



北京大學
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A framework for mixed use decomposition

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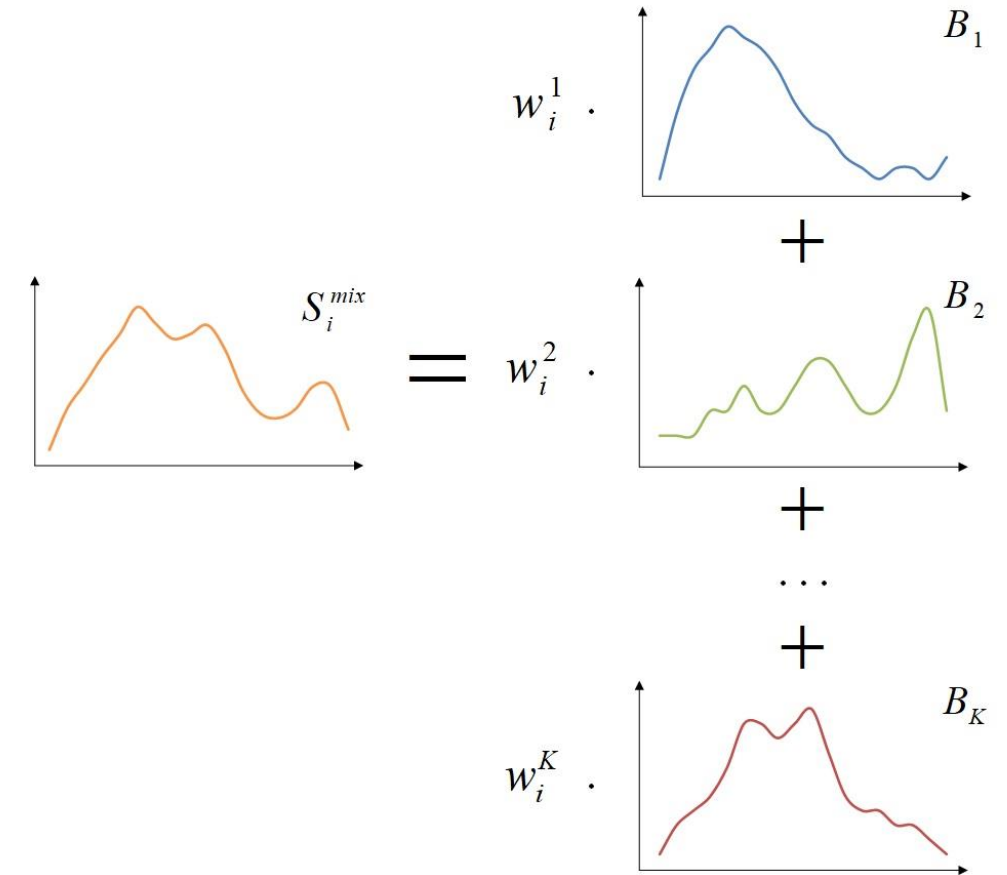


- Mixed use: A strategy for city planning
 - Advantages: relieve traffic pressure, enhance urban vitality
 - Disadvantages: affect security and tranquility of living environments
- Urban function: the reflection of human activities on land
- Mixed use → urban function → human activities



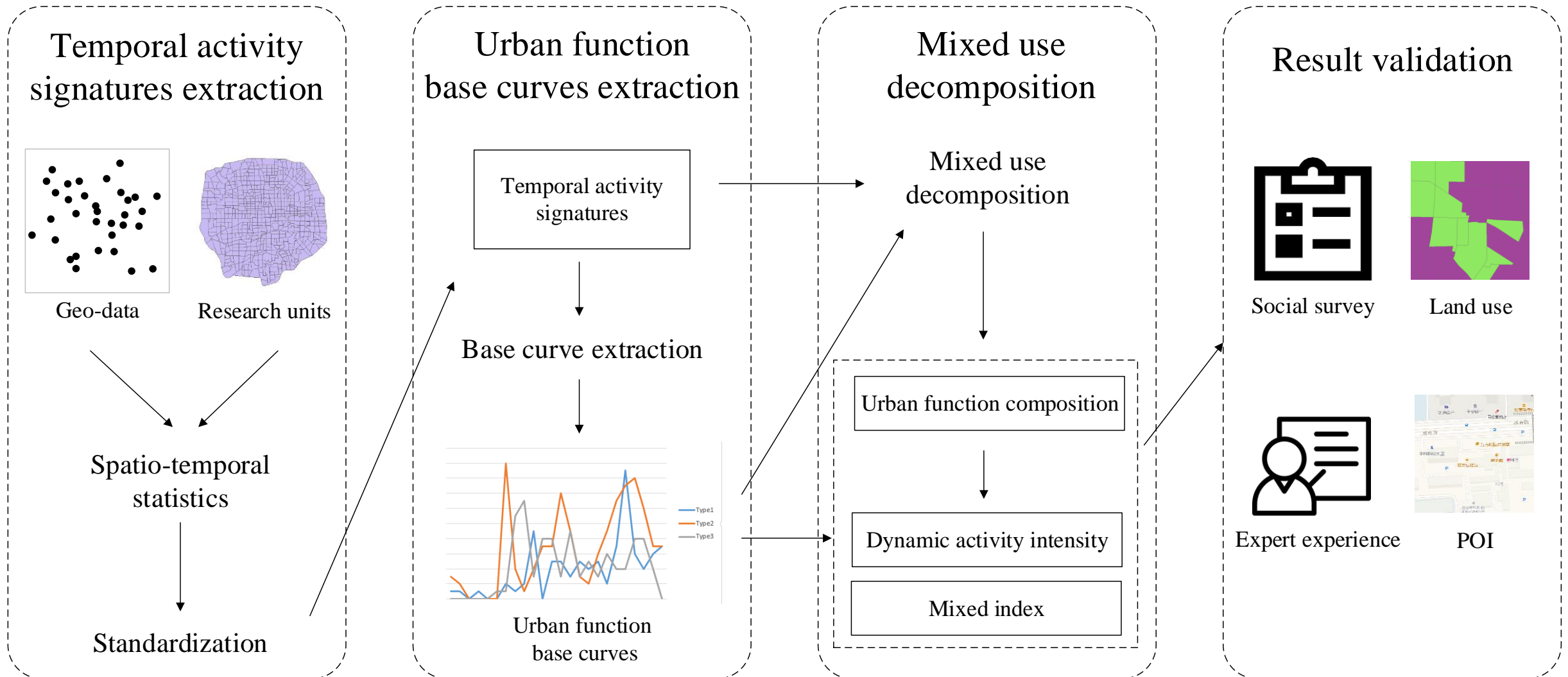
- Big geo-data
 - Multi-source data (e.g. check-in data, taxi trajectory data, mobile phone data)
 - Containing spatial-temporal information of human activities
- Temporal activity signatures
 - Human activity patterns

- Mixed pixel decomposition
 - Land use classification
 - Spectral signatures
 - Endmembers: pure materials present in the image
 - Abundances: the percentage of each endmember in the pixel

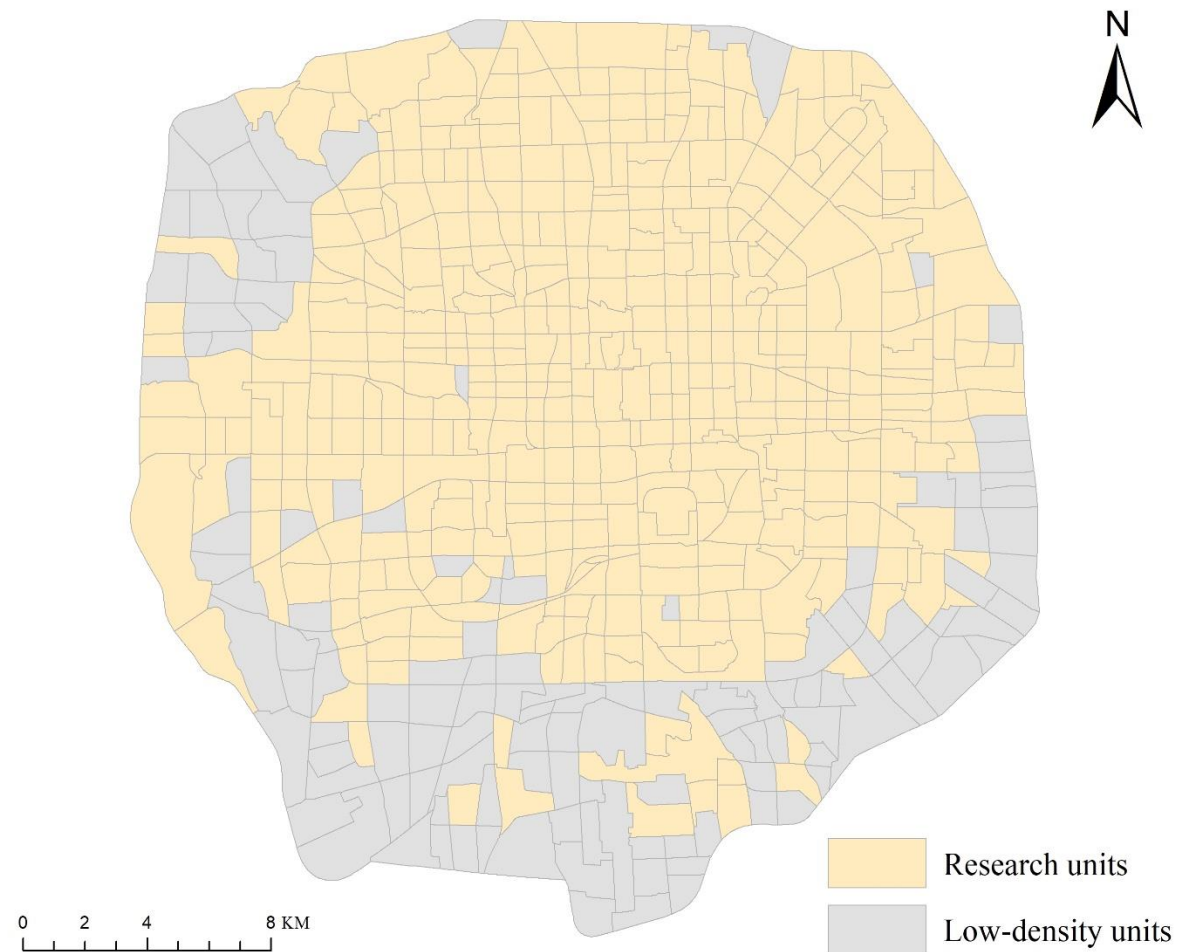




- Mixed use decomposition
 - Assumption: temporal activity signatures of zones with same function are similar in the study area (e.g. country, city)
 - Temporal activity signatures correspond to spectral signatures
 - Single urban function corresponds to the pure material

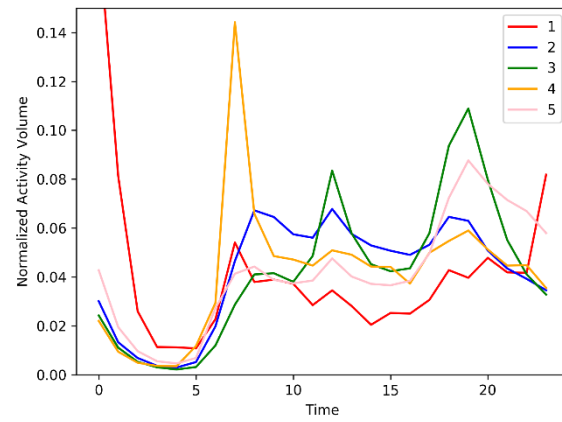


- Data and study area
 - The region within the 5th Ring Road
 - 442 Traffic Analysis Zones (TAZs)
 - Social media check-in data
 - 2011/09~2012/09, 257 workdays

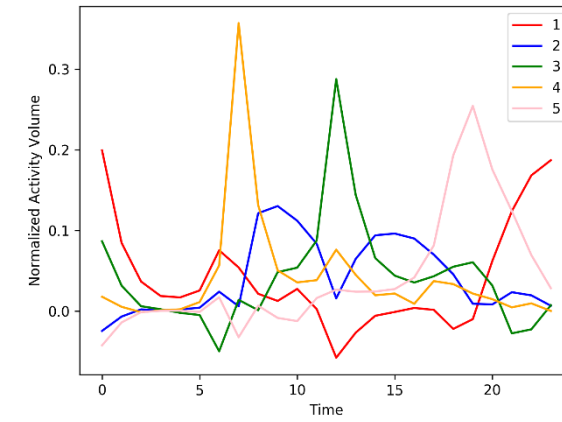


- Urban function base curves extraction

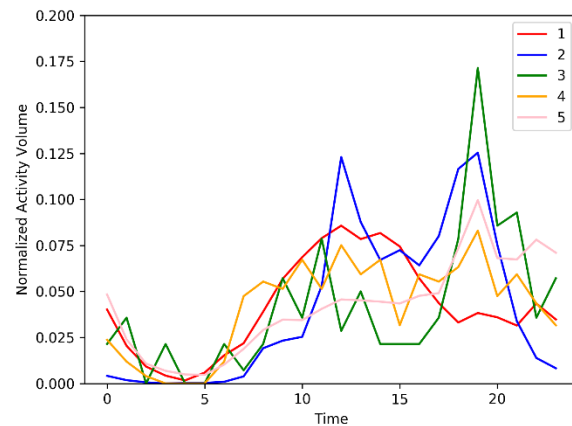
K-means



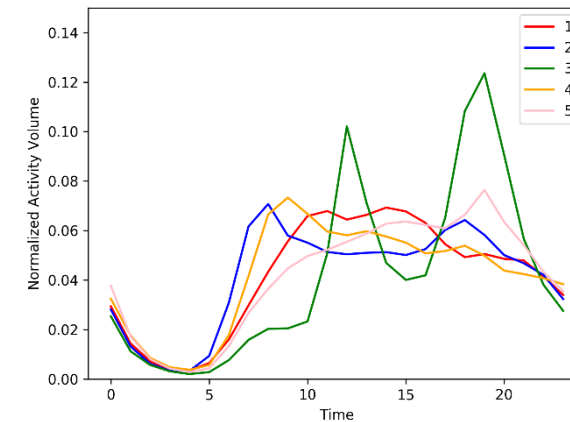
SISAL



Manual
sampling

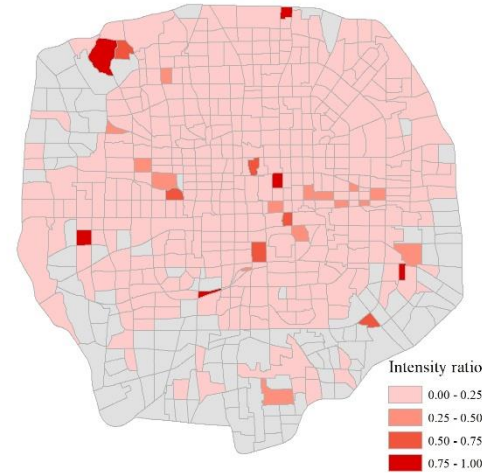


Statistics by
POI types

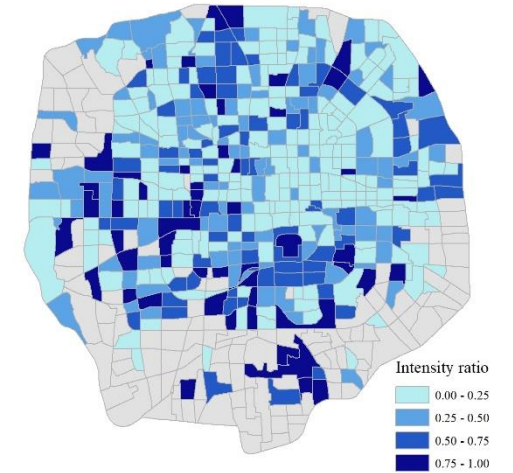


- Mixed use decomposition

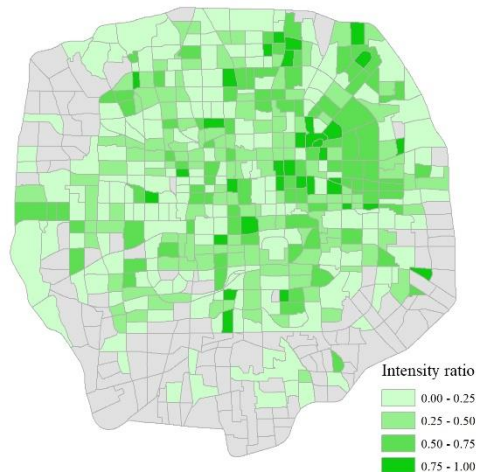
Exercise and relaxation



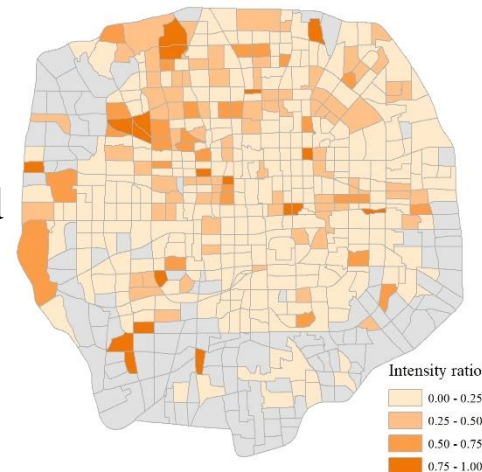
Traffic and dwelling



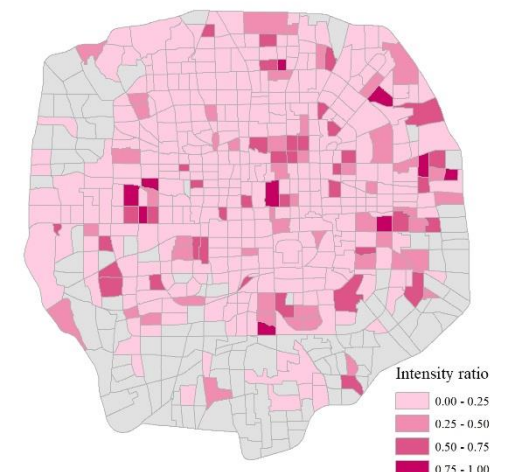
Catering



Working and education

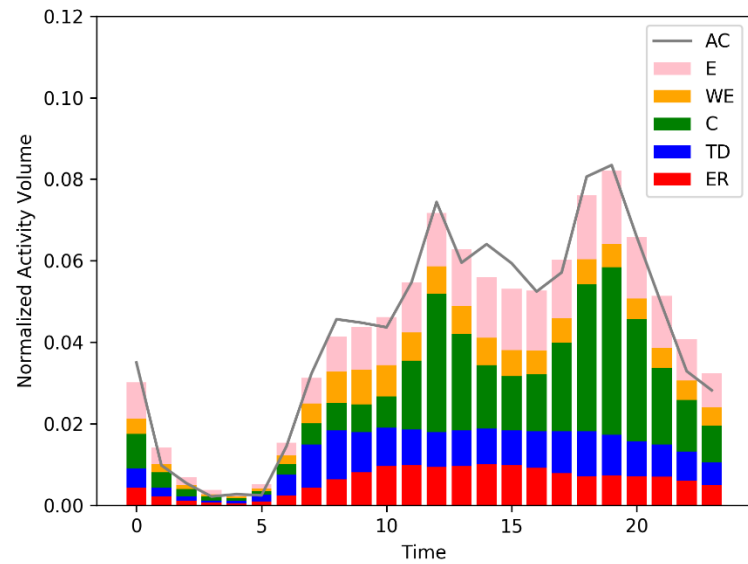


Entertainment

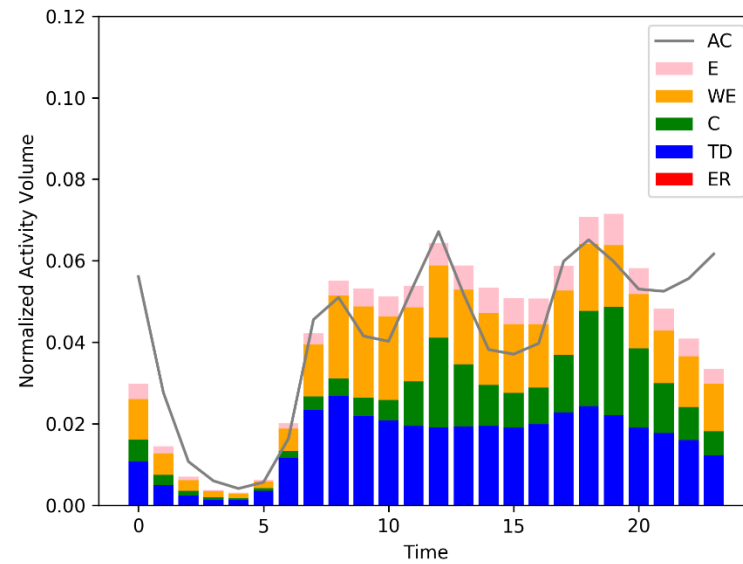




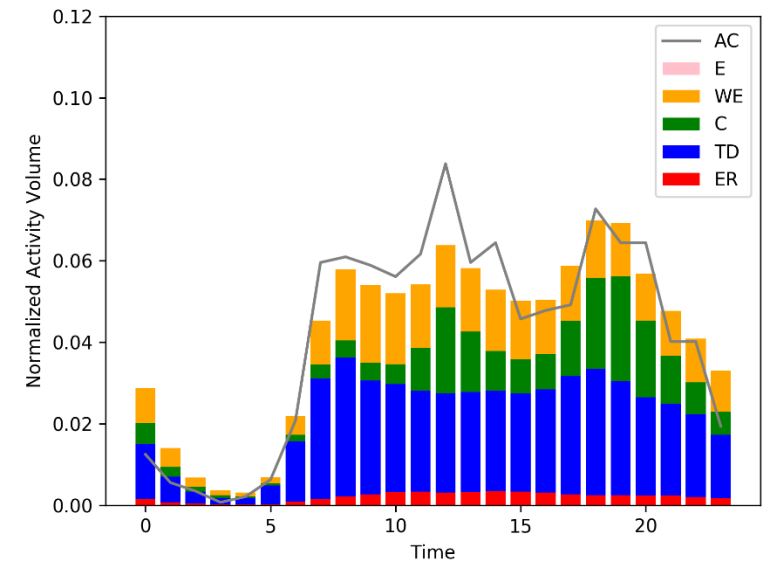
- Dynamic activity intensity



Houhai

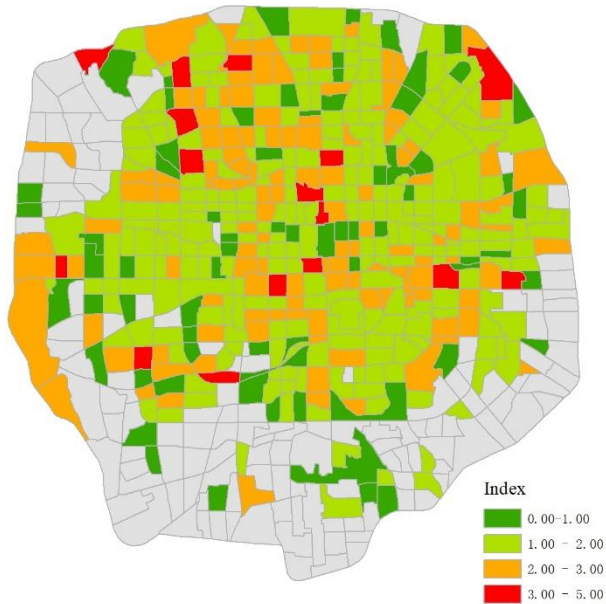


Peking University

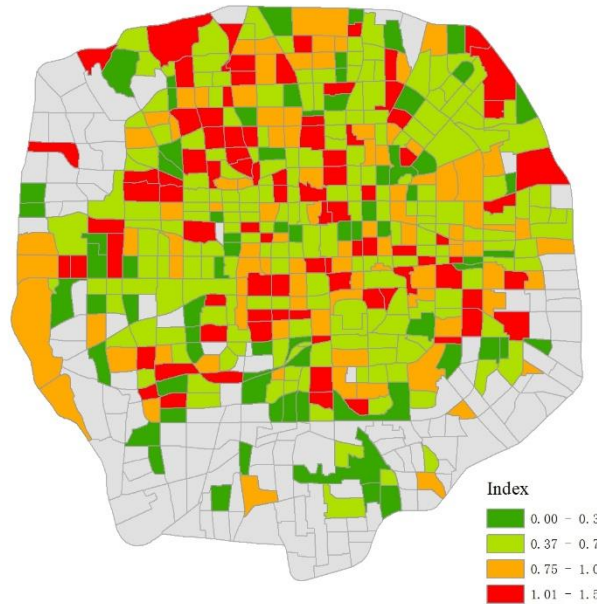


The Finance Street

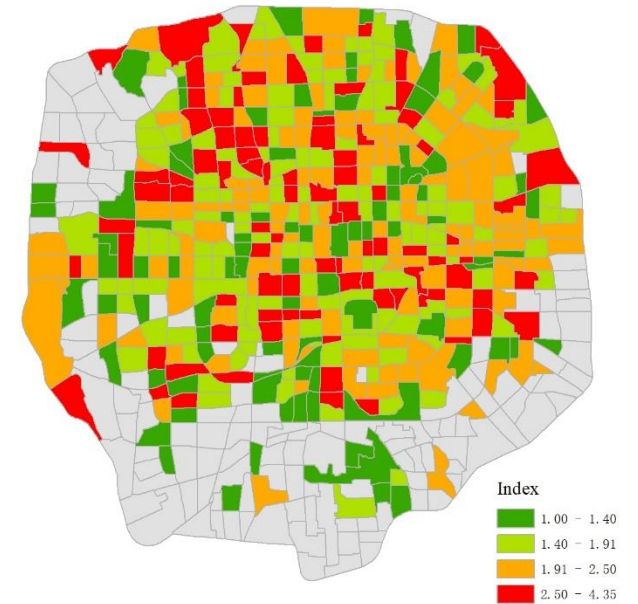
- Mixed index



Richness



Entropy



Simpson



- Connection of remote sensing methods and big geo-data
- Detailed information of mixed use
- Framework advantages: few requirements for input data, method extensibility and multiple results



- Assumption: temporal activity signatures of zones with same function are similar in the study area
- Particular cases
 - Zones with same function have different temporal activity signatures
 - Zones with different functions have similar temporal activity signatures



Thanks!
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