Predicting Prices of Retail Real Estate Spaces Using GWR and Spatial Regression

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ESRI USER CONFERENCE 2024

Local Retail Real Estate Market Expertise Coupled with Agile and Customized GIS Solutions

Four Different Neighborhood Themes

1. Big Box Regional Shopping

target

DAVE & BUSTER'S

OLD NAVY

FOREVER 21

2. Trendy Local Shopping

LUCKY BRAND

Aunt Jake's HANDMADE PASTA

BLACK SEED BAGELS

ANTHROPOLOGIE

3. Residential

TRADER JOE'S

WHOLE FOODS MARKET

RUMBLE

EJ's LUNCHEONETTE

Bright Horizons

4. Office

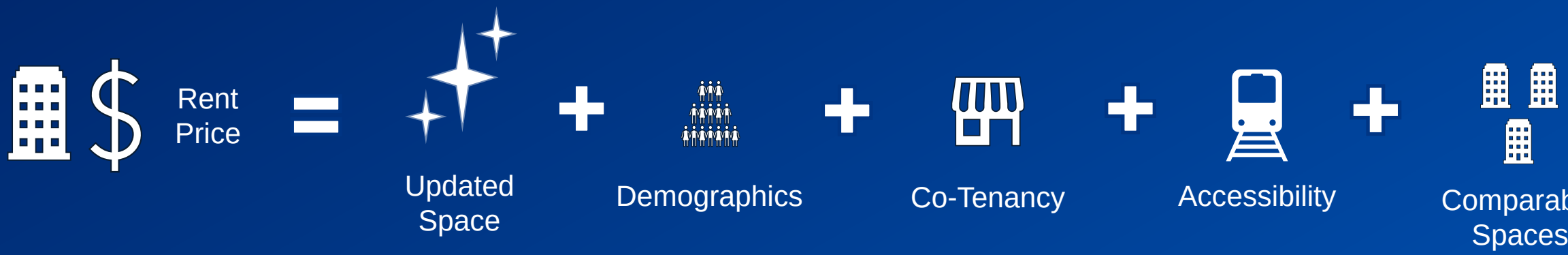
CHIPOTLE MEXICAN GRILL

sweetgreen

WELLS FARGO

DR DUANE reade

Hedonic Price Model



Manhattan Statistics are Global

Daytime Population Density: 139,827
Population Density: 71,863
Median Household Income: $99,544
Average Household Income: $163,848
Aggregate 2023 Subway Ridership: 636.4 Million
Median Assessed Land Value: $271K

If the global statistics don’t tell the full story, then a global regression model wouldn’t either

$$Y = \sum \beta X + \varepsilon$$

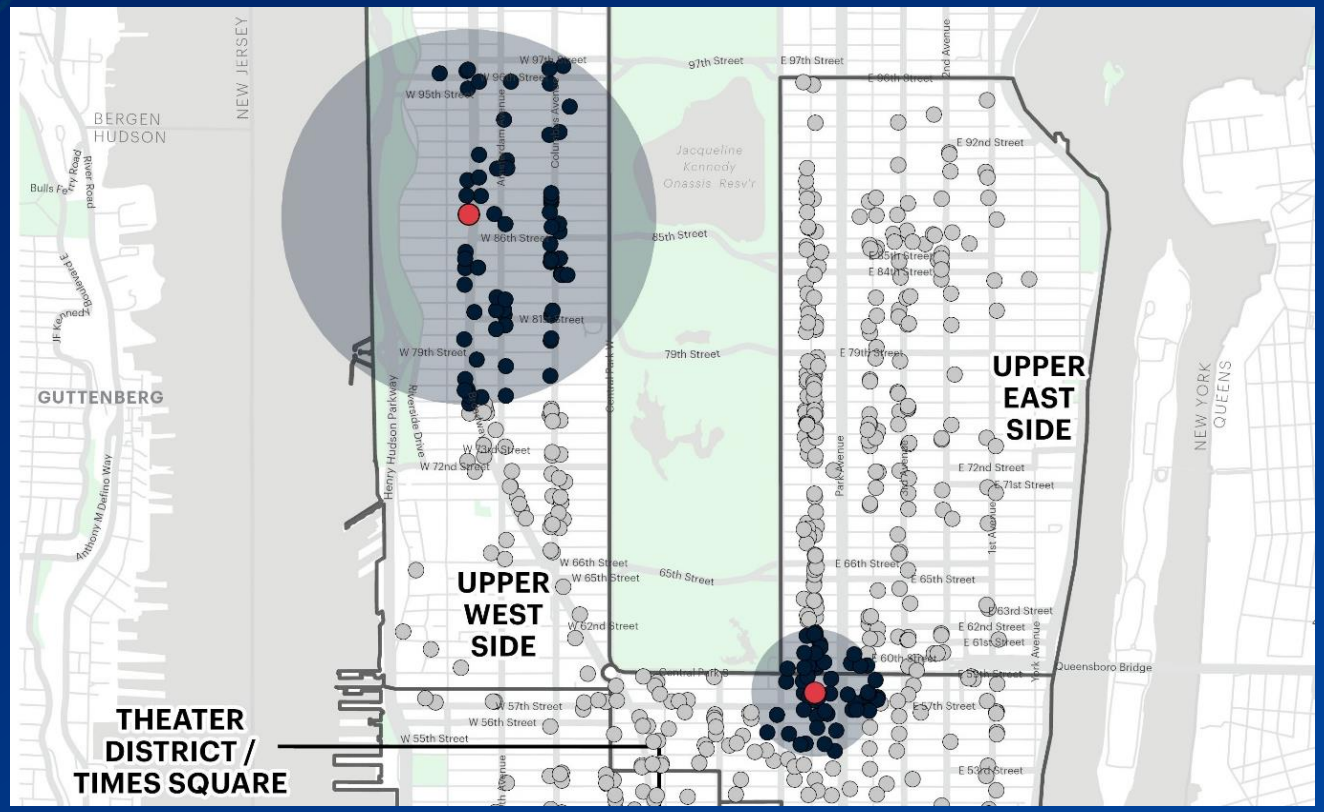
Rent Price

Error Term

Sum of Independent Variables x Coefficients

Geographically Weighted Regression

Explores the spatial variation of independent variables (predictors) throughout Manhattan



Each feature gets its own separate equation that explains the variance in rent.

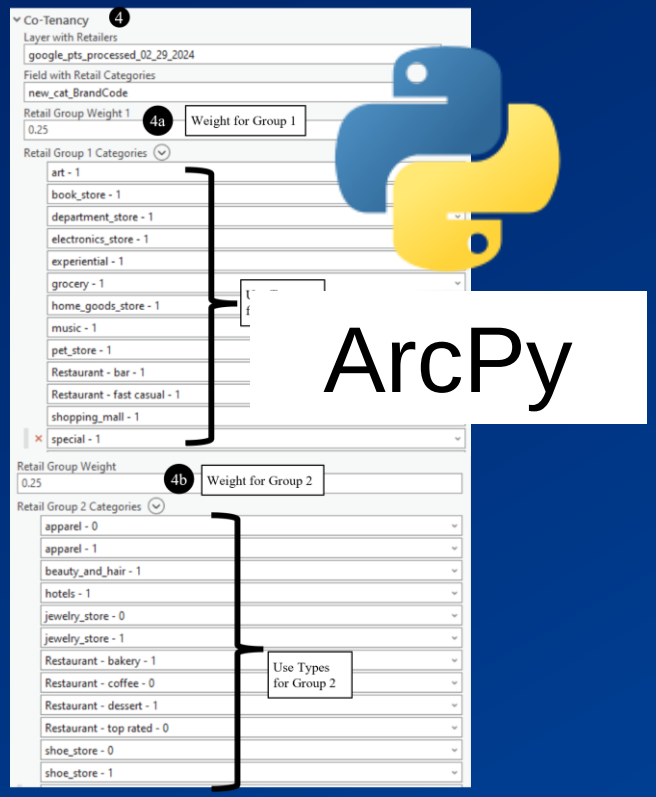
Rent is influenced by the interplay of neighborhood characteristics, accessibility, and the space it occupies

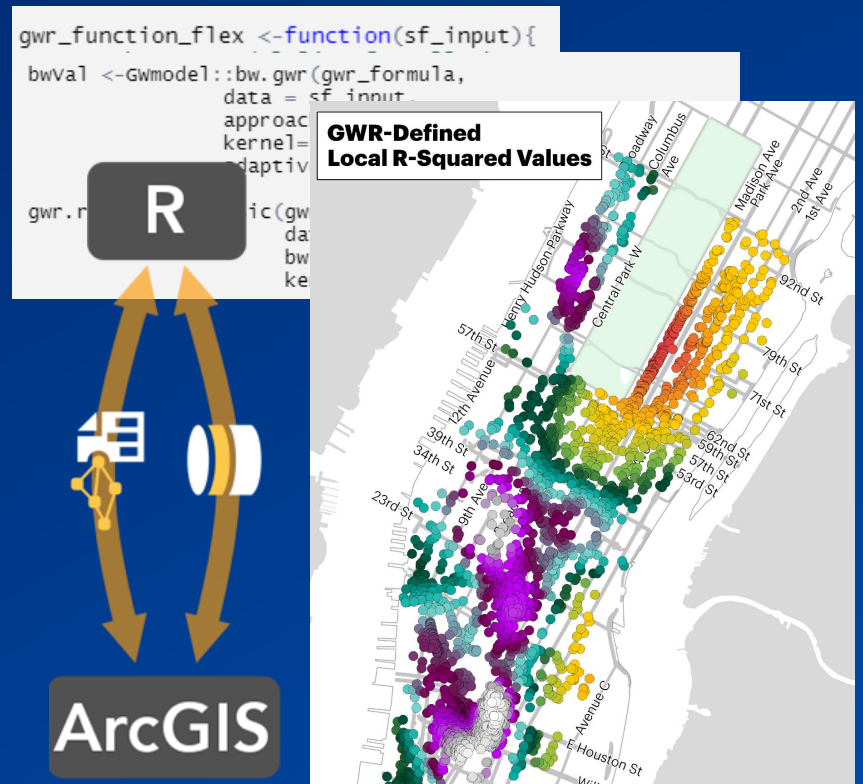
Estimate Rent With a Spatial Decision Support System (SDSS)

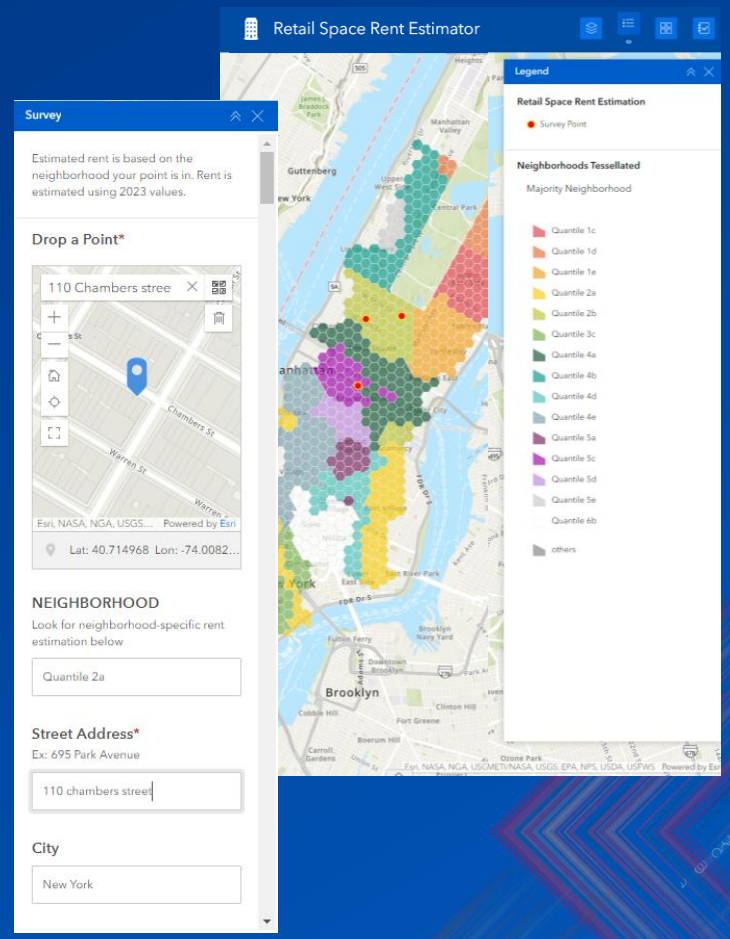
1 **Custom ArcPy Geoprocessing**
Variable Enrichment

2 **R-ArcGIS Bridge**
Calibrate Rent Estimation Models

3 **Experience Builder**
Visualize Results + Estimate Rent On-The-Fly

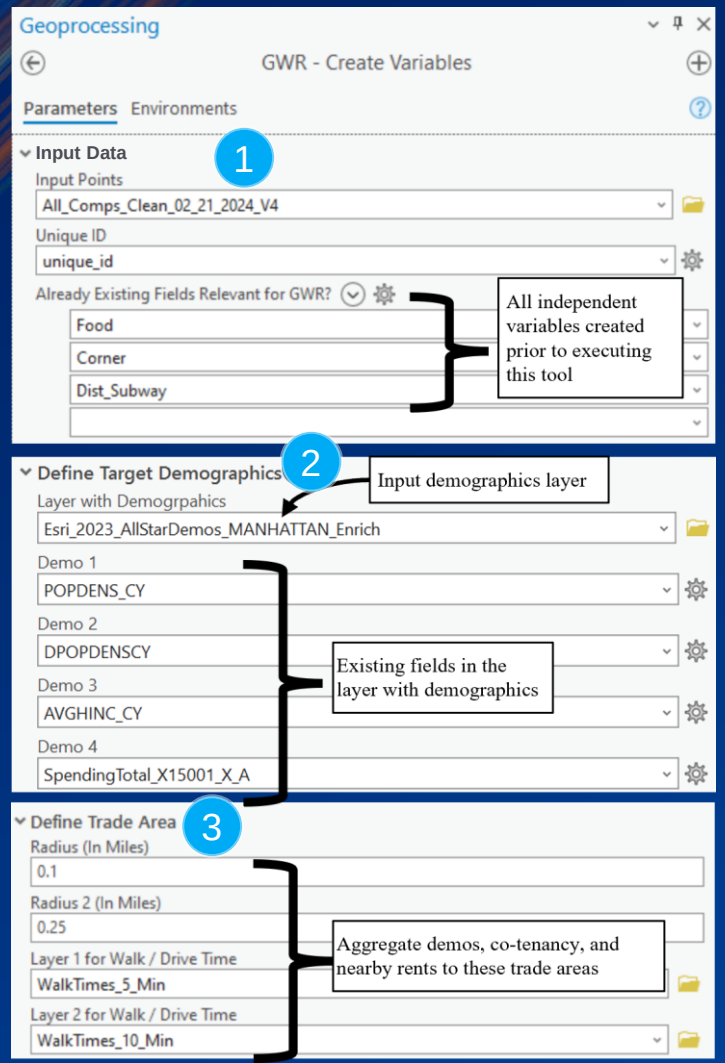


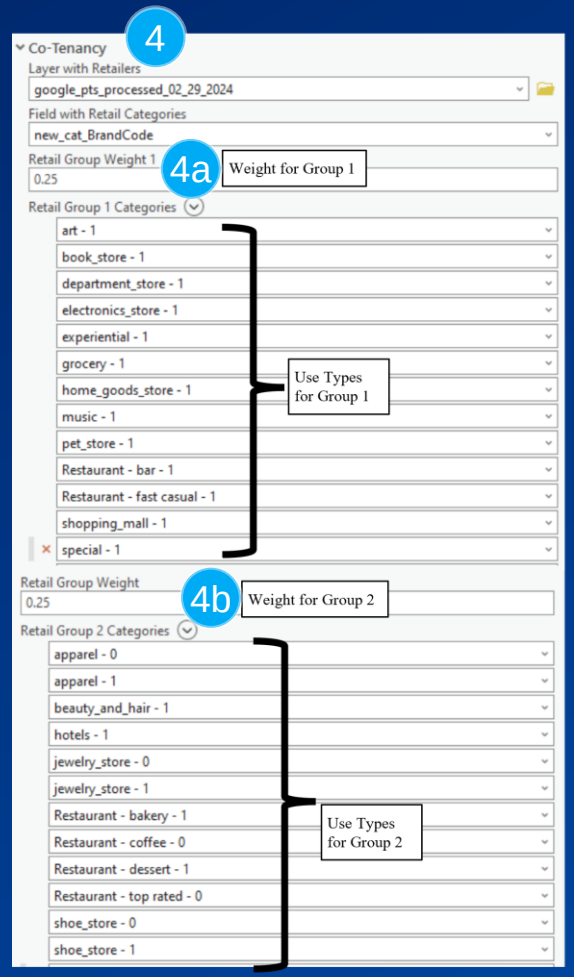


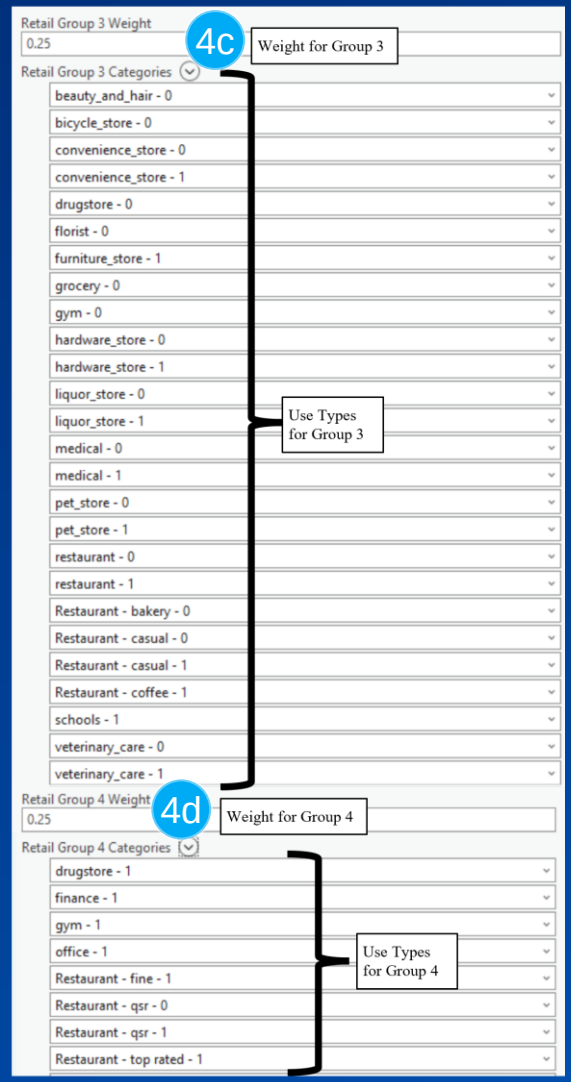


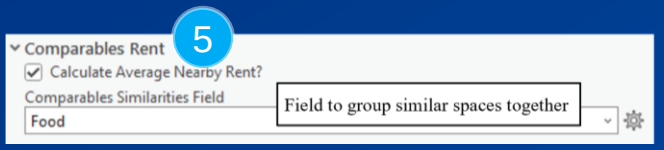
Source: Migden Miller, 2024.

1 Custom Geoprocessing for Variable Enrichment









1. Input Data (Spaces with Rent)
2. Demographics
3. Trade Area
4. Quantify Co-Tenancy
5. Nearby Comparable Rent

Python + ArcPy

1. Variable Enrichment

Source: Migden Miller, 2024.

2a Calibrate the Optimal GWR Model

Model combinations

	var_1	var_2	var_3	var_4	var_5	var_6
1	Corner	SCALED_WLK_5_CoTen_V2	SQRT_SCALED_RAD_0_1_Mean_PSF_RENT_ADJ	SQRT_SCALED_WLK_10_mean_DPOPDENSCY	*NA*	*NA*
2	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
3	Corner	Food	SCALED_WLK_10_CoTen_V2	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_WLK_10_mean_DPOPDENSCY
4	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
5	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_RAD_0_25_mean_SpendingTotal_X15001_X_A	SCALED_WLK_10_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway
6	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
7	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SCALED_WLK_5_mean_SpendingTotal_X15001_X_A	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_POPDENS_CY
8	Corner	Food	SCALED_WLK_5_CoTen_V1	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_POPDENS_CY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ
9	Corner	Food	SQRT_SCALED_Dist_Subway	SQRT_SCALED_WLK_10_mean_POPDENS_CY	SQRT_SCALED_WLK_10_Mean_PSF_RENT_ADJ	SQRT_SCALED_WLK_5_mean_DPOPDENSCY
10	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_RAD_0_25_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
11	Corner	Food	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ	*NA*
12	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_25_mean_DPOPDENSCY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ

```
gwr_function_flex <-function(sf_input){
 bwVal <-GWmodel::bw.gwr(gwr_formula,
                         data = sf_input,
                         approach = 'AICc',
                         kernel= 'bisquare',
                         adaptive = TRUE)

 gwr.res <- gwr.basic(gwr_formula,
                      data = sf_input,
                      bw = bwVal,
                      kernel = "bisquare", adaptive = TRUE)
```

R-ArcGIS Bridge

2. Automated Model Optimization

Source: Migden Miller, 2024.

2a Calibrate the Optimal GWR Model

	id	bw	kernel	RSS.gw	AIC	AICc	enp	edf	gw.R2	gwR2.adj	BIC	var_1	var_2	var_3	var_4
1	7	389	bisquare	119.3013	-650.6110	-569.19798	98.34671	2574.653	0.5283601	0.5103374	-2807.3769	Corner	SCALED_WLK_5_CoTen_V2	SQRT_SCALED_RAD_0_1_Mean_PSF_RENT_ADJ	SQRT_SCALED_WLK_10_mean_DPOPDENSCY
2	16	139	bisquare	109.6552	-595.0318	-126.85118	454.63852	2218.361	0.5664946	0.4776105	-815.8233	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SCALED_WLK_5_mean_AVGHINC_CY
3	1	166	bisquare	116.7008	-490.8085	-121.90839	376.39494	2296.605	0.5386407	0.4629947	-1140.4411	Corner	Food	SCALED_WLK_10_CoTen_V2	SCALED_WLK_5_mean_AVGHINC_CY
4	8	147	bisquare	111.6542	-559.3358	-111.94475	439.28707	2233.713	0.5585917	0.4717445	-866.9169	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_WLK_5_mean_AVGHINC_CY
5	6	156	bisquare	115.7578	-492.0284	-91.41700	403.22371	2269.776	0.5423688	0.4610352	-1000.6184	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_RAD_0_25_mean_SpendingTotal_X15001_X_A
6	2	222	bisquare	125.2211	-364.4959	-86.37596	298.53422	2374.466	0.5049571	0.4426906	-1441.6889	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_WLK_5_mean_AVGHINC_CY
7	10	166	bisquare	117.3519	-466.3926	-82.81817	388.95807	2284.042	0.5360666	0.4570271	-1050.2588	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SCALED_WLK_5_mean_SpendingTotal_X15001_X_A
8	3	393	bisquare	137.9660	-215.1085	-79.28183	158.76737	2514.233	0.4545719	0.4201158	-2048.2188	Corner	Food	SCALED_WLK_5_CoTen_V1	SQRT_SCALED_Dist_Subway
9	14	111	bisquare	112.9223	-527.8384	-78.29948	444.99870	2228.001	0.5535787	0.4643749	-826.3826	Corner	Food	SQRT_SCALED_Dist_Subway	SQRT_SCALED_WLK_10_mean_POPDENS_CY
10	18	155	bisquare	115.6813	-484.8893	-70.19656	414.18871	2258.811	0.5426711	0.4587755	-932.1131	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_RAD_0_25_mean_AVGHINC_CY
11	9	156	bisquare	127.2944	-318.9022	-38.40082	305.55021	2367.450	0.4967605	0.4317834	-1384.3915	Corner	Food	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
12	4	155	bisquare	125.1079	-341.4554	-27.03856	333.66155	2339.338	0.5054046	0.4348299	-1243.2192	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SQRT_SCALED_Dist_Subway

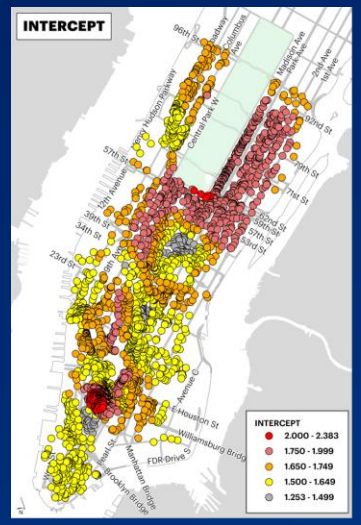
Source: Migden Miller, 2024.

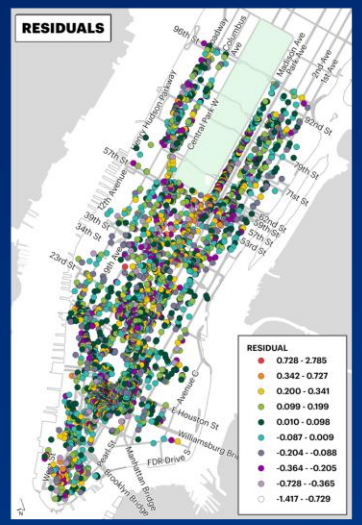
2a Calibrate the Optimal GWR Model

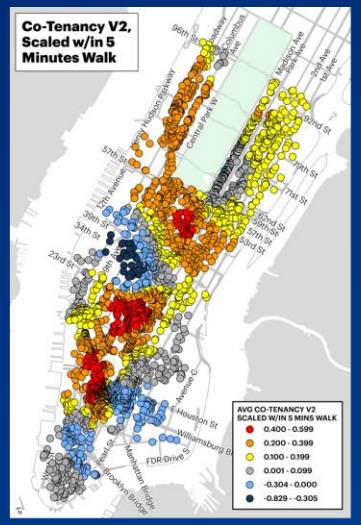
Name	Value
ID	7
bandwidth	389
kernel	bisquare
RSS.gw	119.301
AIC	-650.611
AICc	-569.120
enp	98.347
edf	2,574.653
gw.R2	0.528
gwR2.adj	0.510
BIC	-2,807.377
var_1	Corner
var_2	Walk 5 – Co-Tenancy V2
var_3	Rad 0.1 – Mean PSF Rent Adj. (Sqrt)
var_4	Walk 10 – Daytime Population Density (Sqrt)

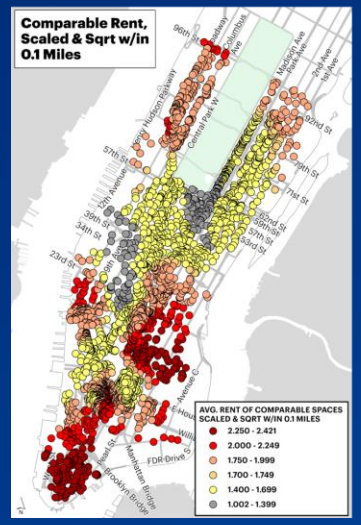
Source: Migden Miller, 2024.

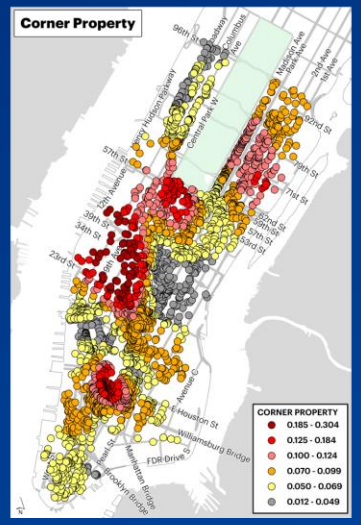
2a Calibrate the Optimal GWR Model

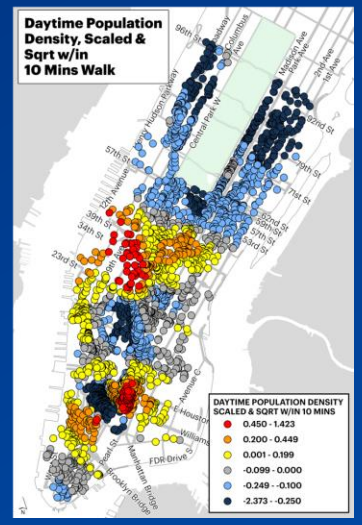




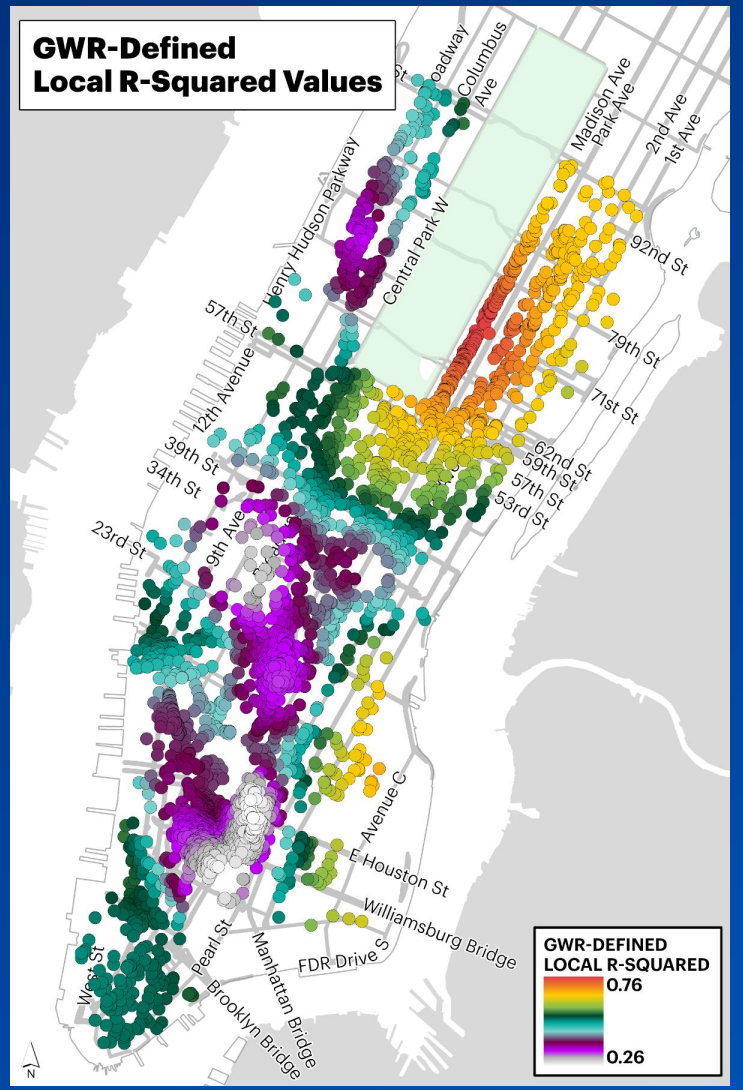






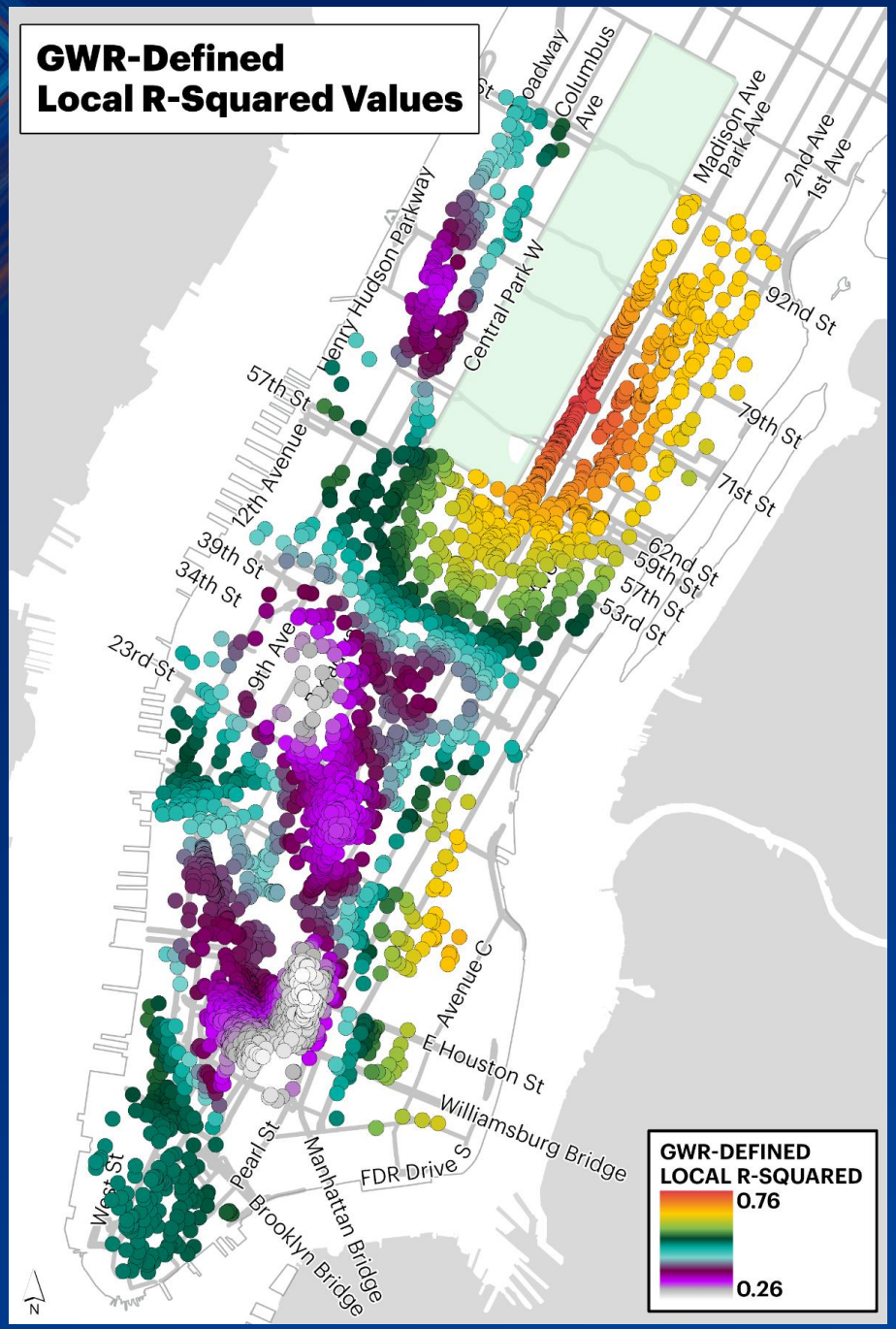


Source: Migden Miller, 2024.



R-ArcGIS Bridge

2. Automated Model Optimization



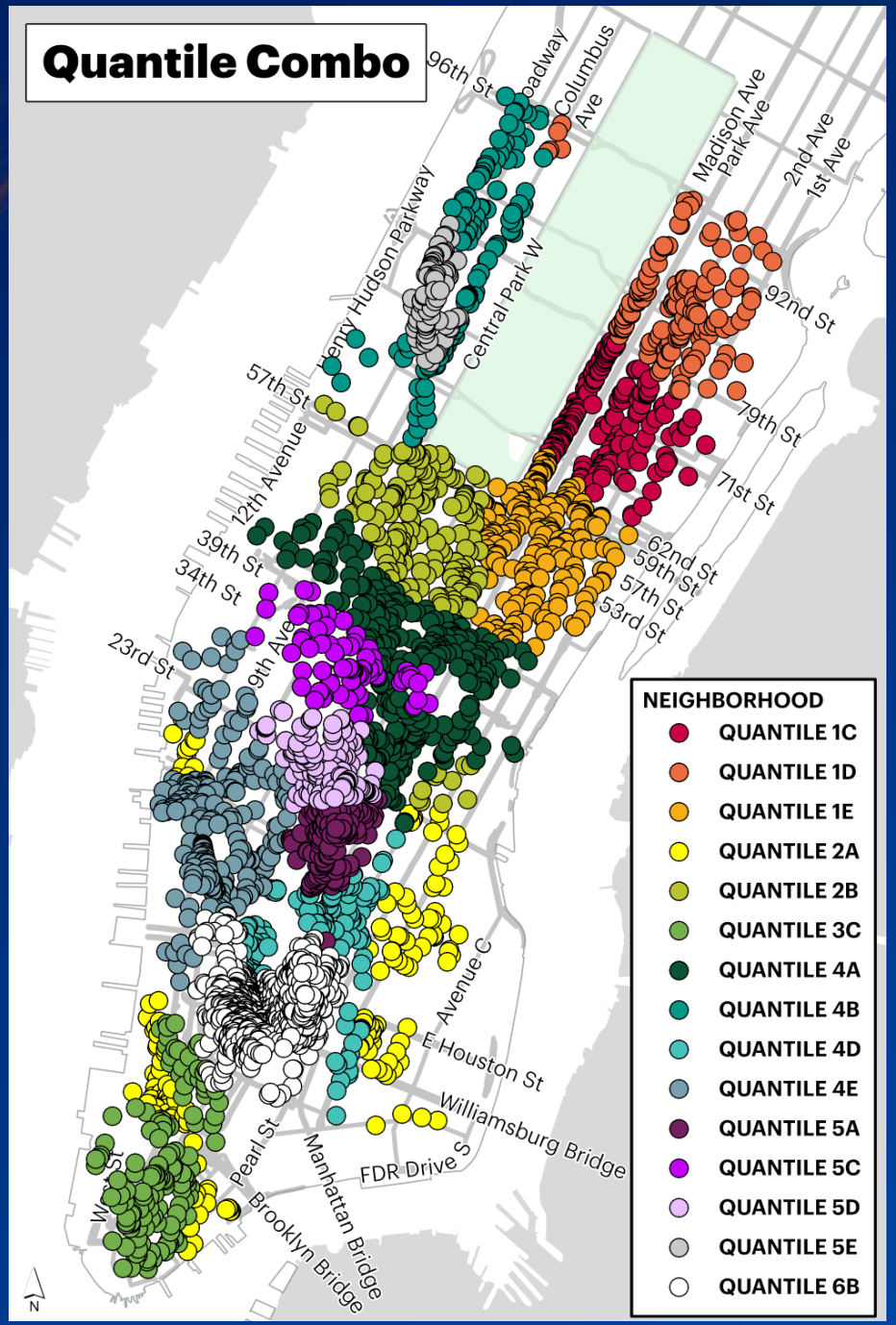
Source: Migden Miller, 2024.

The R-squared values are used to create new data-defined neighborhoods

They are an identification of spatial coherence

R-ArcGIS Bridge

2. Automated Model Optimization



Source: Migden Miller, 2024.

Each Neighborhood Gets its Own Model

- Multivariate Regression Model (OLS) ***Aspatial***
- Spatial Lag ***Spatial***
- Spatial Error ***Spatial***

R-ArcGIS Bridge

2. Automated Model Optimization

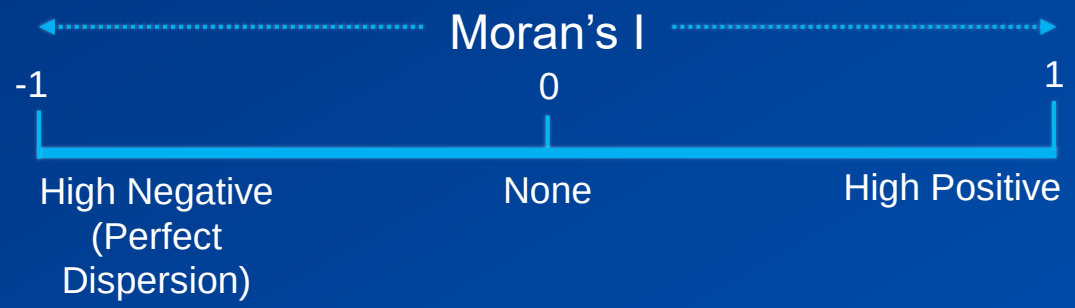
R-Squared Neighborhoods Remove or Reduce Spatial Effects

Test the Moran's I on the residuals as a measure of spatial autocorrelation

Table 14 Moran's I result for quantile delineated neighborhoods.

Neighborhood	Moran's I	Standard Deviate	P Value	Type
Global	0.262	20.457	<2.20E-16	99%
Q 1c	-0.0085	-0.061	0.525	Removed
Q 1d	0.0172	0.446	0.328	99%
Q 1e	0.0180	0.512	0.304	Removed
Q 2a	-0.1130	-2.071	0.981	99%
Q 2b	-0.1172	-2.358	0.991	Removed
Q 3c	0.0058	0.240	0.405	99%
Q 4a	-0.0474	-1.098	0.864	99%
Q 4b	-0.0469	-0.674	0.750	99%
Q 4d	-0.0302	-0.348	0.636	99%
Q 4e	-0.0026	0.036	0.486	99%
Q 5a	-0.0104	-0.040	0.516	95%
Q 5c	0.0569	1.301	0.097	Removed
Q 5d	0.1295	2.321	0.010	Removed
Q 5e	-0.2038	-2.587	0.995	99%
Q 6b	0.2096	7.191	0.000	Removed

Source: Migden Miller, 2024.



One Optimal Model for Each Neighborhood

Model Type	Deals with Spatial Effects in the…	Which looks like…
Multivariate Regression (OLS)	*None*	$Y = \beta X + \varepsilon$
Spatial Error	*Error Term*	$Y = \beta X + \lambda W e + u$
Spatial Lag	*Predictor Variables*	$Y = \beta X + \rho W y + e$

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Spatial Error	*Error Term*	$Y = \beta X + \lambda W e + u$
Spatial Lag	*Predictor Variables*	$Y = \beta X + \rho W y + e$

Congratulations! You can all now estimate rent better than a licensed broker!

…There's just one small problem

2b How do we decide which variables are best for rent estimation within each neighborhood?

Walk Time or Drive Time	5 Min	Average Household Income	Population Density	Co-Tenancy	Surrounding Rent Prices
	10 Min	Average Household Income	Population Density	Co-Tenancy	Surrounding Rent Prices
Radius	500 Ft	Average Household Income	Population Density	Co-Tenancy	Surrounding Rent Prices
	0.1 Mile	Average Household Income	Population Density	Co-Tenancy	Surrounding Rent Prices
	½ Mile	Average Household Income	Population Density	Co-Tenancy	Surrounding Rent Prices
	¼ Mile	Average Household Income	Population Density	Co-Tenancy	Surrounding Rent Prices
Space & Accessibility		Updated HVAC	Ceiling Heights	Modern Buildout	Building Age
		Venting	Tenant Preference	Retail Hub Proximity	Subway Proximity
		Frontage	Landlord TI	Zip Code	Business Improvement District

**This list is not exhaustive*

Source: Migden Miller, 2024.

2b Calibrate Optimal Neighborhood-Level Models

Neighborhood-level optimization goes one step further than GWR optimization. Step 2b tests *best-fit transformations* of independent variables. This is *tailored to the different subsets of data*.

Model combinations

	var_1	var_2	var_3	var_4	var_5	var_6
1	Corner	SCALED_WLK_5_CoTen_V2	SQRT_SCALED_RAD_0_1_Mean_PSF_RENT_ADJ	SQRT_SCALED_WLK_10_mean_DPOPDENSCY	*NA*	*NA*
2	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
3	Corner	Food	SCALED_WLK_10_CoTen_V2	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_WLK_10_mean_DPOPDENSCY
4	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
5	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_RAD_0_25_mean_SpendingTotal_X15001_X_A	SCALED_WLK_10_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway
6	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
7	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SCALED_WLK_5_mean_SpendingTotal_X15001_X_A	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_POPDENS_CY
8	Corner	Food	SCALED_WLK_5_CoTen_V1	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_POPDENS_CY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ
9	Corner	Food	SQRT_SCALED_Dist_Subway	SQRT_SCALED_WLK_10_mean_POPDENS_CY	SQRT_SCALED_WLK_10_Mean_PSF_RENT_ADJ	SQRT_SCALED_WLK_5_mean_DPOPDENSCY
10	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_RAD_0_25_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
11	Corner	Food	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ	*NA*
12	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_25_mean_DPOPDENSCY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ

R-ArcGIS Bridge

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Neighborhood-level optimization goes one step further than GWR optimization. Step 2b tests *best-fit transformations* of independent variables. This is *tailored to the different subsets of data*.

Model combinations

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1	Corner	SCALED_WLK_5_CoTen_V2	SQRT_SCALED_RAD_0_1_Mean_PSF_RENT_ADJ	SQRT_SCALED_WLK_10_mean_DPOPDENSCY	*NA*	*NA*
2	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
3	Corner	Food	SCALED_WLK_10_CoTen_V2	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_WLK_10_mean_DPOPDENSCY
4	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
5	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_RAD_0_25_mean_SpendingTotal_X15001_X_A	SCALED_WLK_10_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway
6	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_WLK_5_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
7	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SCALED_WLK_5_mean_SpendingTotal_X15001_X_A	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_POPDENS_CY
8	Corner	Food	SCALED_WLK_5_CoTen_V1	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_POPDENS_CY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ
9	Corner	Food	SQRT_SCALED_Dist_Subway	SQRT_SCALED_WLK_10_mean_POPDENS_CY	SQRT_SCALED_WLK_10_Mean_PSF_RENT_ADJ	SQRT_SCALED_WLK_5_mean_DPOPDENSCY
10	Corner	Food	SCALED_RAD_0_25_CoTen_V1	SCALED_RAD_0_25_mean_AVGHINC_CY	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY
11	Corner	Food	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_1_mean_DPOPDENSCY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ	*NA*
12	Corner	Food	SCALED_RAD_0_25_CoTen_V2	SQRT_SCALED_Dist_Subway	SQRT_SCALED_RAD_0_25_mean_DPOPDENSCY	SQRT_SCALED_RAD_0_25_Mean_PSF_RENT_ADJ

This is fed into an iterative OLS multivariate regression function that considers variable significance, outliers, and heteroskedasticity, leading to the ***best possible model***.

R-ArcGIS Bridge

2. Automated Model Optimization

Source: Migden Miller, 2024.

2b Neighborhood-Level Results and Diagnostics

Table 21 Quantile neighborhood-level model fit diagnostics.

Neighborhood	RMSE	Mean Abs. Err	Median Abs. Err	Hetero-skedasticity	Bias	Bias STD
Q 1c (29)	0.154	0.126	0.115	Yes	-2.61E-15	-1.00E-13
Q 1d (48)	0.149	0.123	0.114	No	-4.44E-16	-1.90E-14
Q 1e (41)	0.215	0.171	0.153	Yes	-7.59E-16	-3.02E-14
Q 2a (38)	0.123					
Q 2b (43)	0.192					
Q 3c (15)	98.173					
Q 4a (39)*	0.168					
Q 4b (40)	0.152					
Q 4d (1)	0.131					
Q 4e (33)	0.147					
Q 5a (34)	0.167					
Q 5c (4)*	65.789					
Q 5d (43)	0.169					
Q 5e (39)	0.172					
Q 6b (50) SL	0.194					

Table 20 Quantile neighborhood-level coefficients.

Neighborhood	Intercept	Var 1	Var 2	Var 3	Var 4	Var 5	Adj. R2 (80%)	Adj. R2 (20%)
Q 1c (29)	-1.444	4.681	0.097				0.772	0.673
Q 1d (48)	1.965	2.115	0.098	0.707			0.466	0.371
Q 1e (41)	2.262	0.462	-0.590	0.774				
Q 2a (38)	1.893	0.065	4.343					
Q 2b (43)	2.098	1.790	1.192	-0.334				
Q 3c (15)*	2.692	101.848	338.043					
Q 4a (39)	0.969	2.478	1.191					
Q 4b (40)	0.664	-0.780	1.337	1.474	1.943			
Q 4d (1)	2.796	0.574	0.078					
Q 4e (33)	1.994	0.069	2.950					
Q 5a (34)	1.830	0.103	4.520					
Q 5c (4)*	137.705	10,707.656	-320.540	564.573	-665.939	-60.084		
Q 5d (43)	2.593	0.901	-1.184	-0.876				
Q 5e (39)	2.947	1.021	5.451					
Q 6b (50) SL	2.010	1.760	0.081					

Table 19 Quantile neighborhood-model variables.

Name	Var 1	Var 2	Var 3	Var 4	Var 5
Q 1c (29)	Rad 0.1 - Mean PSF Rent Adj (0.1)	Corner			
Q 1d (48)	Walk 5 - Mean PSF Rent Adj	Corner	Rad 0. 1 - CoTen V2 (3.0)		
Q 1e (41)	Walk 5 - Avg HH Income	Rad 0.25- Population Density (0.5)	Rad 0.25 - Mean PSF Rent Adj		
Q 2a (38)	Corner	Rad 0.1 - Mean PSF Rent Adj			
Q 2b (43)	Rad 0.1 - Mean PSF Rent Adj	Walk 10 - CoTen V1 (3.0)	Walk 10 - Daytime Population Density		
Q 3c (15)	Rad 0.25 - Daytime Population Density	Walk 10 - Co Ten V2			
Q 4a (39)	Rad 0.1 - Mean PSF Rent Adj	Rad 0.1 - CoTen V2 (0.1)			
Q 4b (40)	Walk 10 - Avg HH Income	Walk 10 - Mean PSF Rent Adj (0.3)	Walk 5 - Population Density	Walk 10 - CoTen V2	
Q 4d (1)	Rad 0.1 - Mean PSF Rent Adj (log 10)	Corner			
Q 4e (33)	Corner	Rad 0.1 – Mean PSF Rent Adj			
Q 5a (34)	Corner	Rad 0.1 – Mean PSF Rent Adj			
Q 5c (4)*	Rad 0.1 - Mean PSF Rent Adj (2.2)	Walk 5 - CoTen V2 (1.8)	Walk 5 - Avg. HH Retail Spending	Walk 5 - Population Density	Corner
Q 5d (43)	Walk 10 - CoTen V2 (3.0)	Rad 0.1 - Population Density	Rad 0.25 - Daytime Population Density		
Q 5e (39)	Walk 5 - CoTen V2	Walk 5 - Avg. HH Retail Spending (log 10)			
Q 6b (50) SL	Rad 0.1 - Mean PSF Rent Adj	Corner			

R-ArcGIS Bridge

2. Automated Model Optimization

Source: Migden Miller, 2024.

2b Neighborhood-Level Results and Diagnostics

Neighborhood	Intercept	Variable 1	Variable 2	Variable 3	Variable 4	Var. 5
Q 1c (4)	-1.444	**Rad 0.1 – Avg Rent**	Corner			
Q 1d (29)	1.965	Walk 5 - Avg Rent	Corner	Rad 0. 1 - CoTen V2		
Q 1e (41)	2.262	Walk 5 - Avg HH Income	Rad 0.25- Pop Density	Rad 0.25 - Avg Rent		
Q 2a (43)	1.893	Corner	**Rad 0.1 – Avg Rent**			
Q 2b (33)	2.098	Rad 0.1 – Avg Rent	Walk 10 - CoTen V1	Walk 10 - Day Pop Density		
Q 3c (48)*	2.692	Rad 0.25 - Day Pop Density	Walk 10 - Co Ten V2			
Q 4a (39)	0.969	Rad 0.1 – Avg Rent	Rad 0.1 - CoTen V2			
Q 4b (34)	0.664	Walk 10 - Avg HH Income	Walk 10 – Avg Rent	Walk 5 - Pop Density	Walk 10 - CoTen V2	
Q 4d (38)	2.796	Rad 0.1 – Avg Rent	Corner			
Q 4e (40)	1.994	Corner	Rad 0.1 – Avg Rent			
Q 5a (50)	1.830	Corner	**Rad 0.1 – Avg Rent**			
Q 5c (1)*	137.705	Rad 0.1 – Avg Rent	Walk 5 - CoTen V2	**Walk 5 - Avg. HH Retail Spending**	Walk 5 - Pop Density	Corner
Q 5d (43)	2.593	Walk 10 - CoTen V2	Rad 0.1 - Pop Density	Rad 0.25 – Day Pop Density		
Q 5e (39)	2.947	Walk 5 - CoTen V2	**Walk 5 - Avg. HH Retail Spending**			
Q 6b (15) SL	2.010	Rad 0.1 – Avg Rent	Corner			

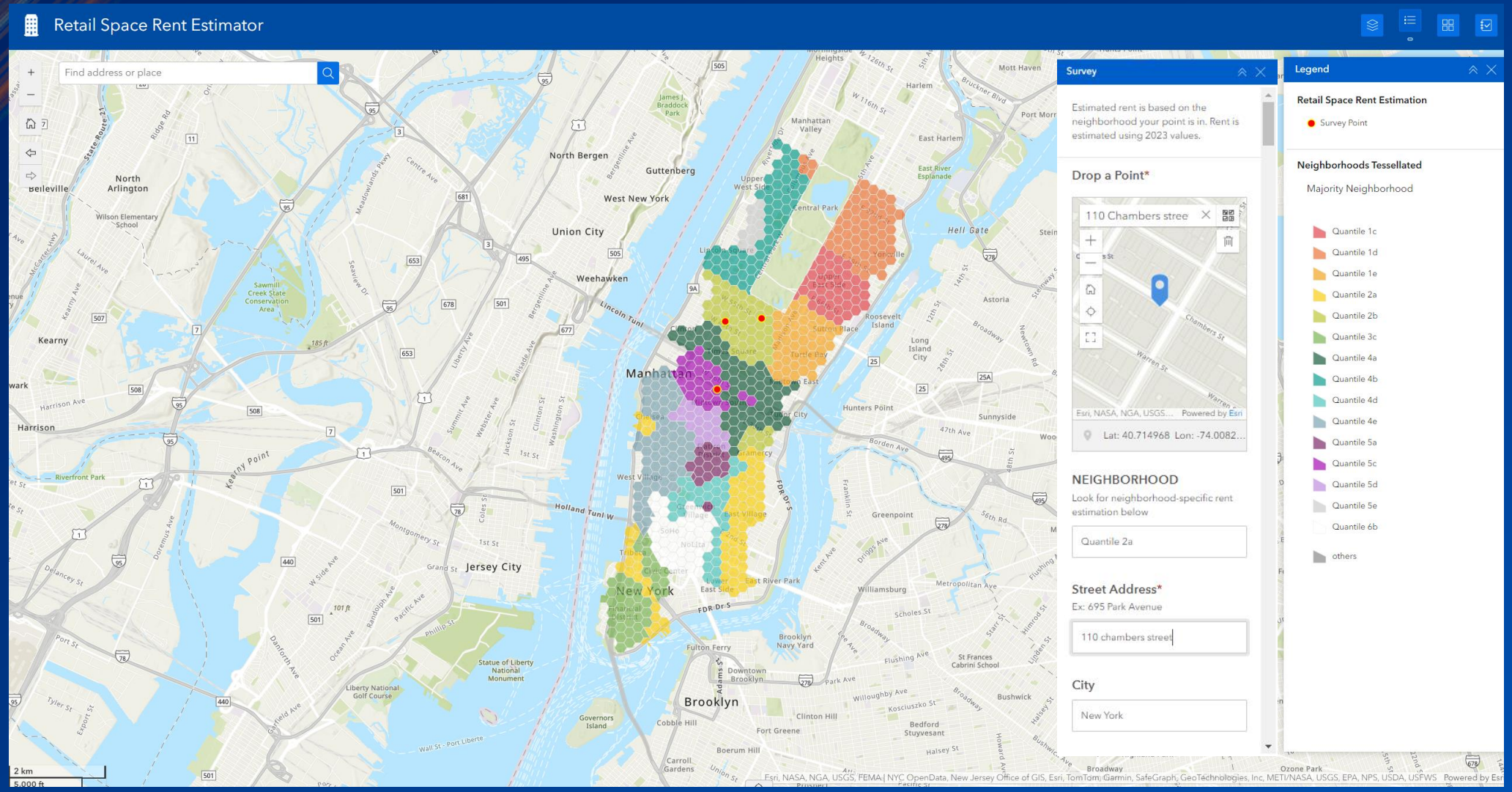
Small Coefficient → **Large Coefficient**

Positive Coefficient

Negative Coefficient

Source: Migden Miller, 2024.

3 Rent Estimator with Experience Builder and Survey 123

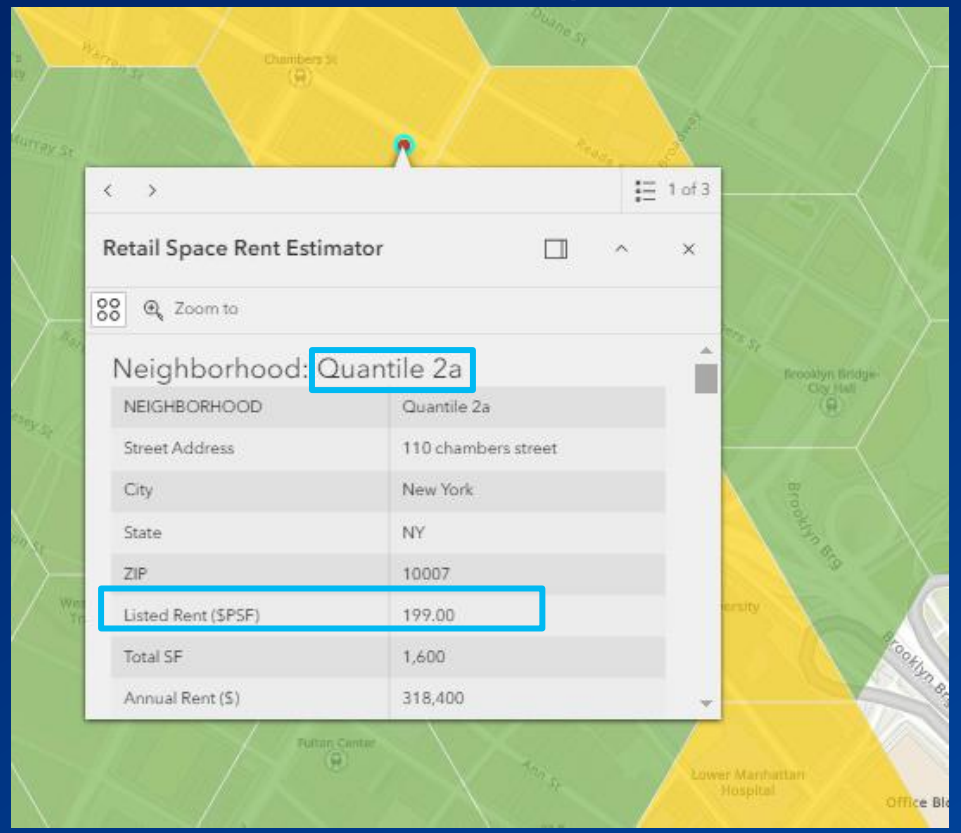


Experience Builder + Survey 123

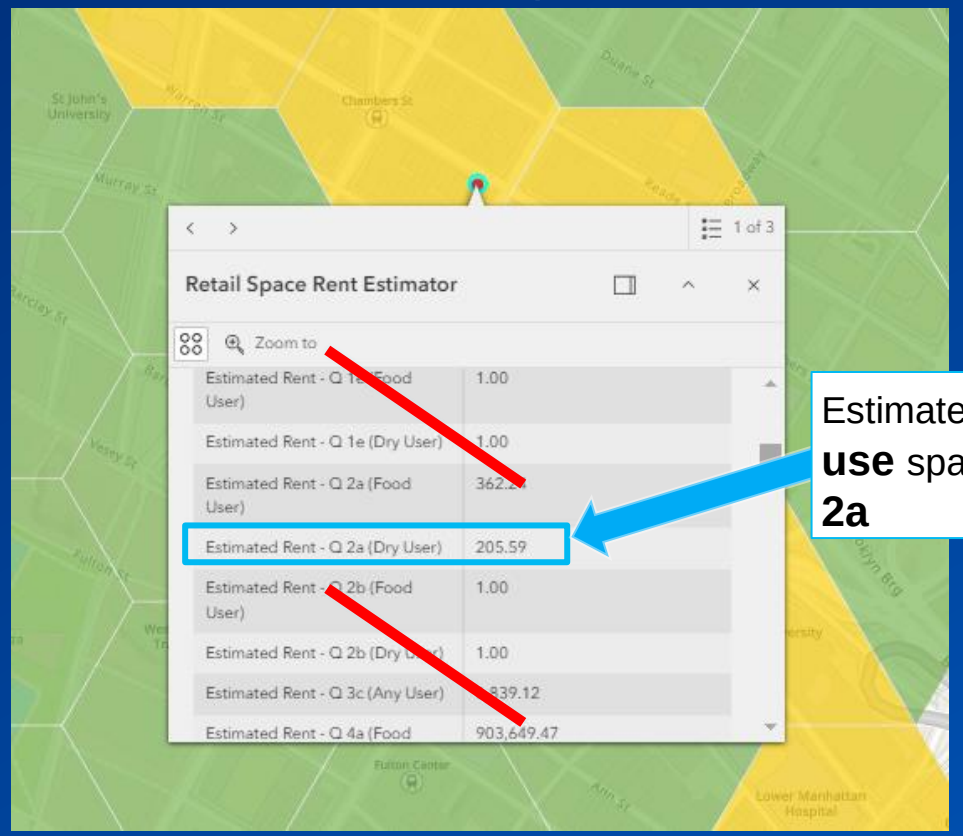
3. Visualize Results

3 Rent Estimator with Experience Builder and Survey 123

Market Listed Rent = $199.00



Estimated Rent = $205.50



Estimated rent for this **dry use** space, in neighborhood **2a**

Experience Builder + Survey 123

3. Visualize Results

Thank you!

***Link to paper**: https://academicworks.cuny.edu/hc_sas_etds/1160*

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