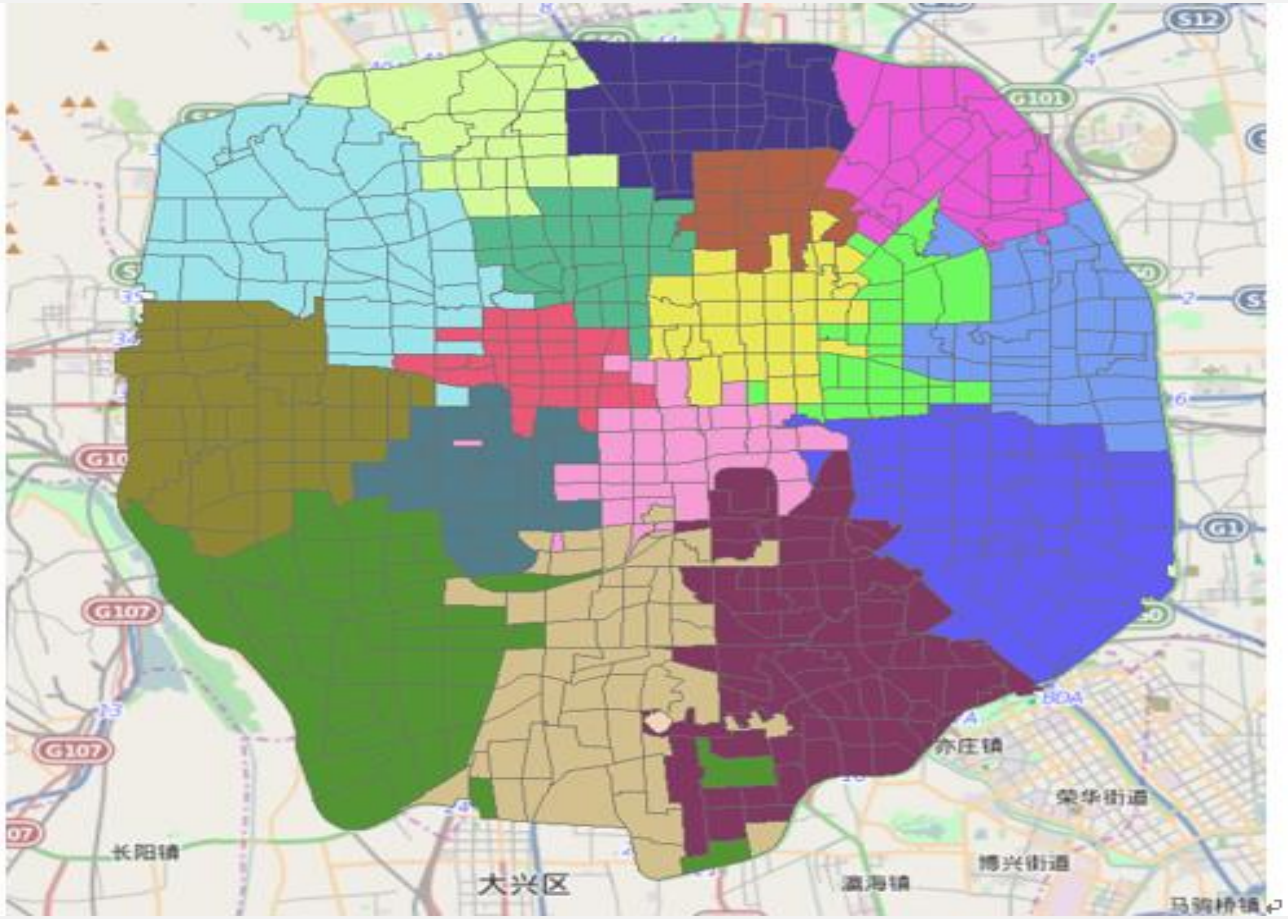


5% 运输行业人员

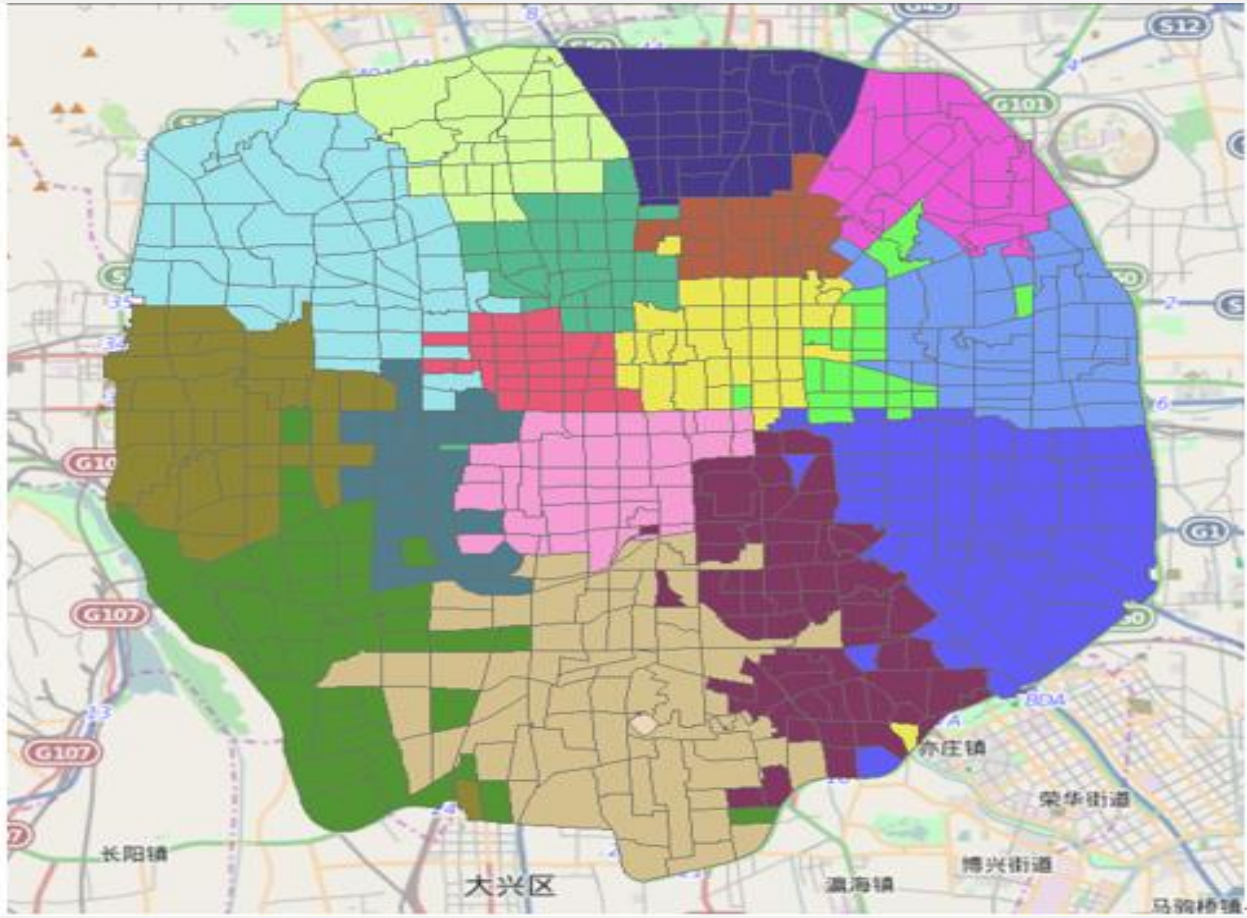


52% 通勤人员

北京城市结构变化

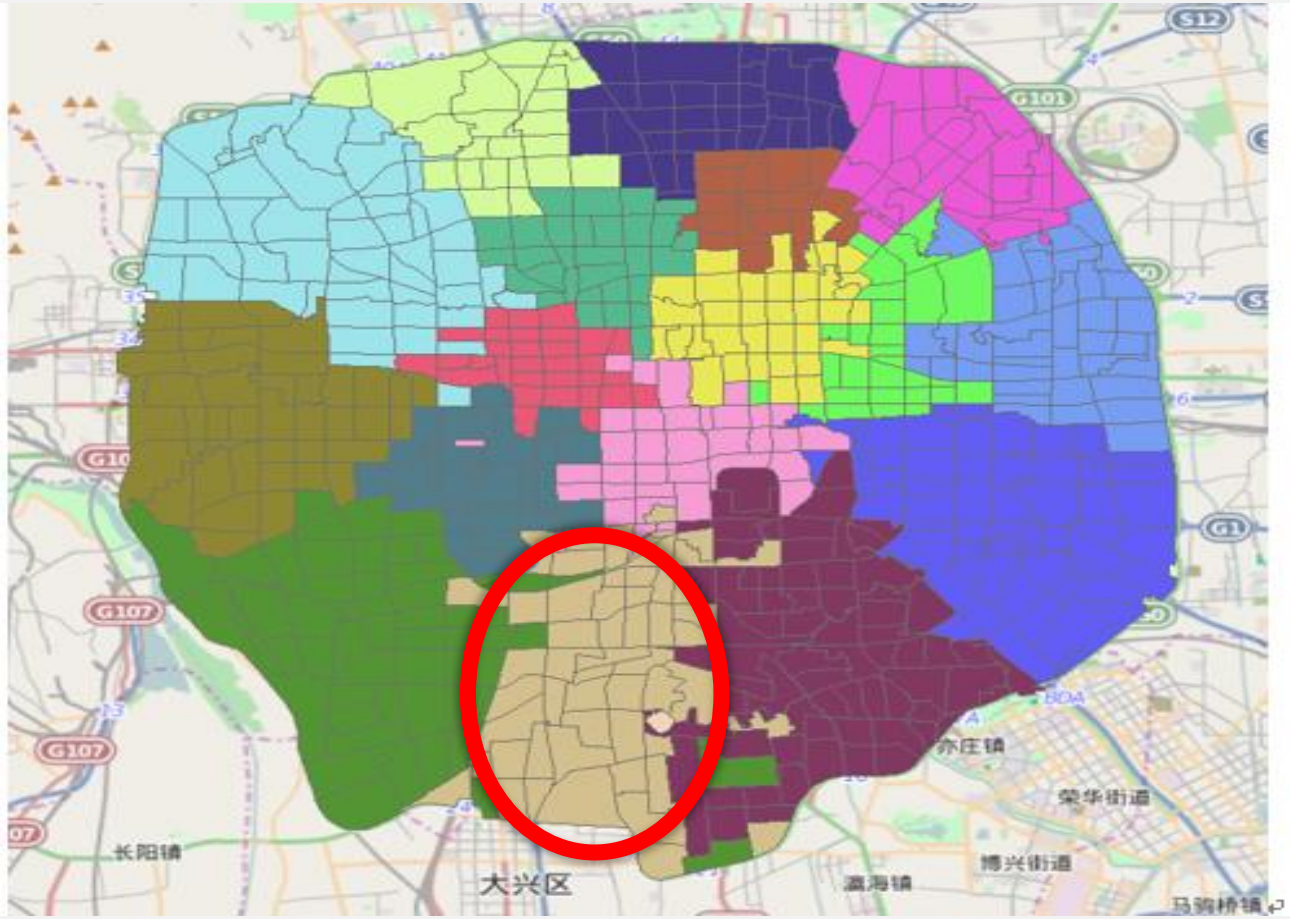


2012

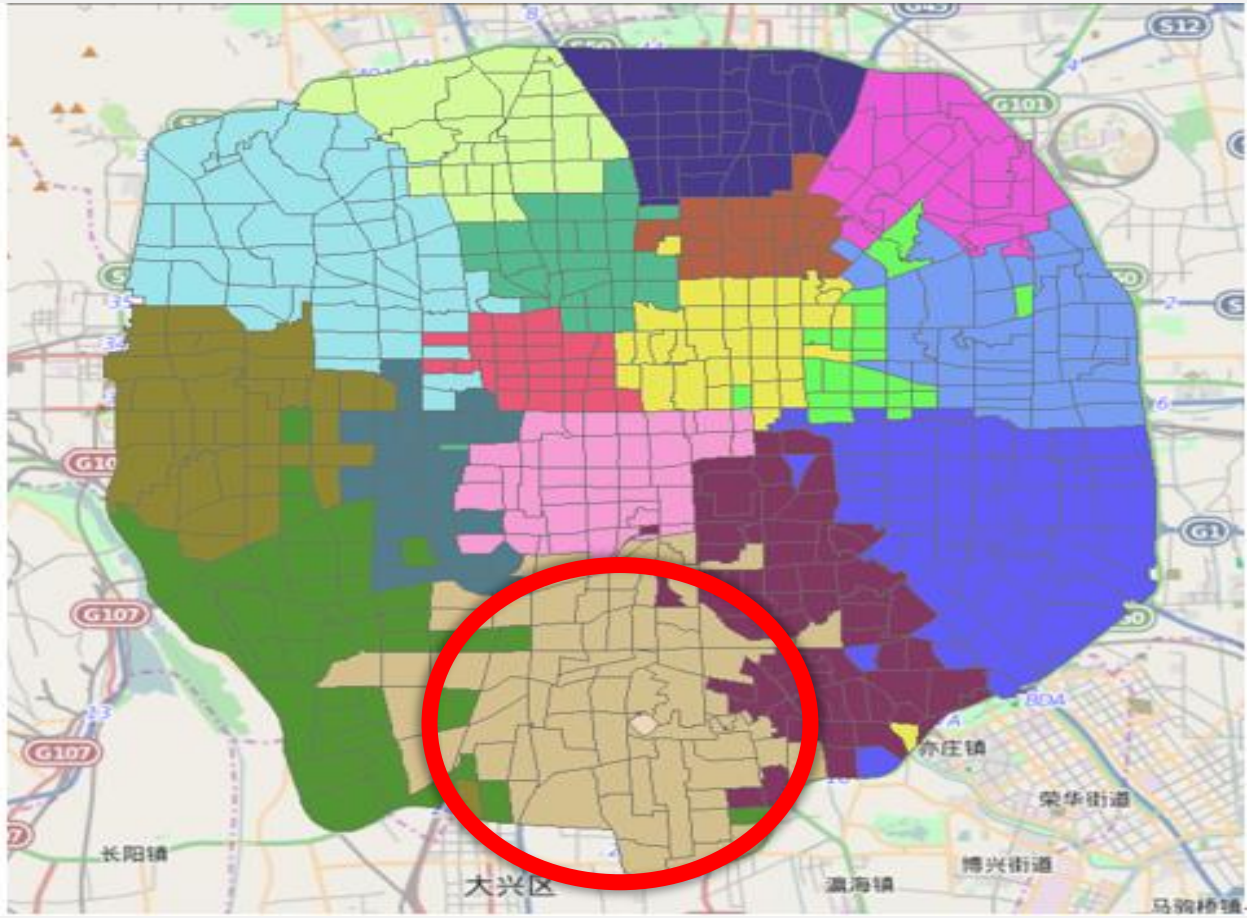


2015

北京城市结构变化

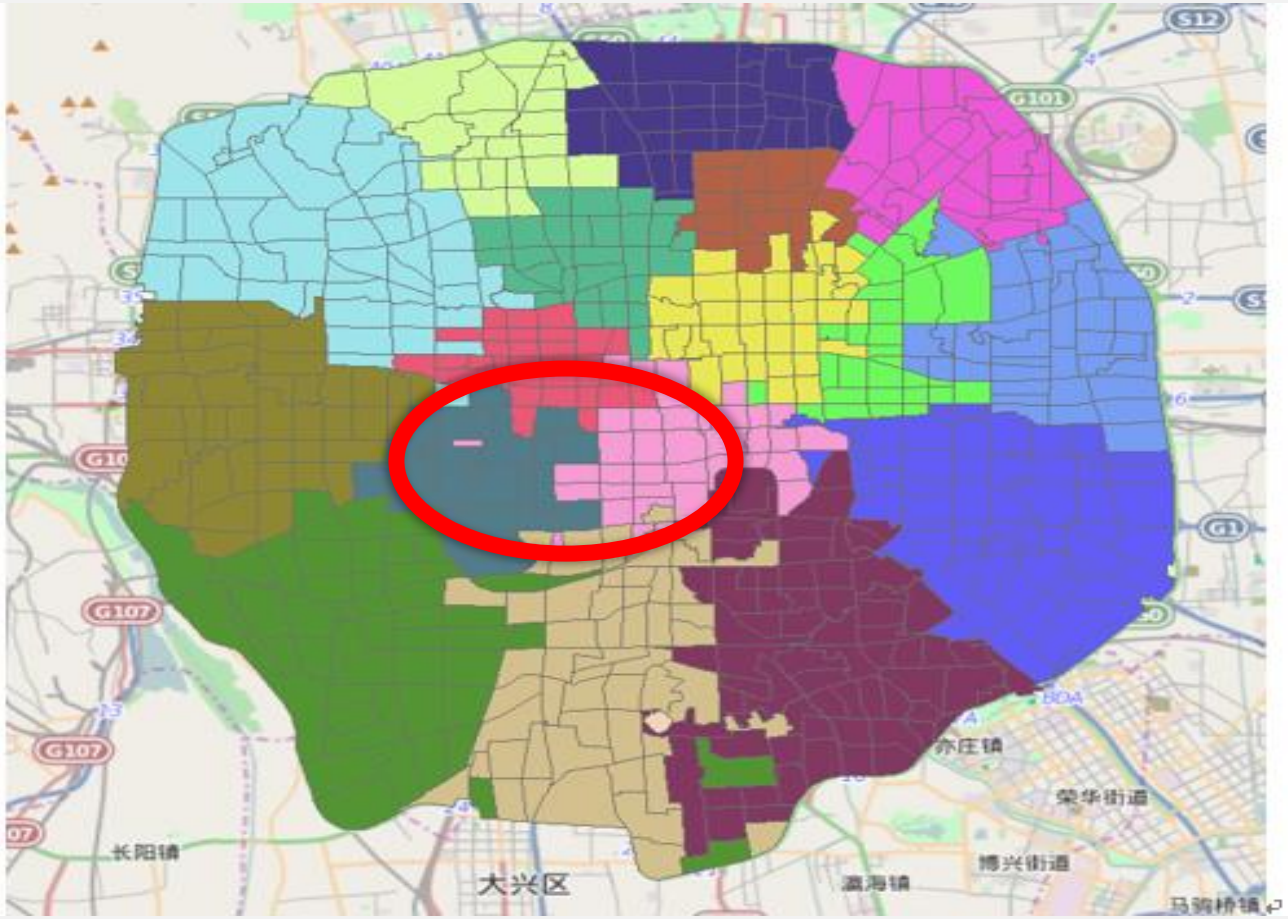


2012

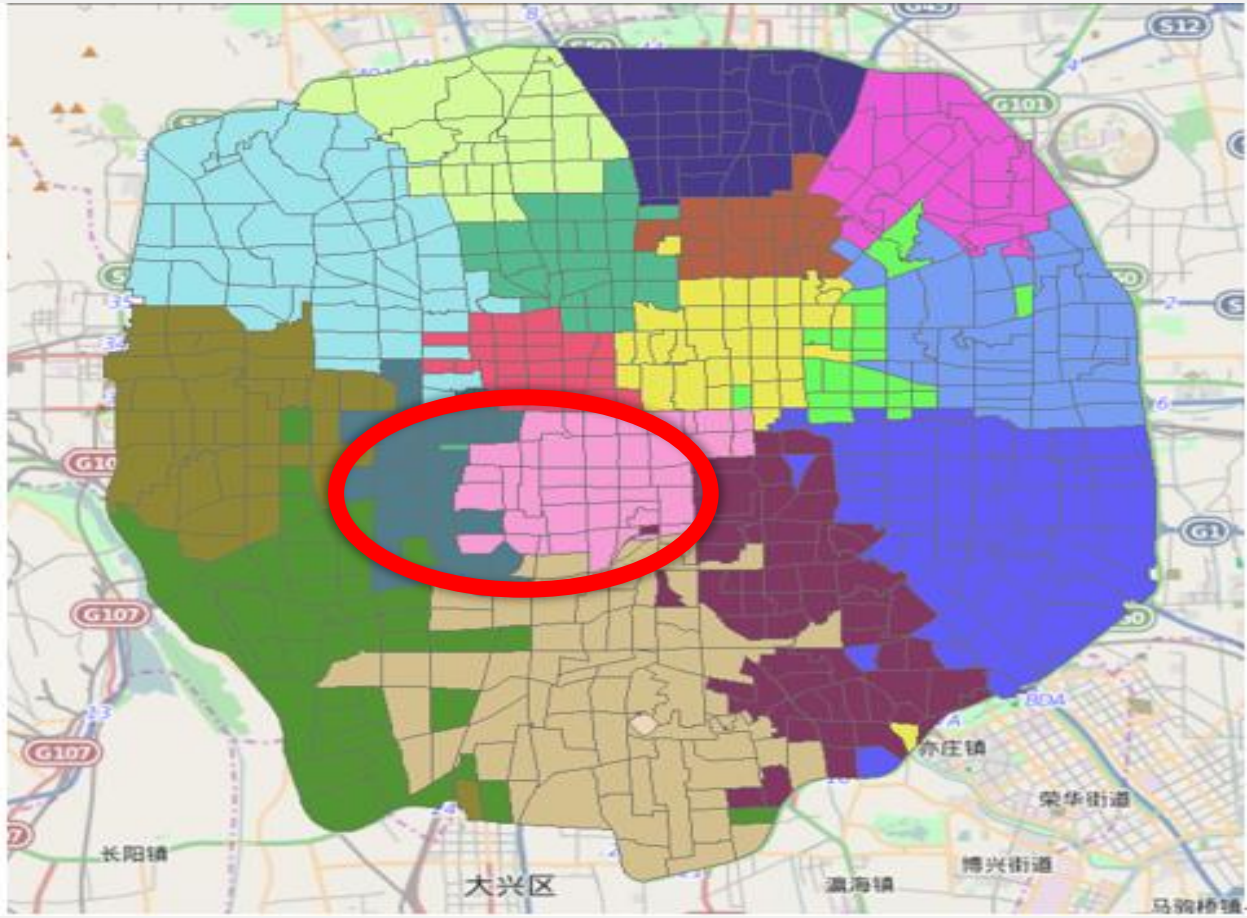


2015

北京城市结构变化

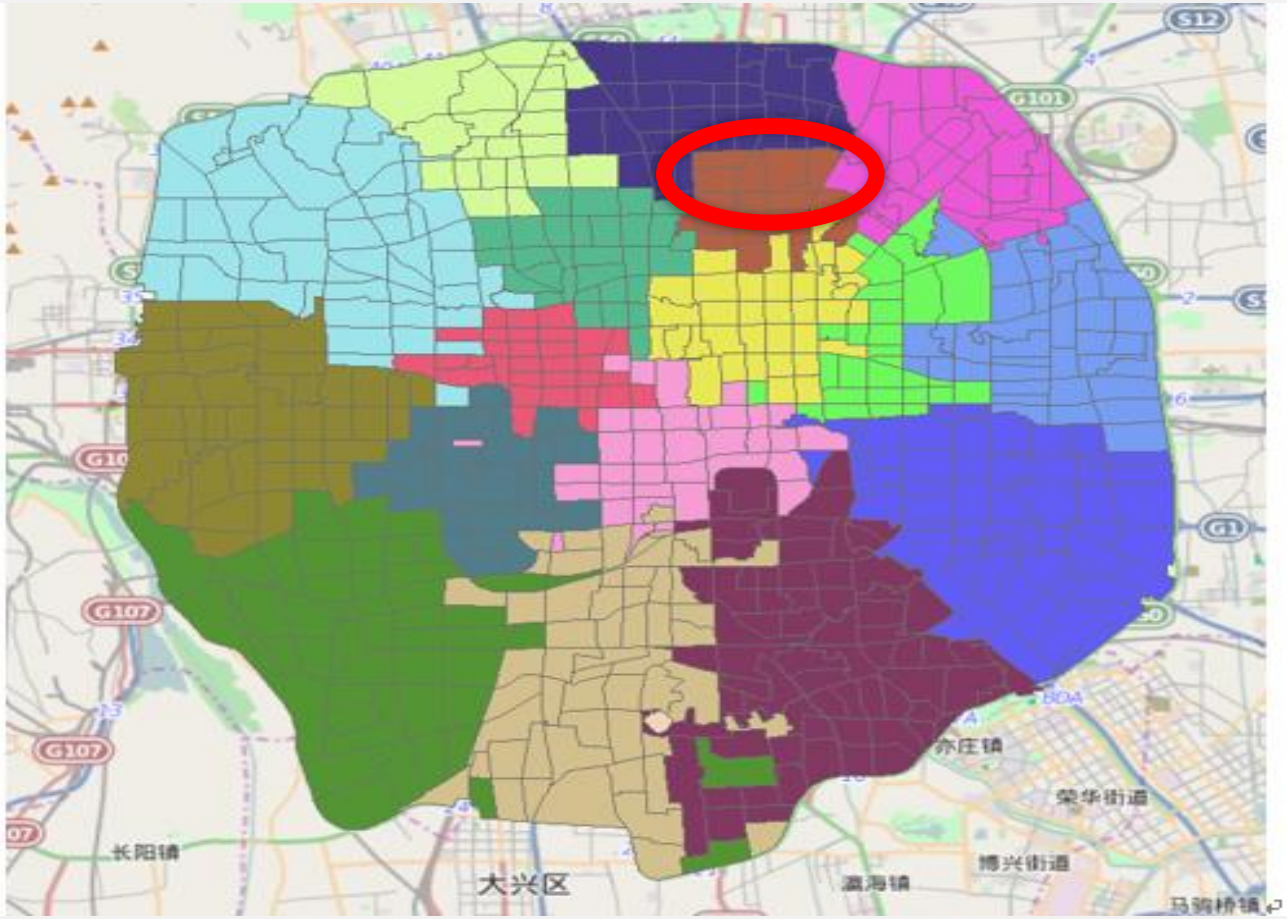


2012

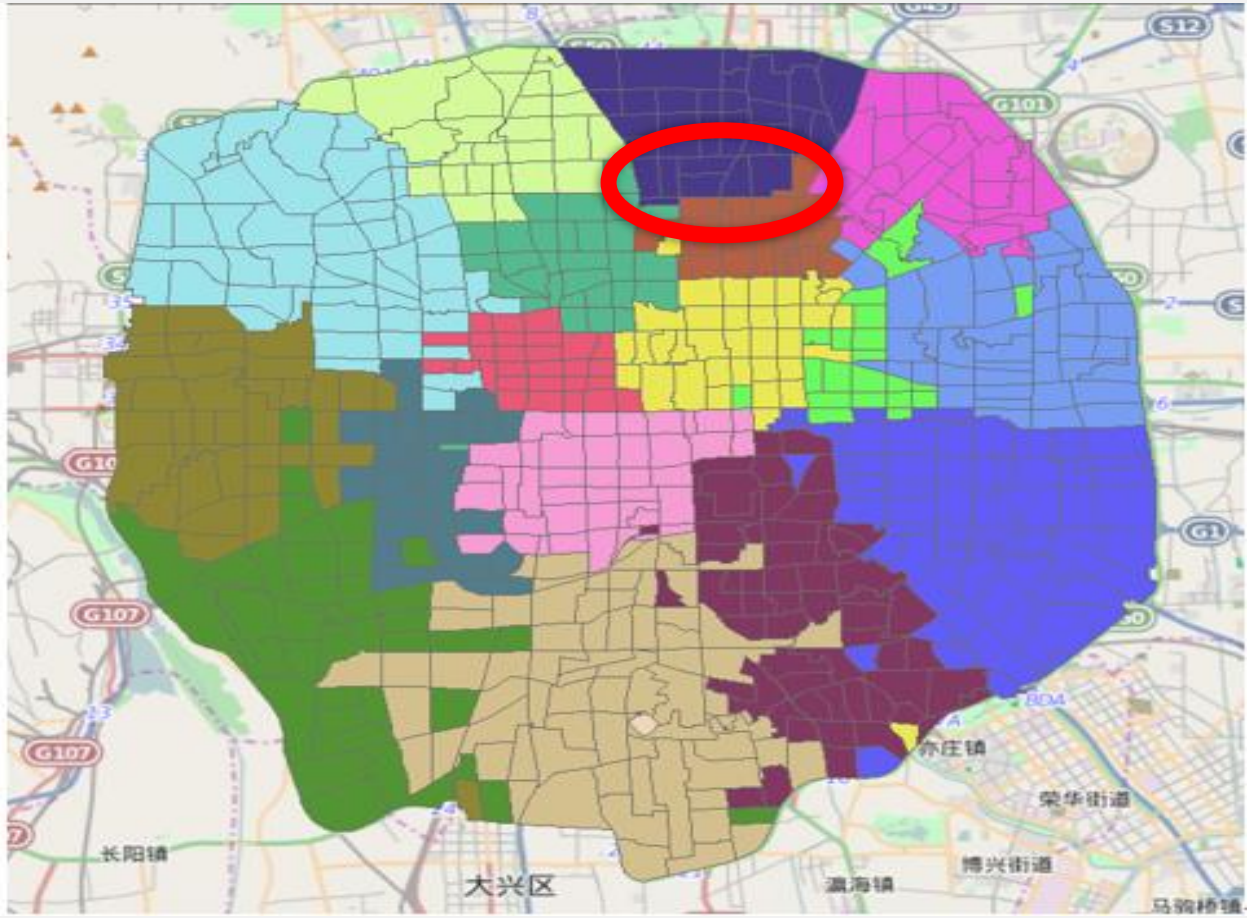


2015

北京城市结构变化

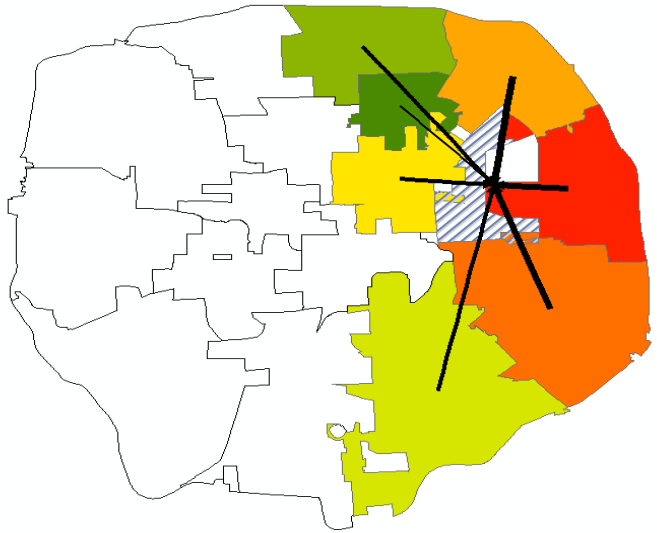


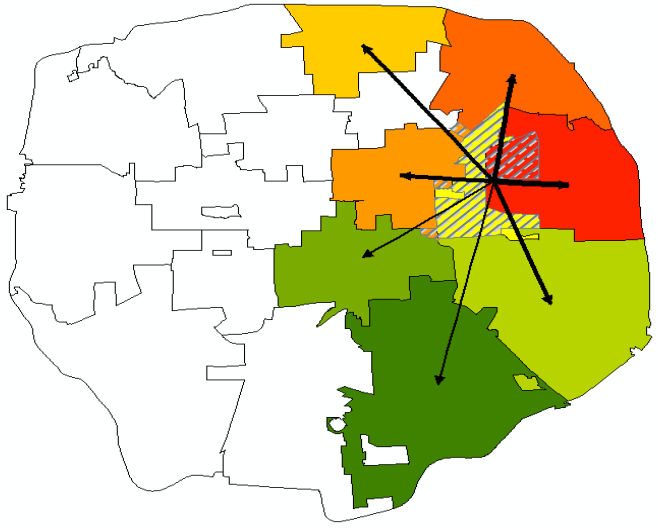
2012



2015

北京城市功能中心





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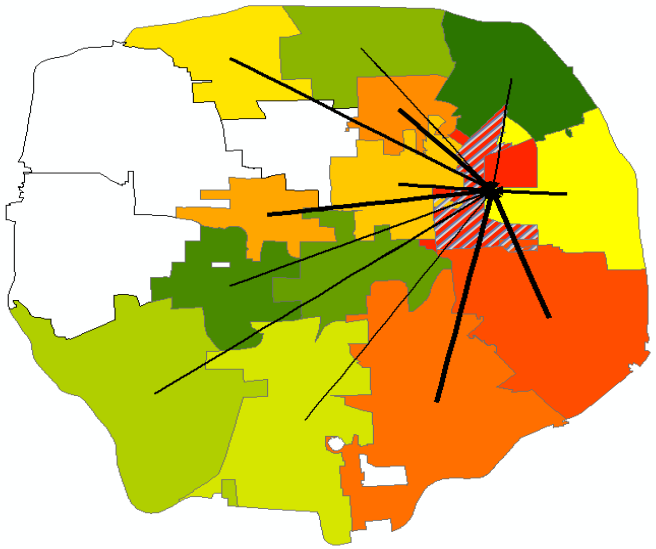
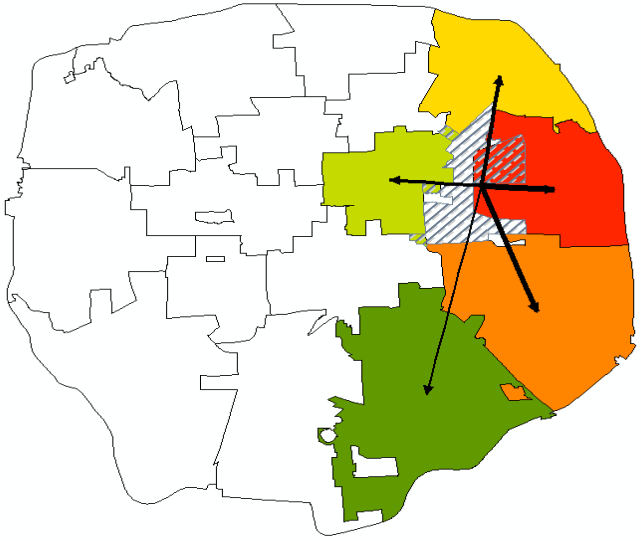
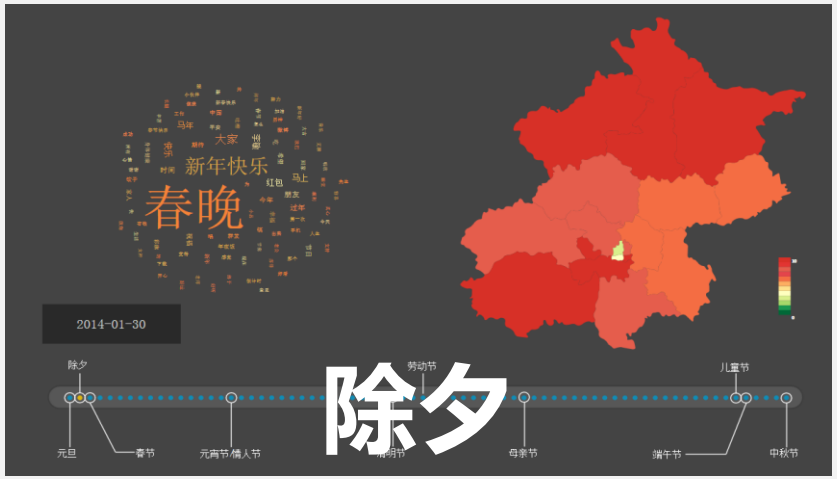


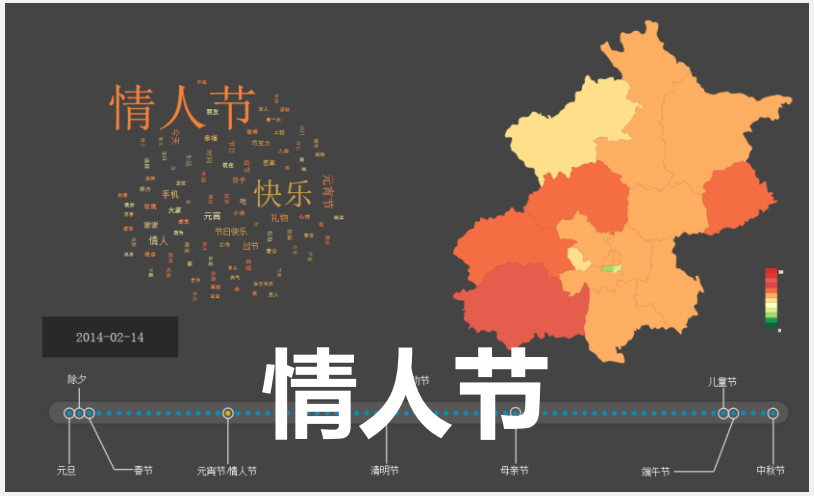


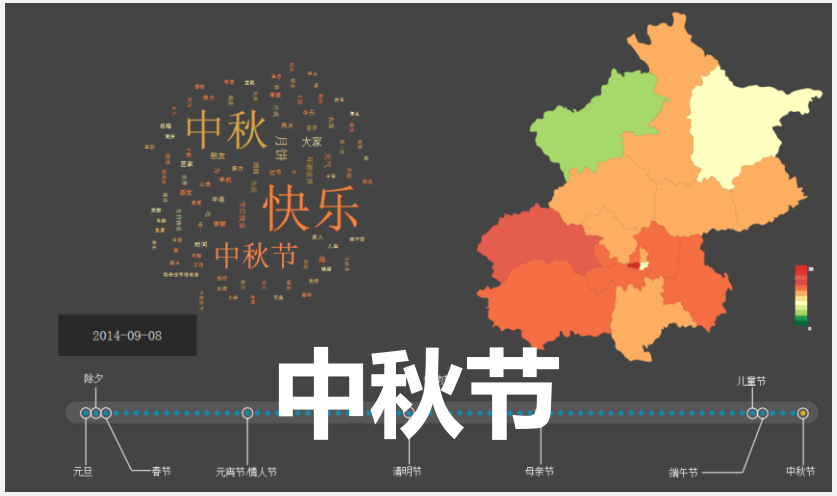
[心情画像]

城市心情指数-正面情绪

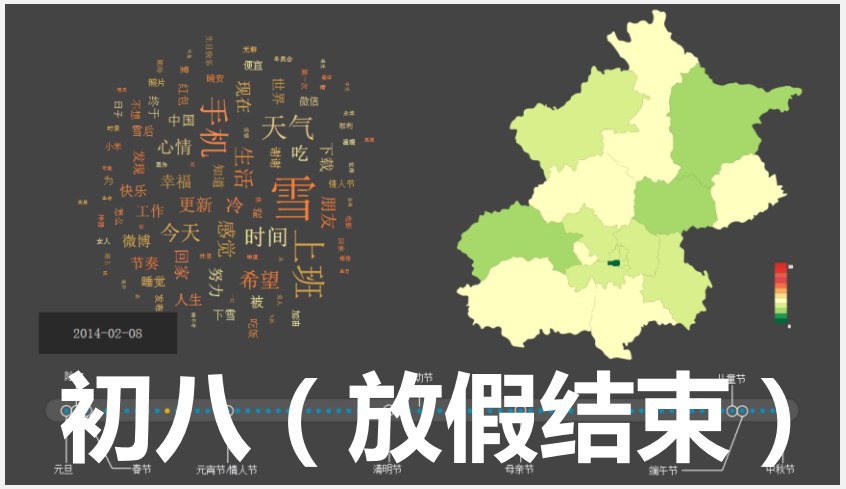
新年快乐
2014-01-01
元旦

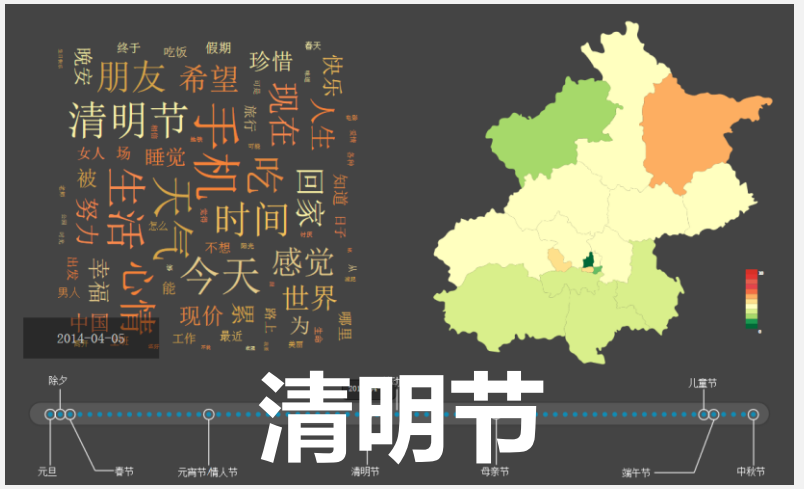

春晚
新年快乐
2014-01-30
除夕

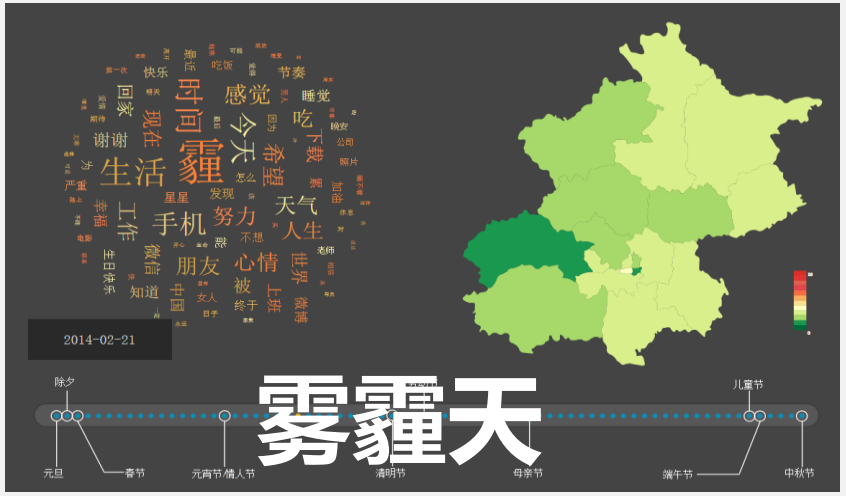

情人节
快乐
2014-02-14
情人节

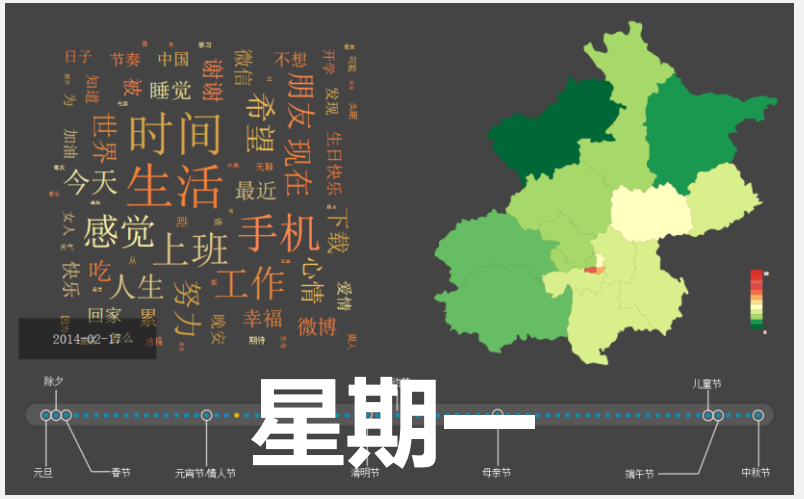

中秋
快乐
中秋节
2014-09-08
中秋节

城市心情指数-负面情绪









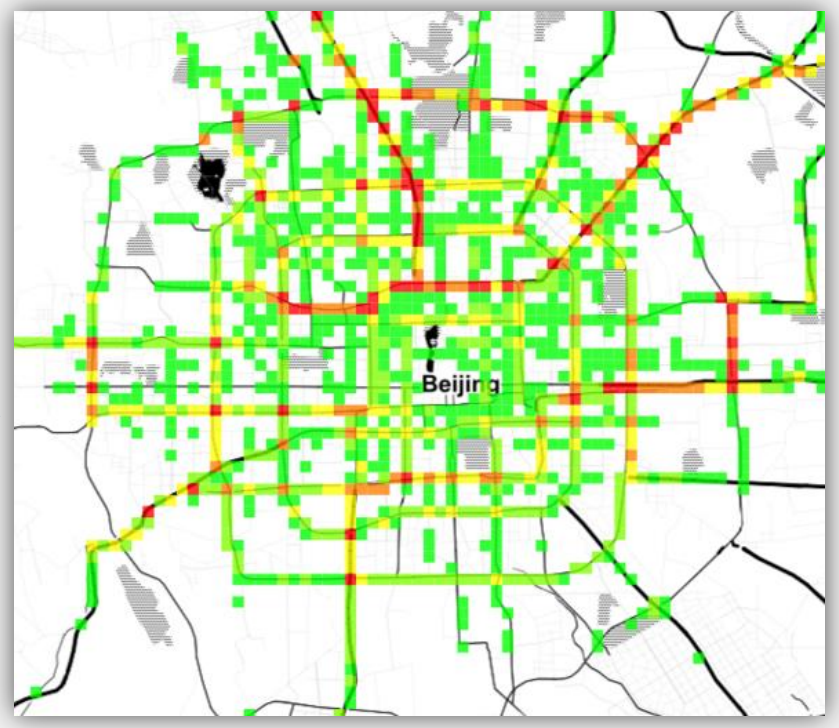
[安全画像]

多源数据融合：北京安全地图

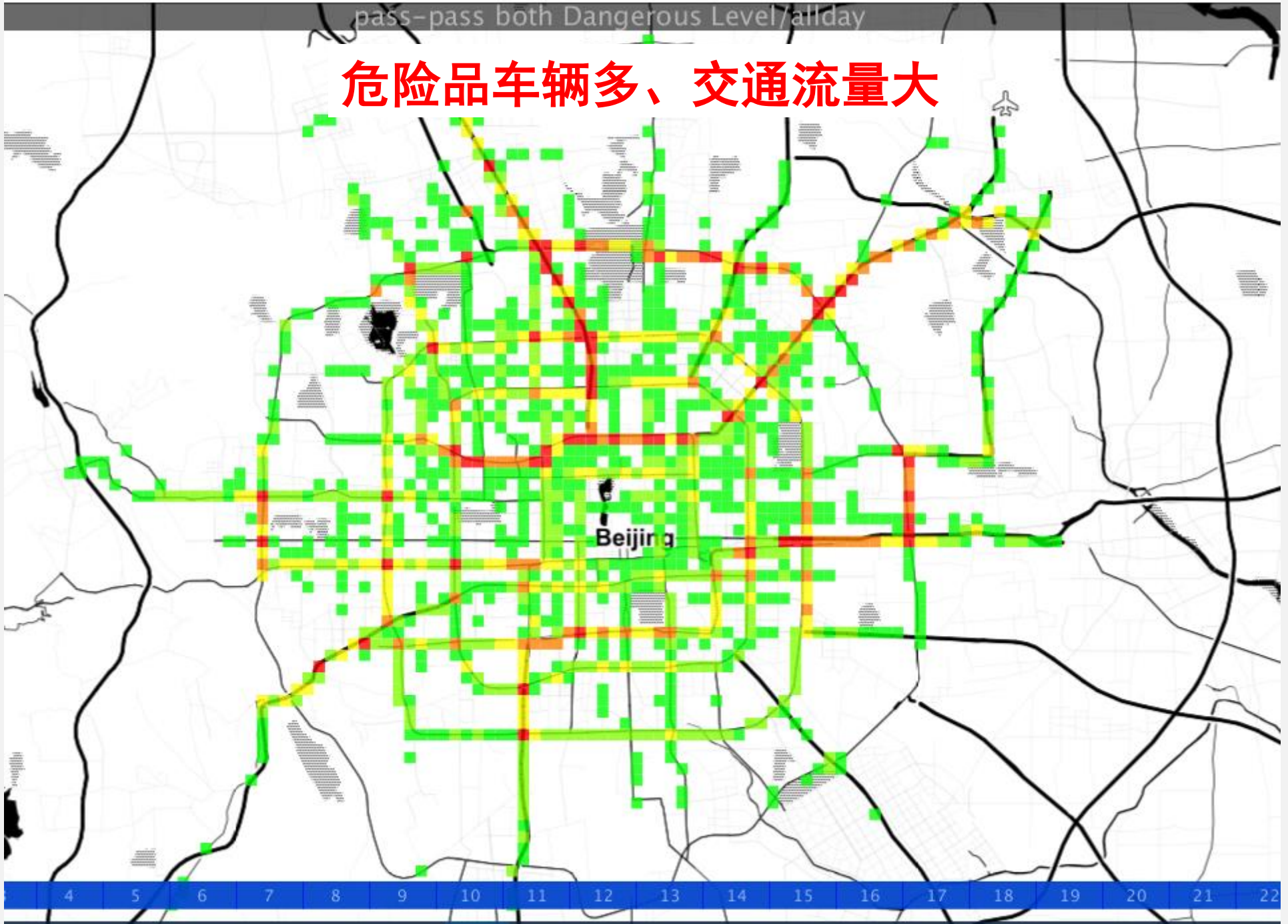
出租车
数据

危险品
数据

手机位置
数据



北京安全等级
评价地图


pass-pass both Dangerous Level/allday
危险品车辆多、交通流量大
Beijing
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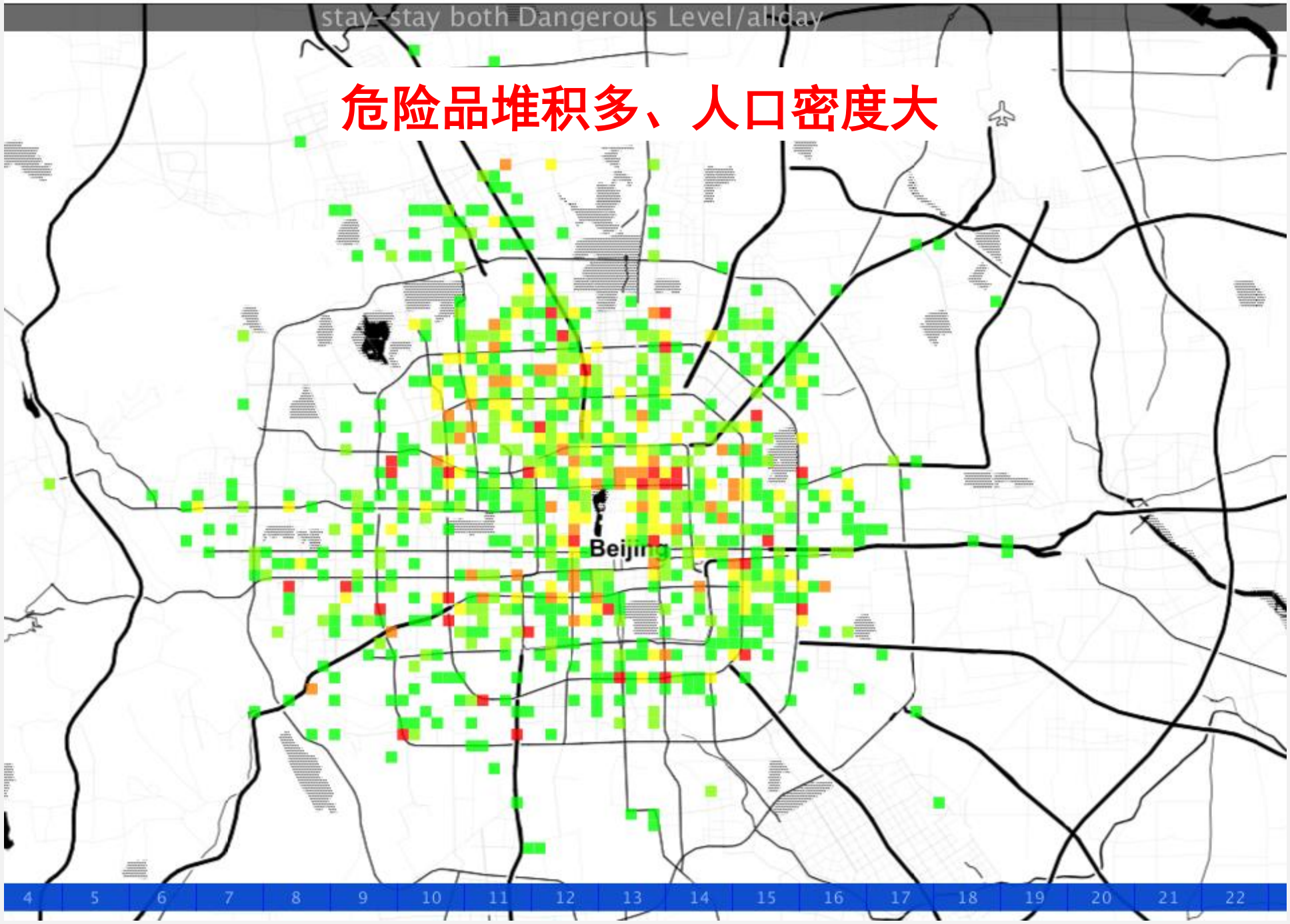
stay-stay both Dangerous Level/allday
危险品堆积多、人口密度大
Beijing
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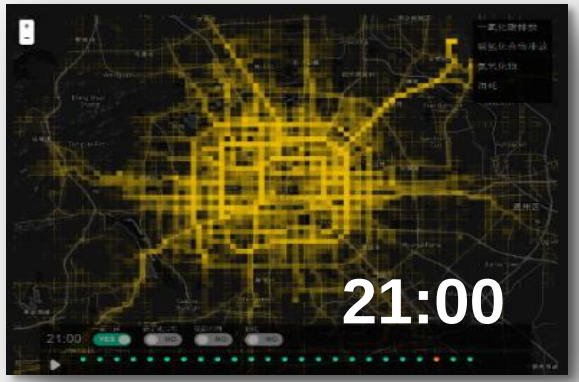
[环境画像]

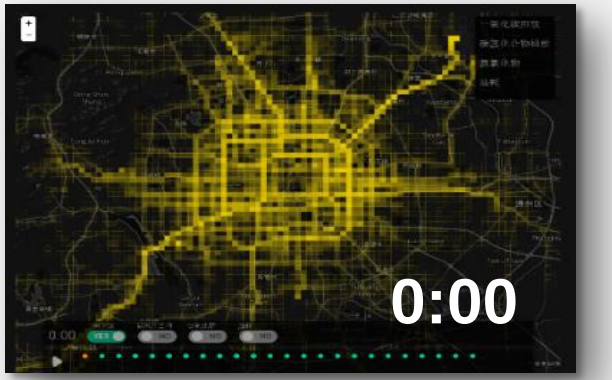
车辆轨迹

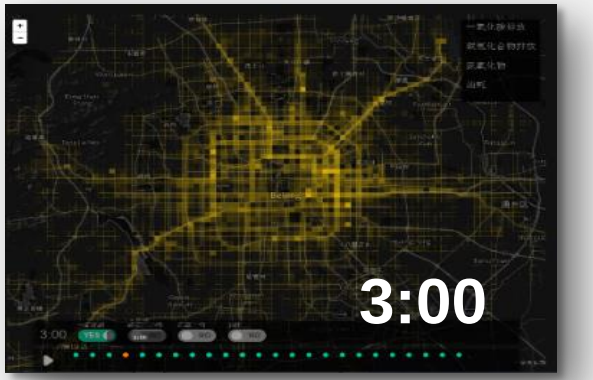
交通强度

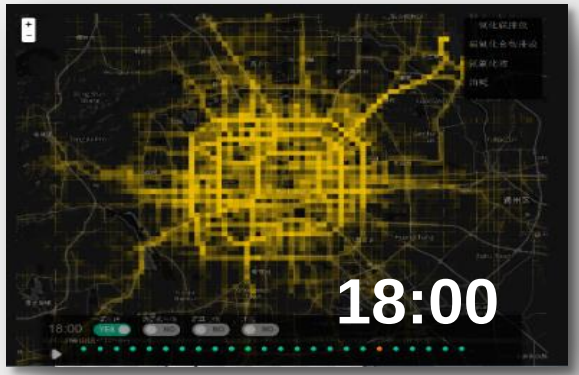
能耗排放

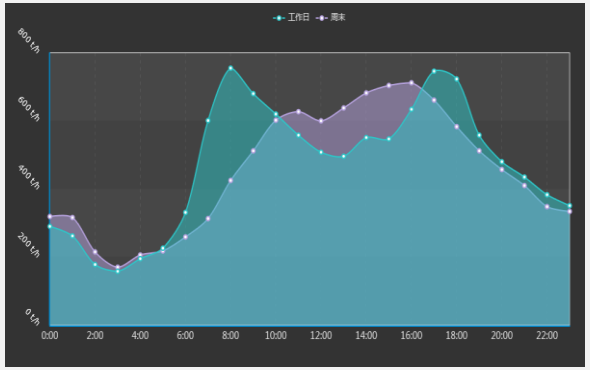
大气质量

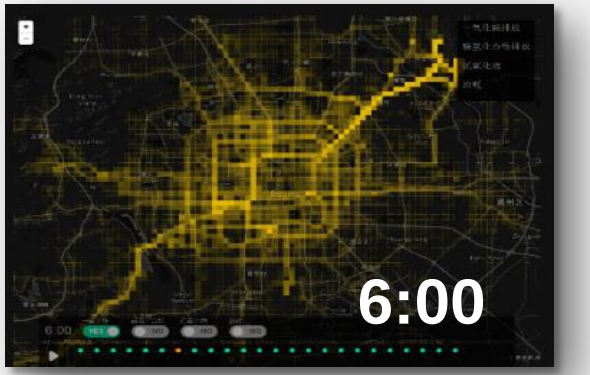


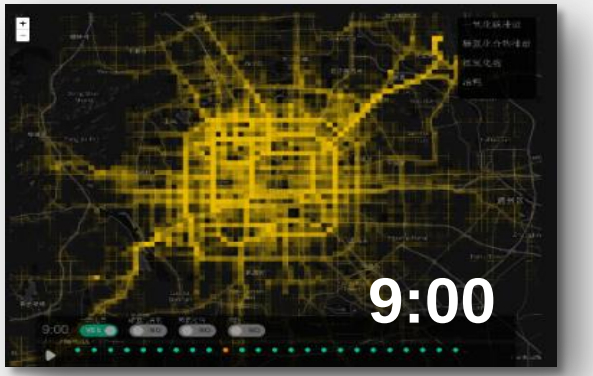


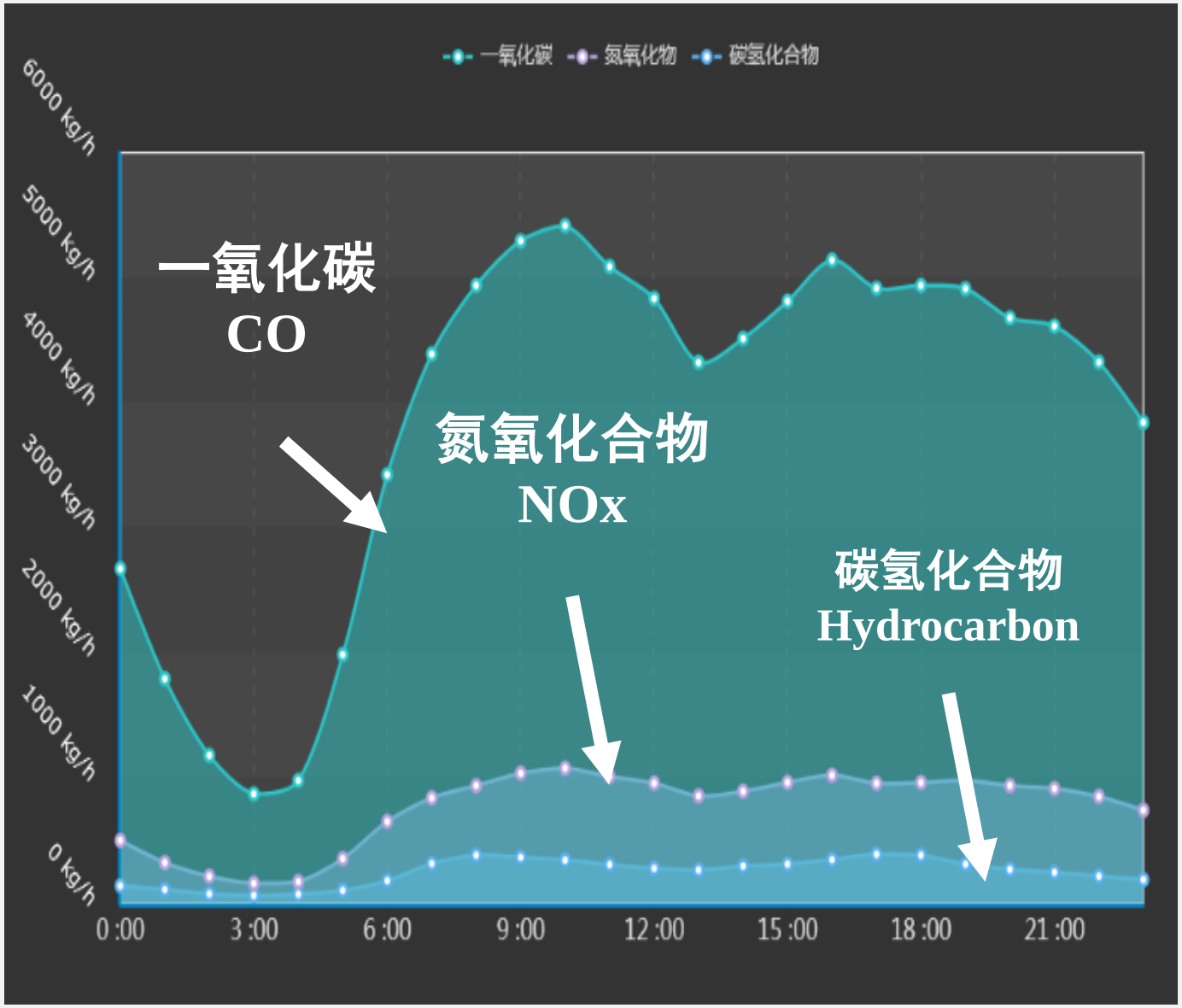






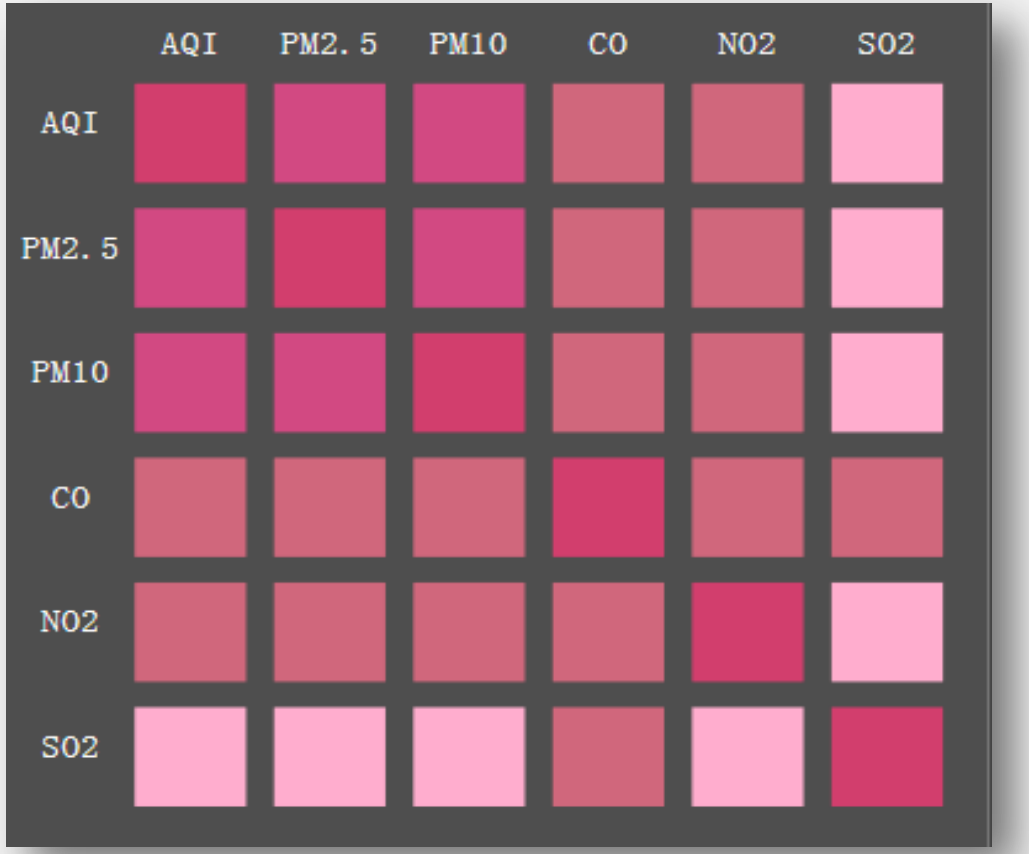


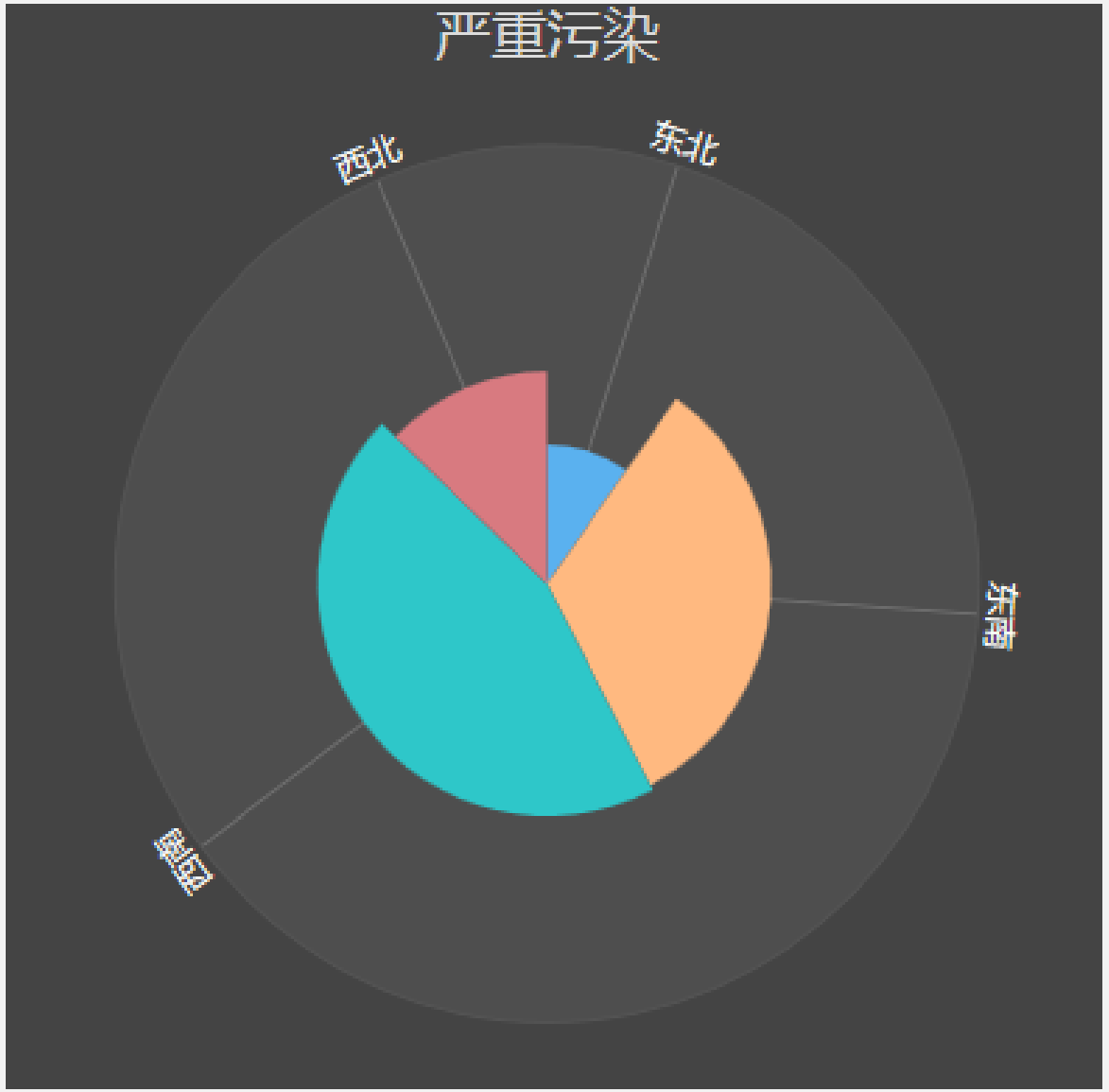


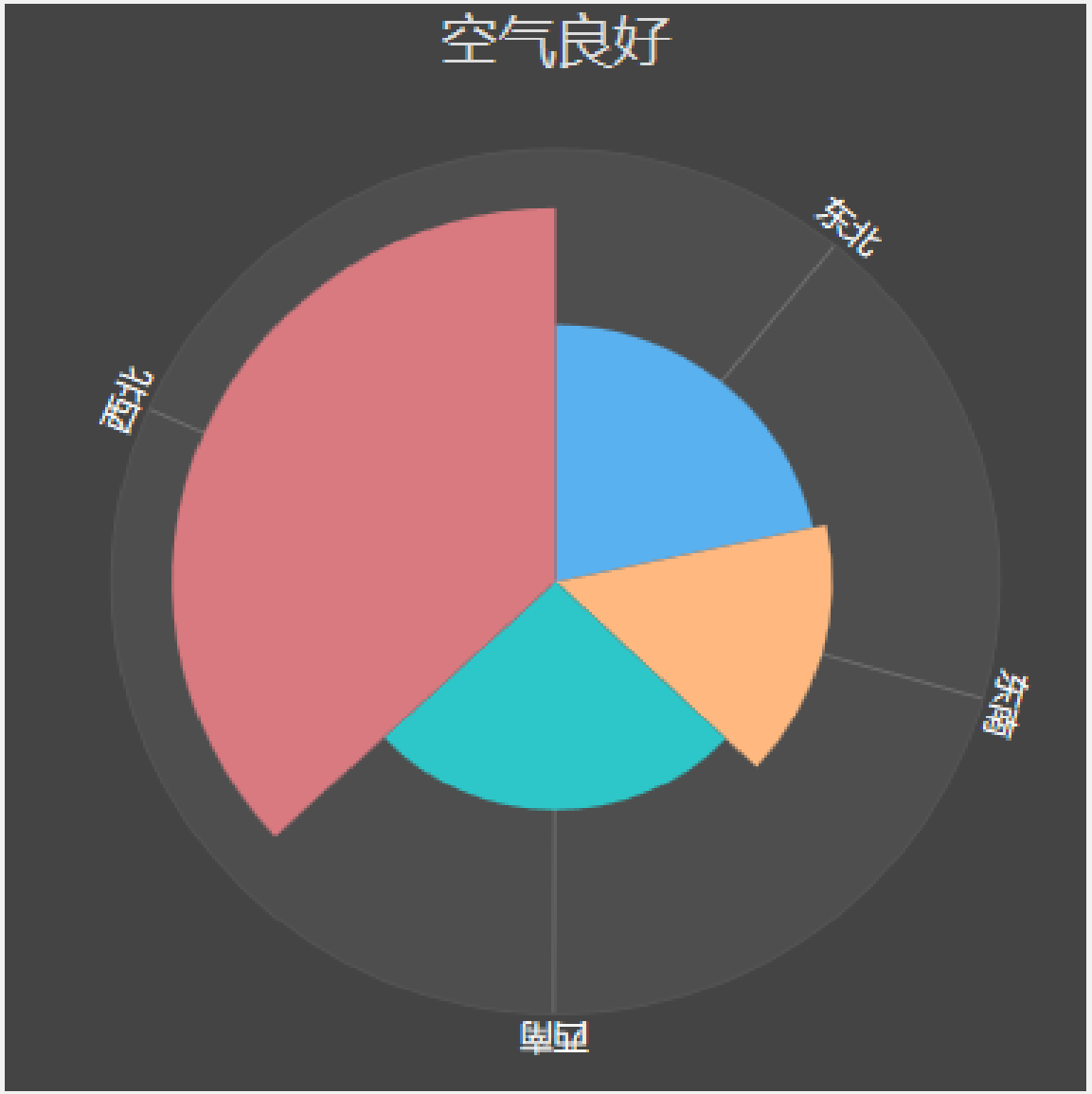


一氧化碳是最主要的污染排放物

一氧化碳与PM2.5相关性很强，模型可以帮助政府进行**PM2.5治理**




严重污染
西北
东北
东南
西南


空气良好
西北
东北
东南
西南

［健康画像］

多源数据融合的流行病分析

公共卫生大数据

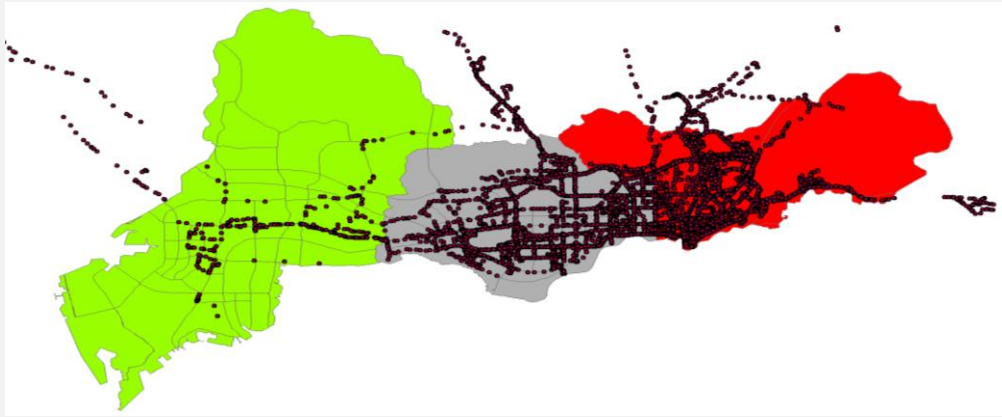
- 门诊与住院医疗数据
- 保健与健康体检数据
- 疾病控制与管理数据
- 医院与社康资源数据
- 市民与病患病史数据

融合建模

人类活动大数据

- 出租车GPS定位数据
- 公交一卡通刷卡数据
- **手机基站的定位数据**
- LBS、微博签到数据
- 城市的地理信息数据

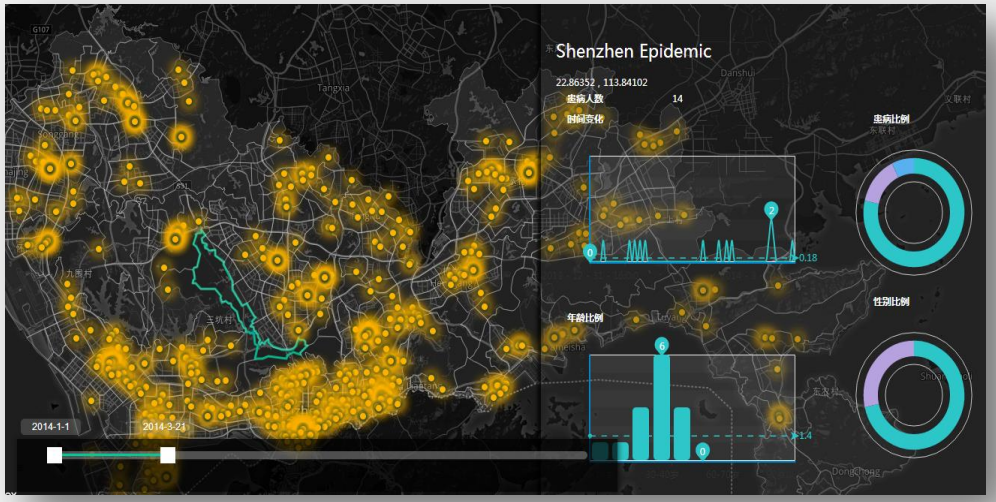
深圳公共卫生与医疗数据

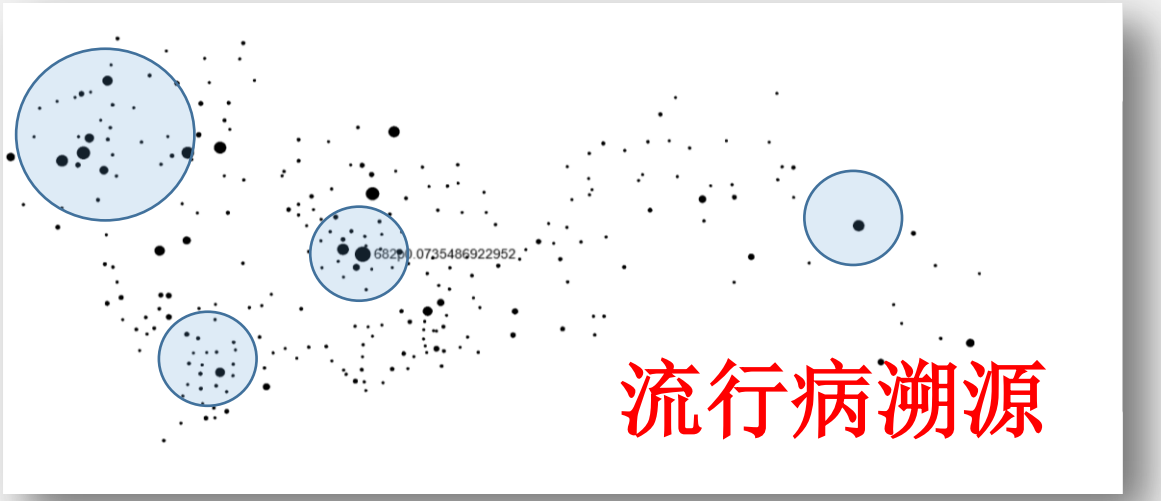


深圳地理信息+人类活动数据

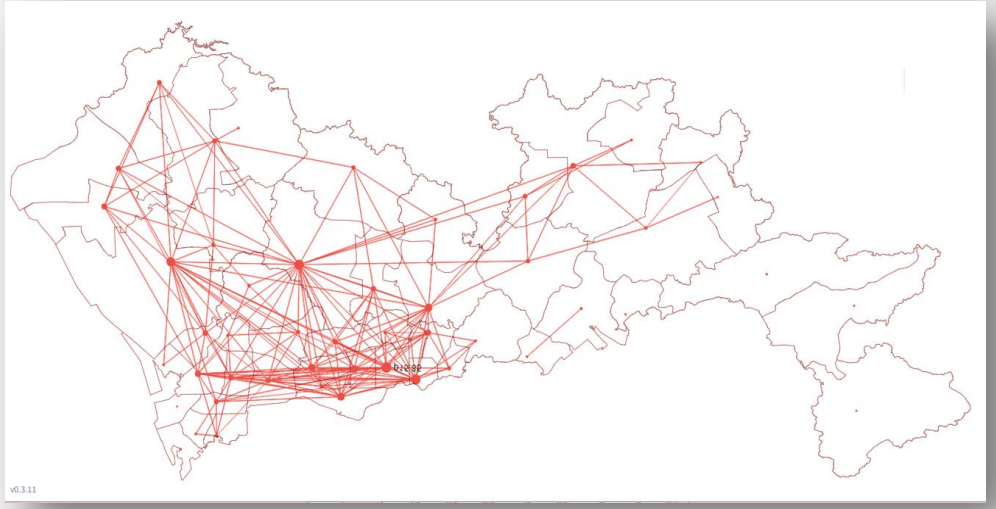
流行病传播路径分析

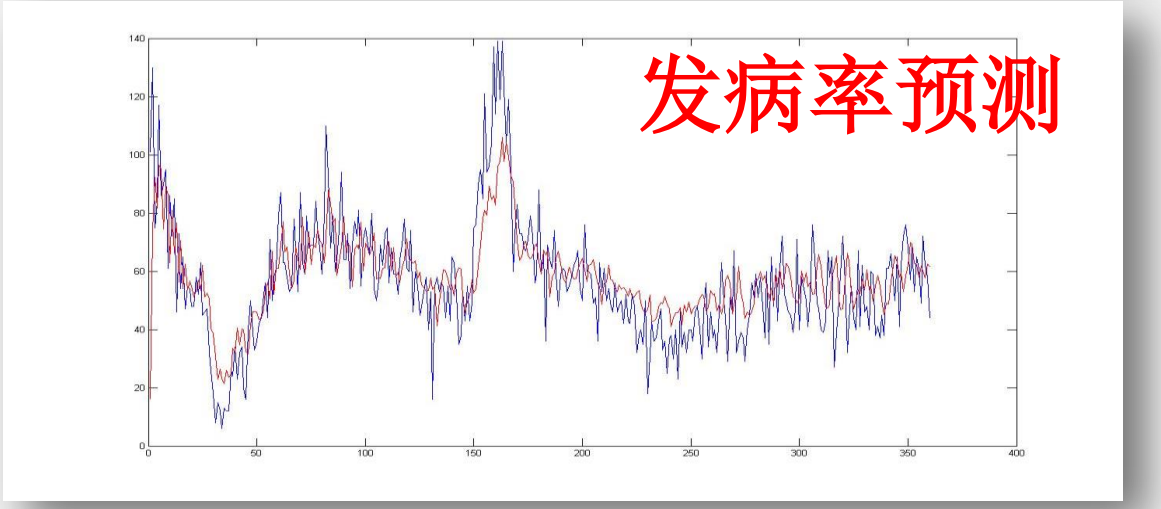
流行病
病例





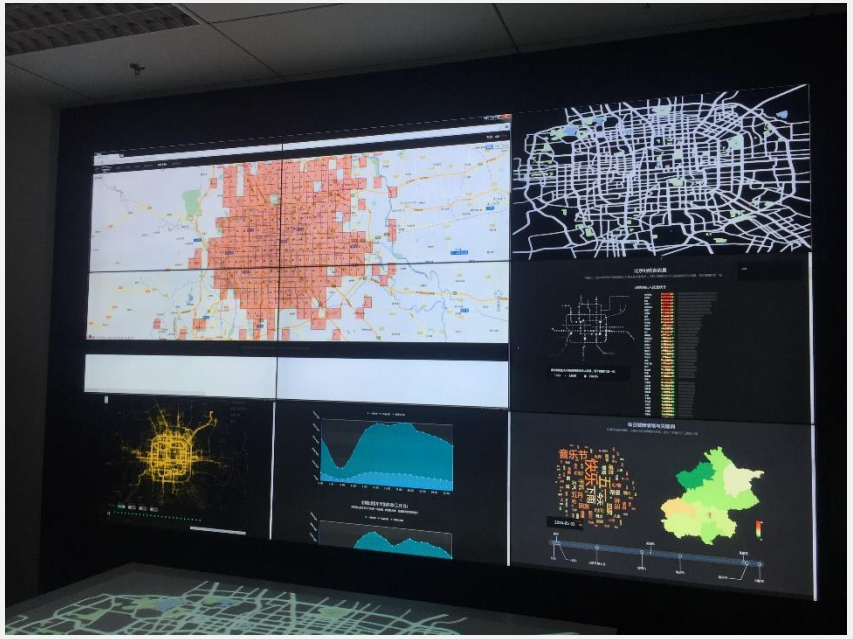
手机
信令

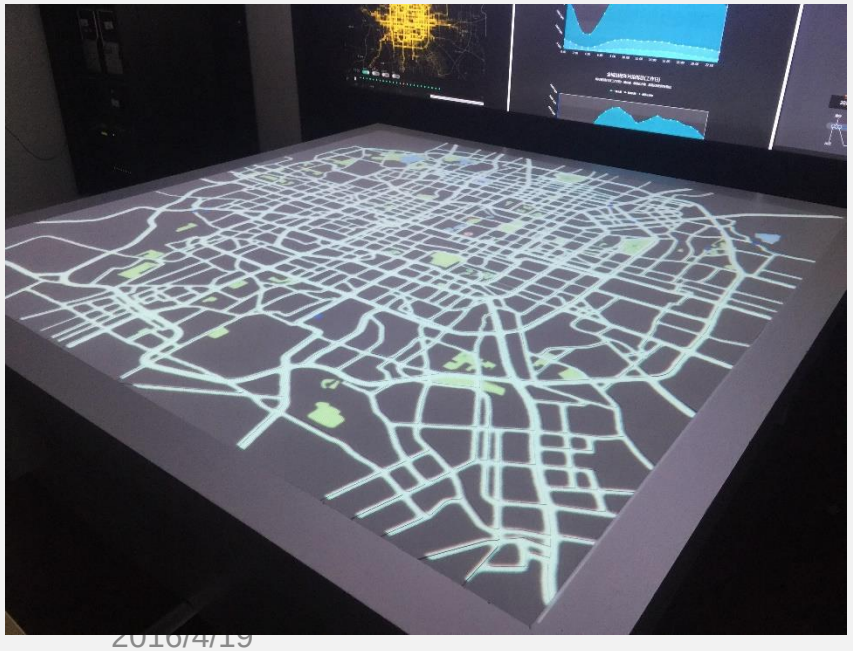




[演示环境]

演示系统





[願景]

未来城市？

愿景

汇集城市数据

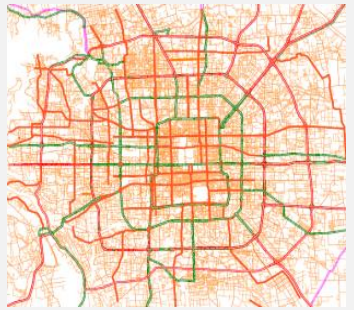
GPS

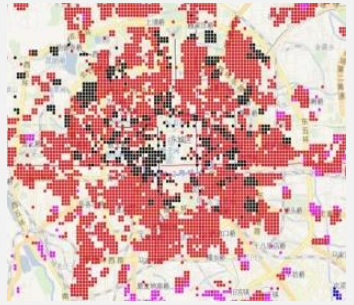
RFID

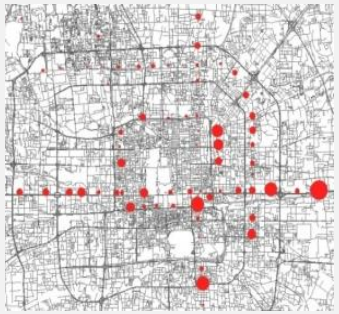
手机

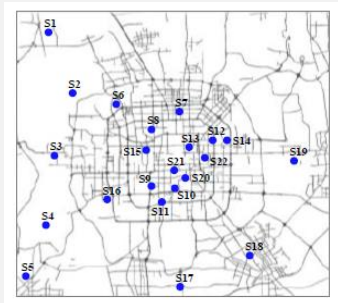
IOT

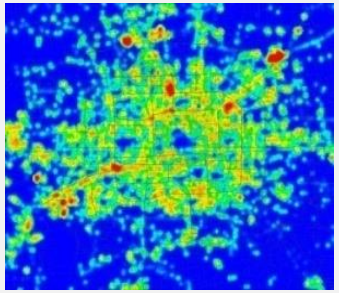
视频监控











解决城市问题

行动

BIGSCITY

Beihang Interest Group on SmartCity

Beijing City Lab

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