A Land Price Prediction Model using Multi-scale Data and UrbanSim in Seoul

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- Data for UrbanSim
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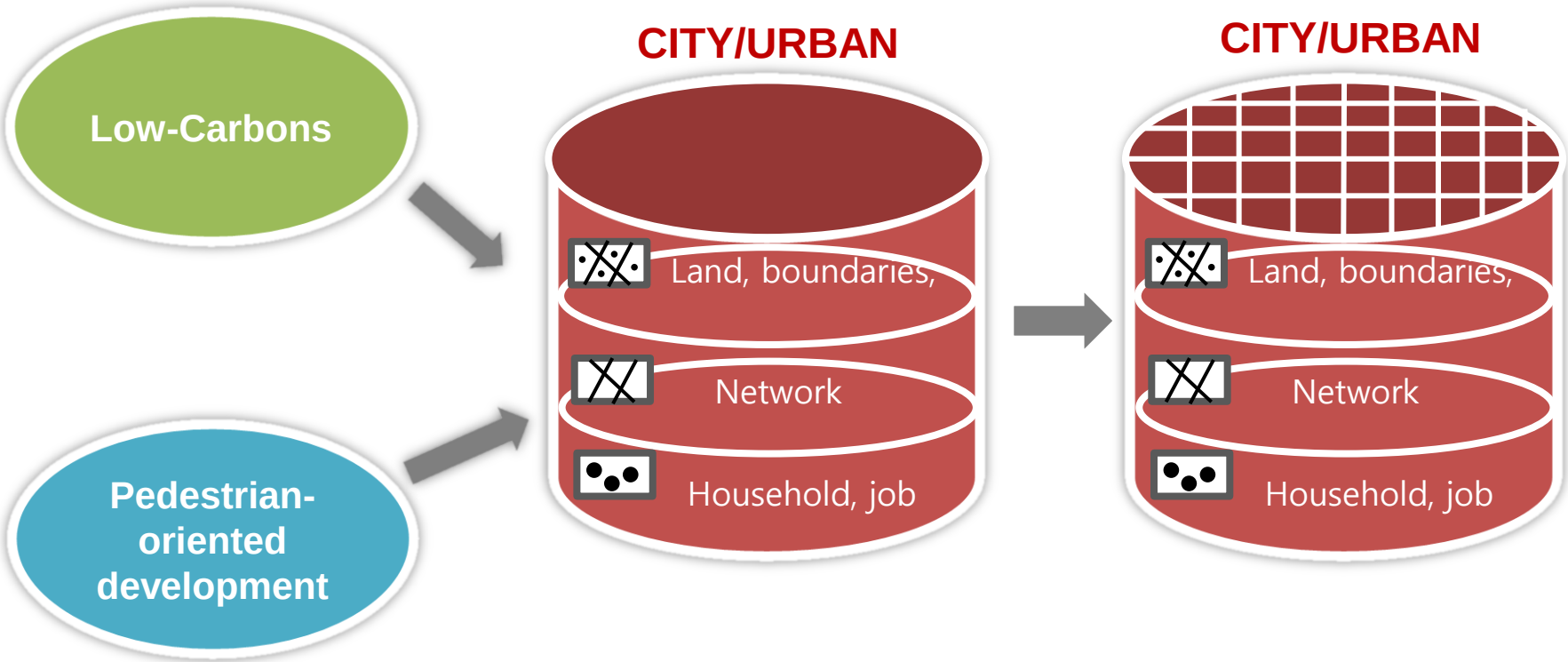
1. Introduction

- Low-carbons, pedestrian-oriented development is getting attention.
- Need urban analysis in more detailed units.



1. Introduction

- Key indicators for urban socio-economic analysis
  - Population
  - Land price
- Land price can be measured by estimation based on spatial data (i.e. buildings, land use and transportation network) and properties (i.e. population, employees) (Lin,2009/Kim,2007)
- Government regularly assesses land values

  ➔ Important indicator in urban development

1. Introduction

- H. Kang (2004)
  - Used finely processed datasets for analysing co-relation among multiple variable of residential areas
- Z. Patterson (2010)
  - Used UrbanSim
  - Showed how to apply aggregate data to grid cells-based models

Need datasets in finer units for analyzing land price
Need to integrate various forms of data into single unit
Need to disaggregate data using aggregate data

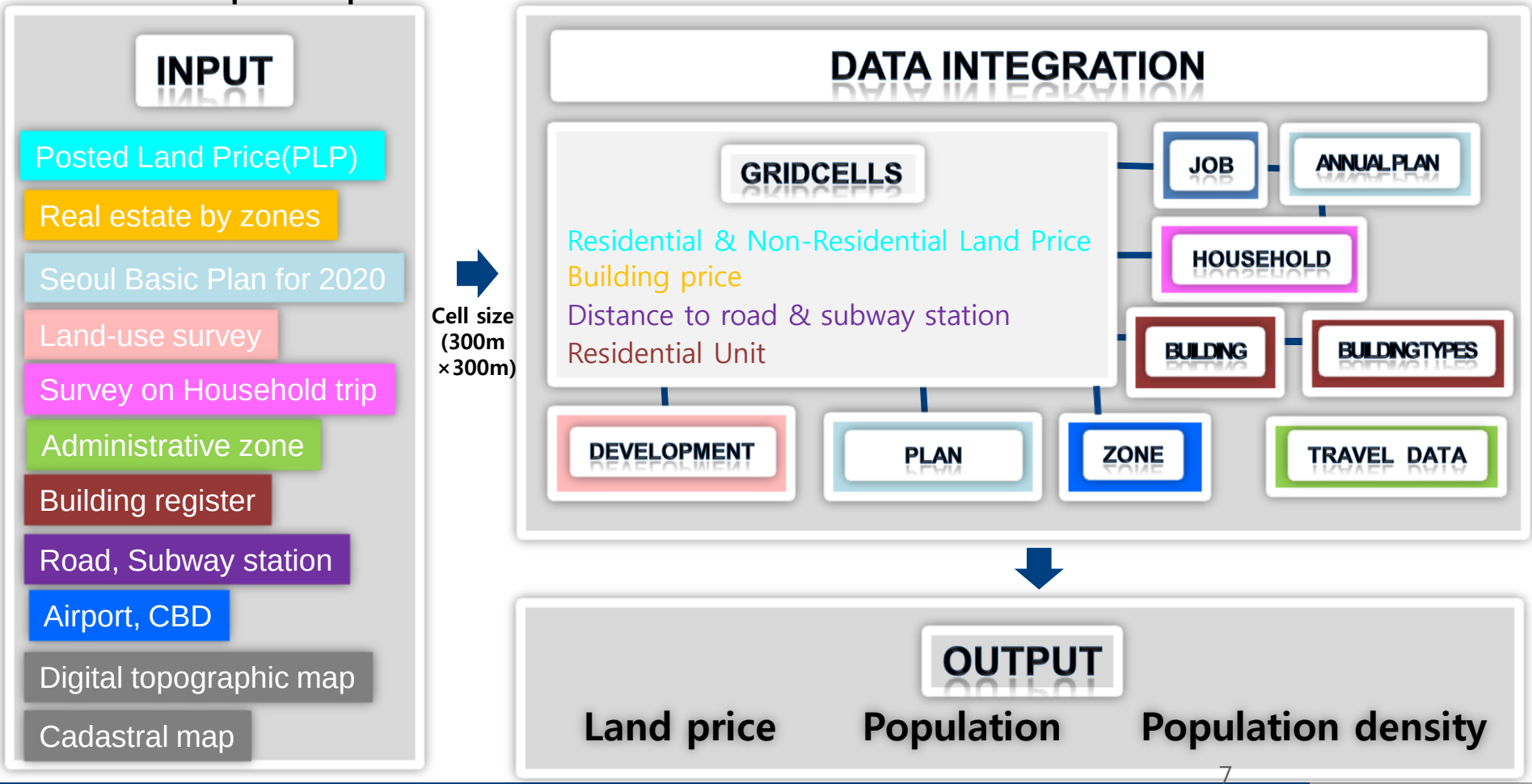
1. Introduction

- UrbanSim is a planning support system and analyzes how urban planning and policy affects a city through the relation of land use and transportation
- We used UrbanSim to estimate land price of Seoul
- Spatial data of Seoul are integrated into cell units.

	Content
Unit	• Grid-based(Eugene_gridcell), Parcel-based(Seattle_parcel), Zone-based(San_Antonio_zone) • Simulation by 1 year • GIS techniques to integrate input data
Developer	• Designed by Paul Waddell from University of California, Berkeley • www.urbansim.org

Land price prediction model in UrbanSim

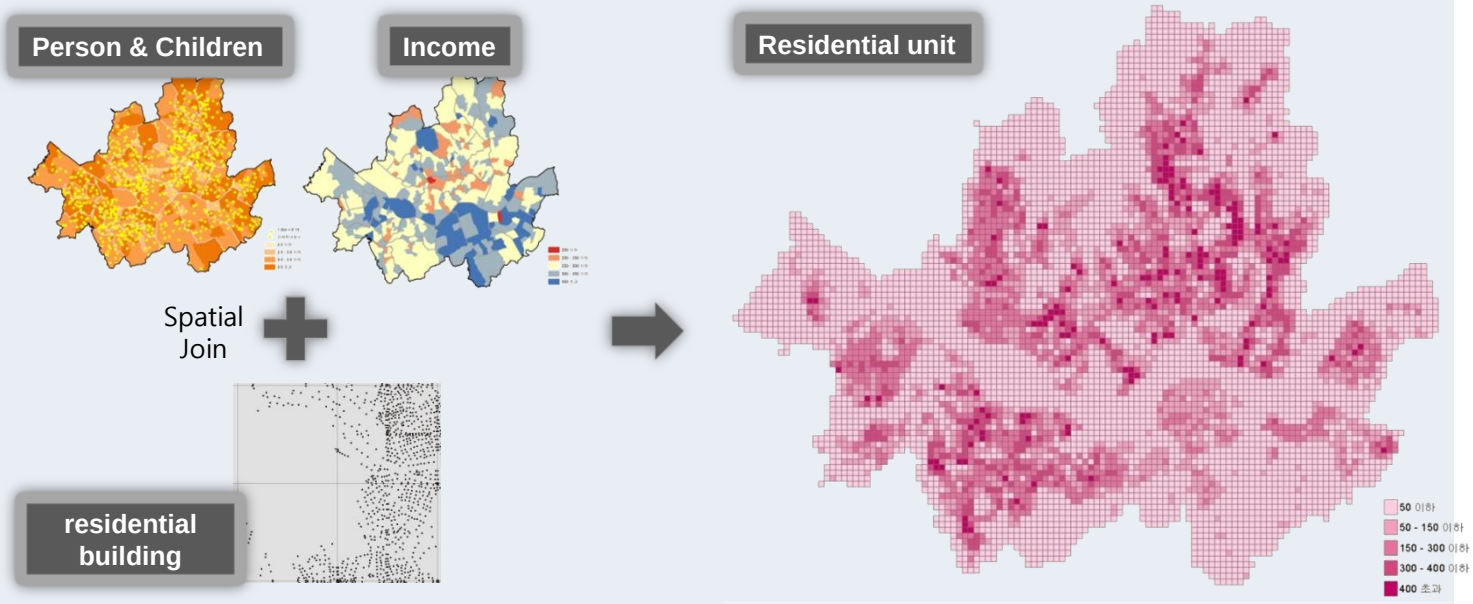
- Land price prediction model



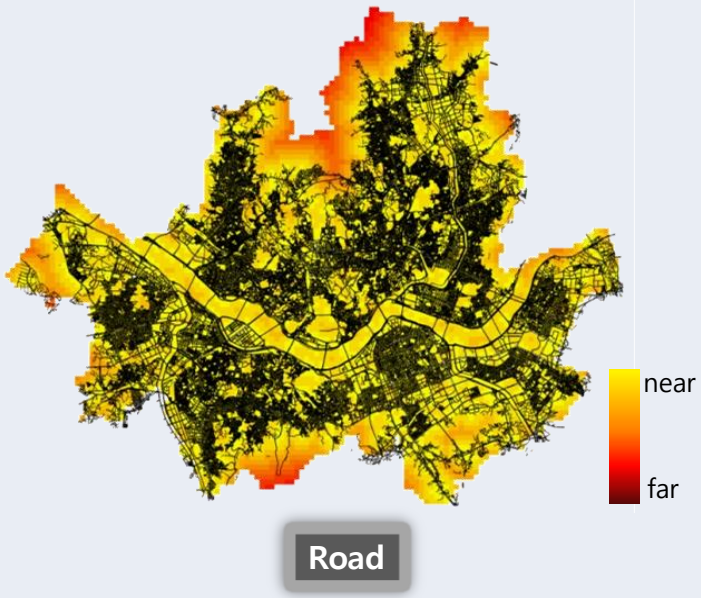
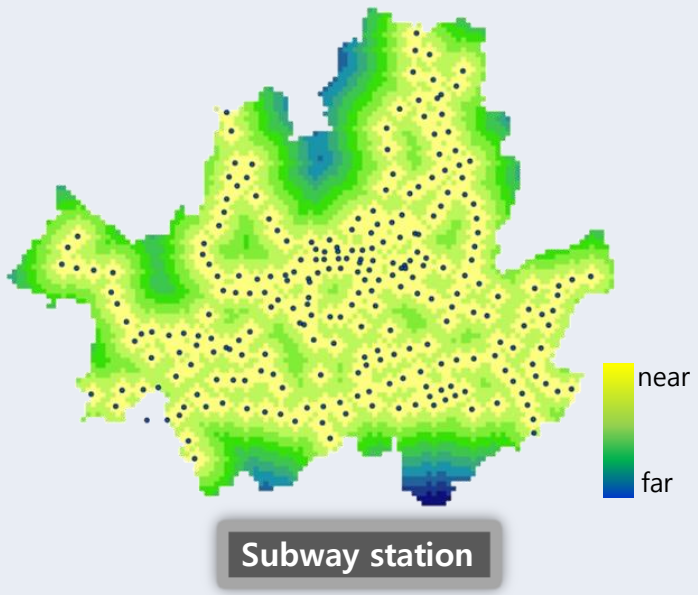
2.1 Available data of Seoul

Table of UrbanSim		Available data of Seoul
Gridcells	•Land price •Building price •Residential unit •Residential & Non-residential area •Distance to transportation	•Posted Land Price(Attribute data) •Real estate by zone(Attribute data) •Building (Table) •Road, Subway station(Spatial data) •Digital topographic map(Spatial data) •Cadastral map(Spatial data)
Household	•Children, Income, Persons, Workers	•The Survey on Household Trip(Attribute data)
Annual plan	•Household •Employment	•Seoul Basic Plan for 2020 (Attribute data)
Building **Building type**	•Area, year of construction •Building type	•Digital topographic map(Spatial data) •Building register(Attribute data)
Plan	•Plan type	•Seoul Basic Urban Plan for 2020 (Spatial data)
Development	•Development type	•Land-Use Survey(Spatial data)
Travel data	•Single vehicle to work travel time	•Administrative zones(Spatial data)

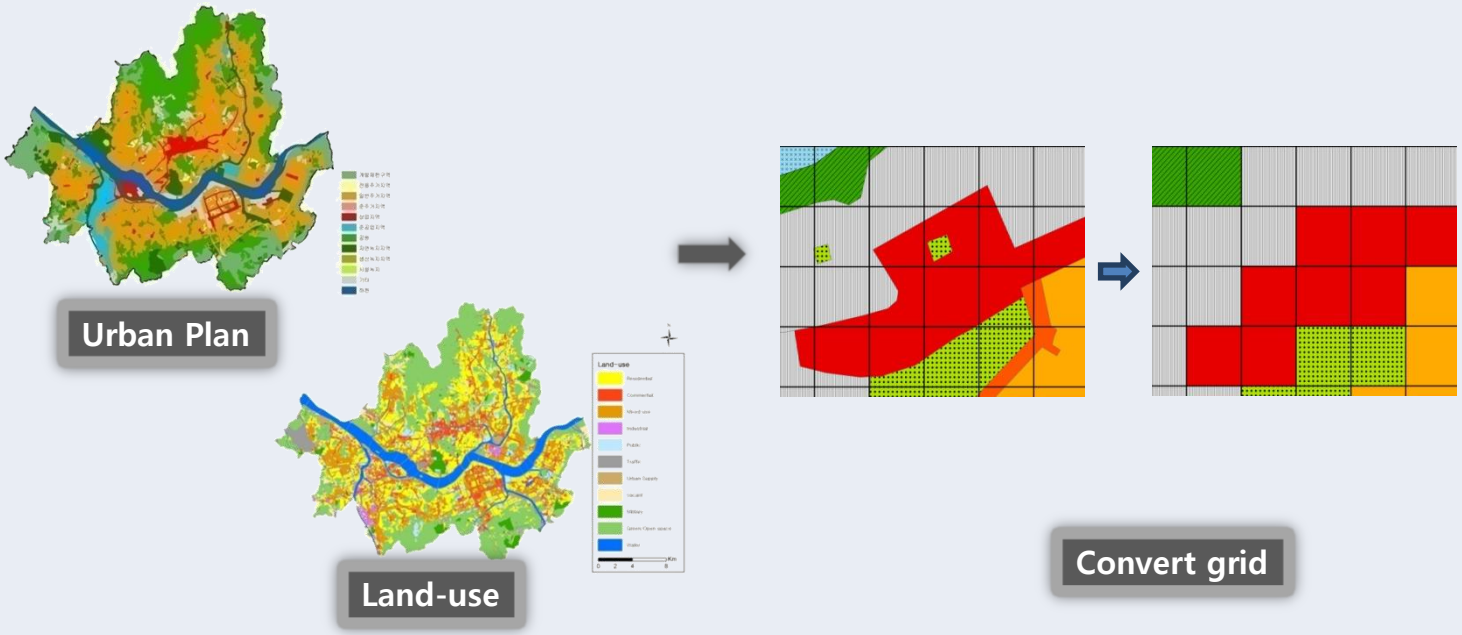
2.2. Data preparation

Section	Content
Table	• Households(Children, Income, Workers, Persons) • Gridcells(Residential unit)
Available data	• Digital topographic map, Cadastral map, Building register, Survey on Household Trip
Process	• Residential building(Point), Spatial join, Average by cell
Preparation	

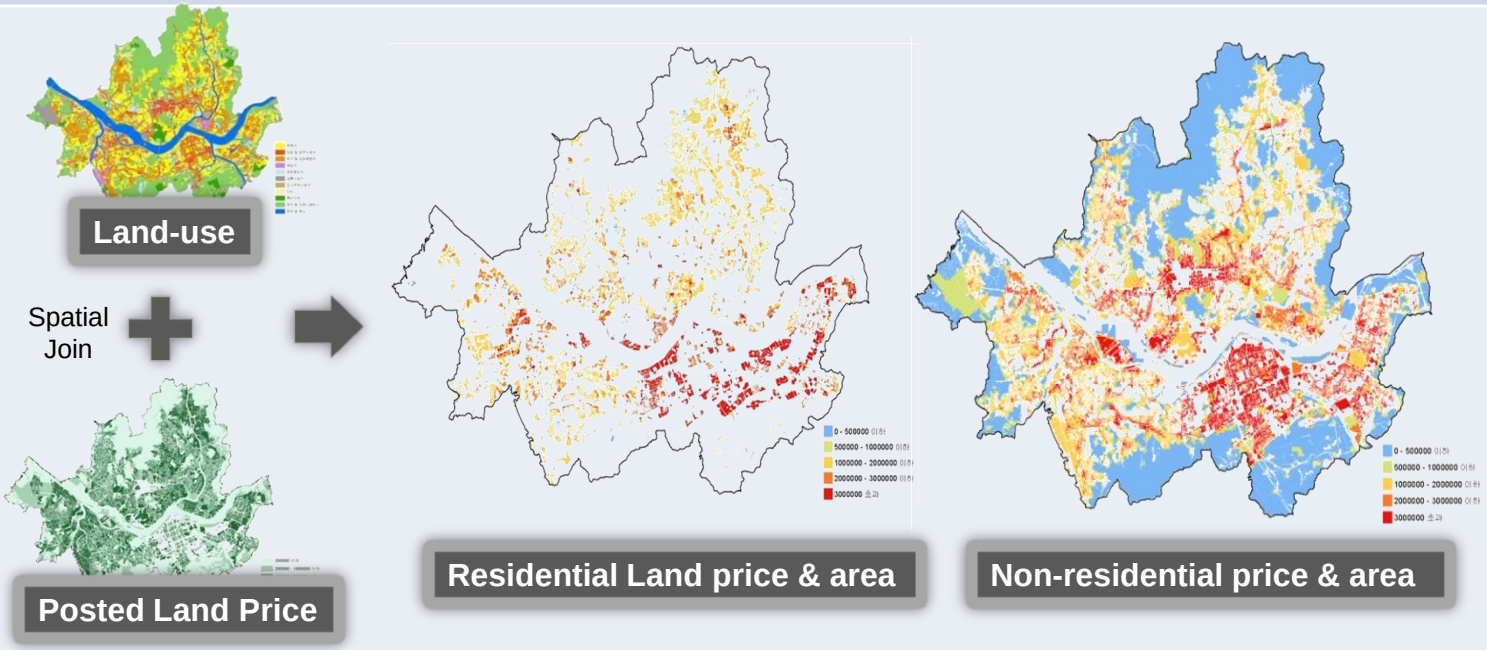
2.2. Data preparation

Section	Content
Table	• Gridcells(distance to road, distance to transportation)
Available data	• Road, Subway station
Process	• Euclidean distance
Preparation	 

2.2. Data preparation

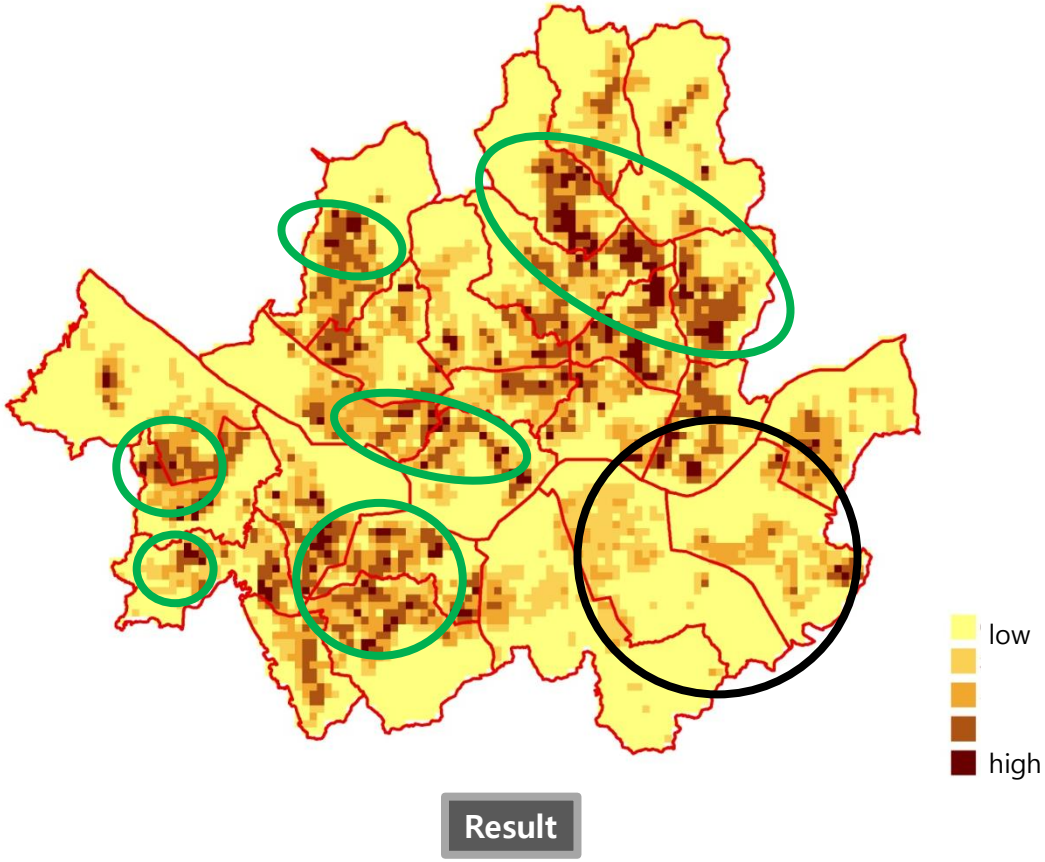
Section	Content
Table	• Gridcells(Plan type, Development type)
Available data	• Seoul Basic Plan for 2020 (Spatial data), Land-use
Process	• Based Urban Plan(Polygon) and Land-use(Polygon), Convert Raster(maximum area)
Preparation	

2.2. Data preparation

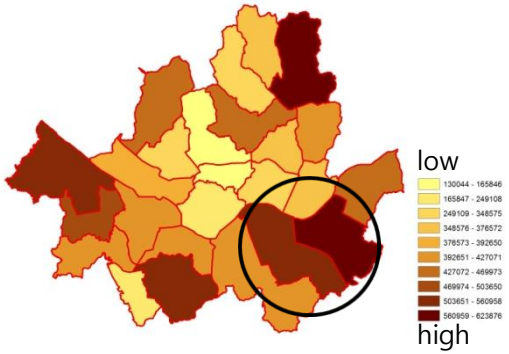
Section	Content
Table	• Gridcells(Land price, Residential & Non-residential area)
Available data	• Land-use, Posted Land Price
Process	• Based Land-use(Parcel), Spatial Join, Dissolve. Average by cell
Preparation	

3. Analysis

- Population(2007)



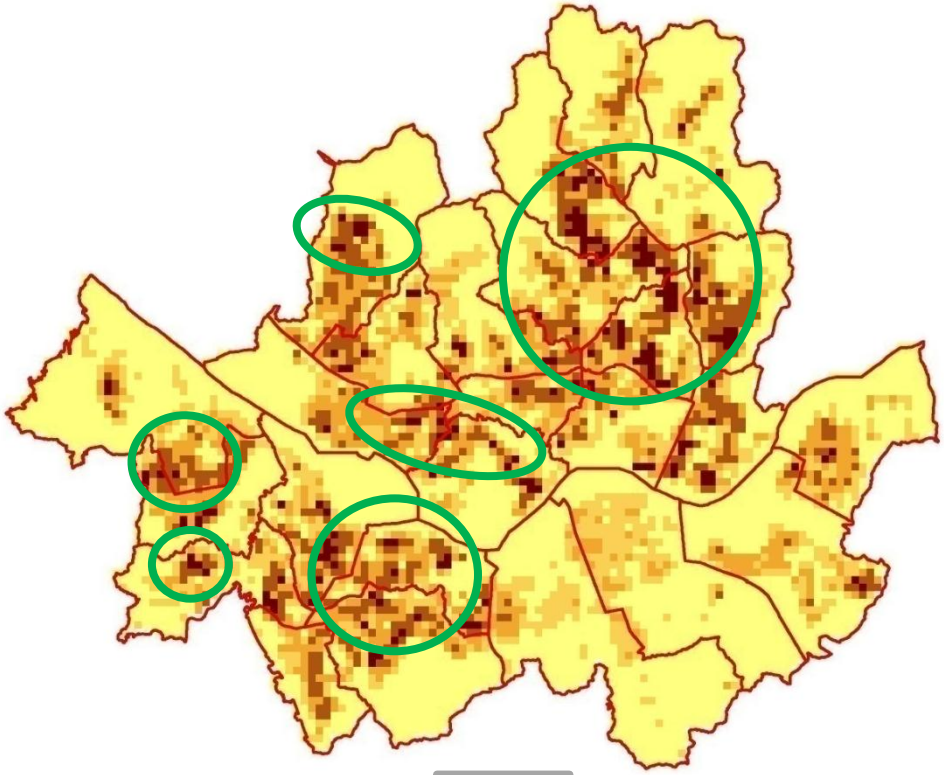
Result



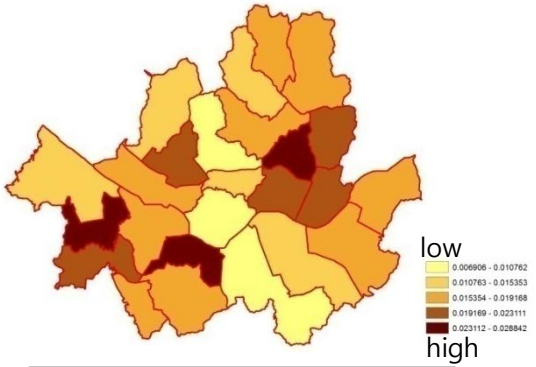
Population(2007)

3. Analysis

- Population density(2007)



Result

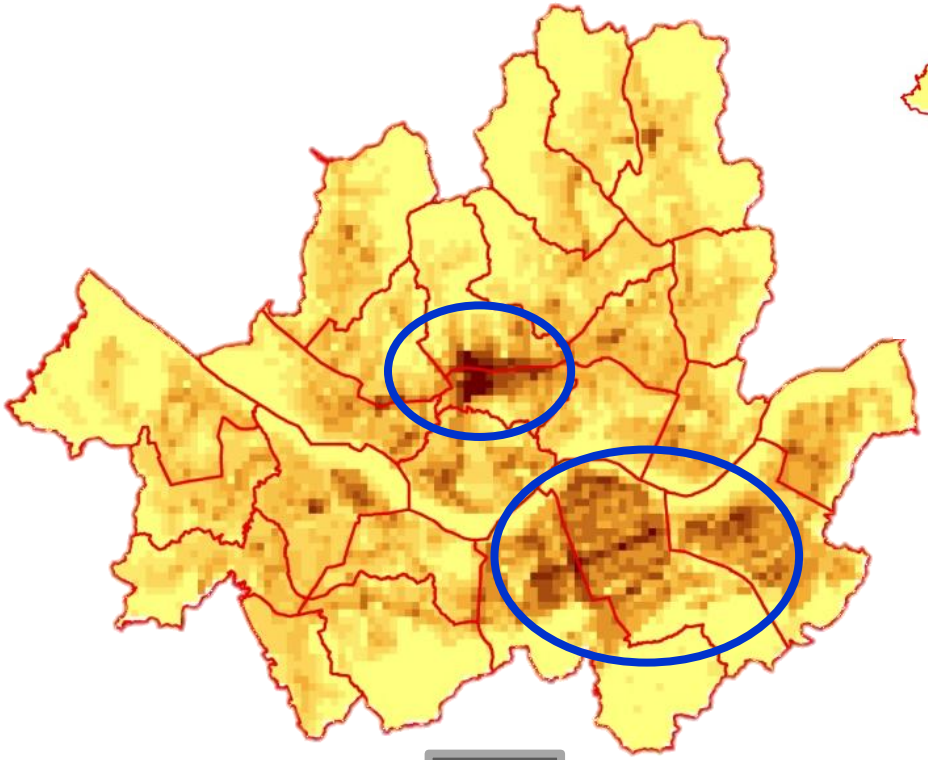


Population density(2007)

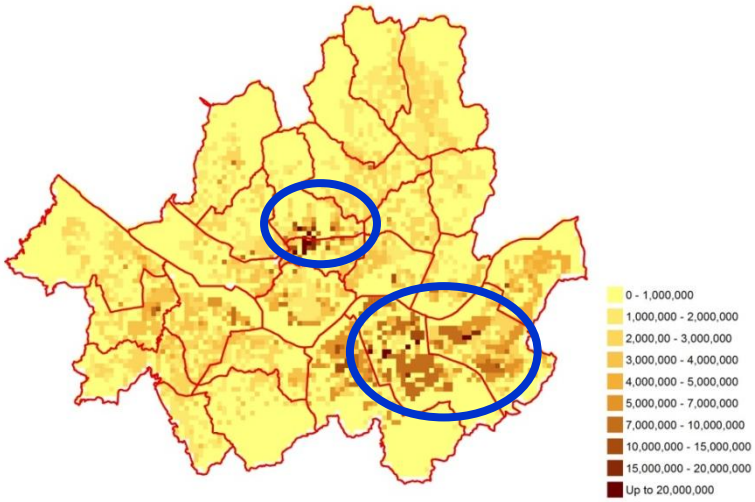
Low
0.000000 - 9.757633
9.757634 - 26.305140
26.305141 - 45.325779
45.325780 - 69.112820
69.112821 - 158.280498
high

3. Analysis

- Land price(2007)



Result

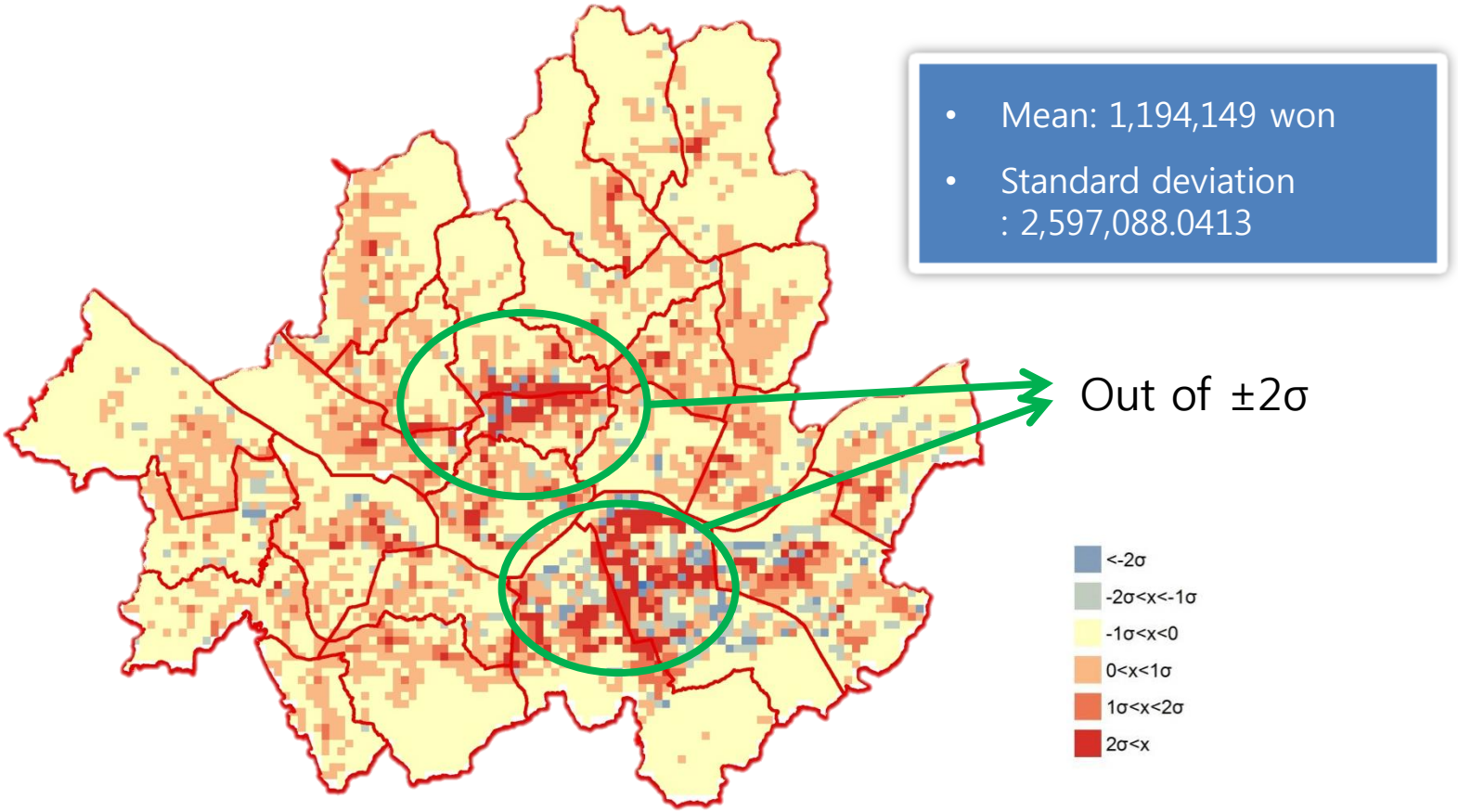


Posted Land Price(2007)

0 - 1,000,000
1,000,000 - 2,000,000
2,000,000 - 3,000,000
3,000,000 - 4,000,000
4,000,000 - 5,000,000
5,000,000 - 7,000,000
7,000,000 - 10,000,000
10,000,000 - 15,000,000
15,000,000 - 20,000,000
Up to 20,000,000

3. Analysis

- The difference between UrbanSim's result and PLP(2007)



4. Summary

- Adopted UrbanSim, a land price prediction model and applied to Seoul area
- Confirmed possibility of a detailed analysis using cell-based model in UrbanSim
- Further research:
  - Need better estimation methods for households in multi-story buildings
  - Need spatial data mining or data synthesizing techniques to process un-available data
  - To find the growth pattern of Seoul through more experiments

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Thank you

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