



OPTIMIZING HOUSING RECOMMENDATIONS FOR GRADUATE STUDENTS AT WSB

MIP for Tailored Housing Solutions

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BACKGROUND

Graduate students at the Wisconsin School of Business (wsb) face challenges finding optimal housing options due to varying budgets, proximity to campus, and personal preferences like commute time or amenities. This issue is especially relevant as students, often unfamiliar with Madison, require reliable housing recommendations that balance cost and convenience.





EXECUTIVE SUMMARY

Purpose: To optimize off-campus housing recommendations for graduate students considering proximity, affordability, and amenities.

Audience: Graduate students at Wisconsin School of Business

Approach: A Mixed-Integer Programming (MIP) model selects optimal housing by evaluating real-world constraints and preferences.

Value: Provides students with data-driven, cost-effective housing options, ensuring better decision-making aligned with individual priorities.

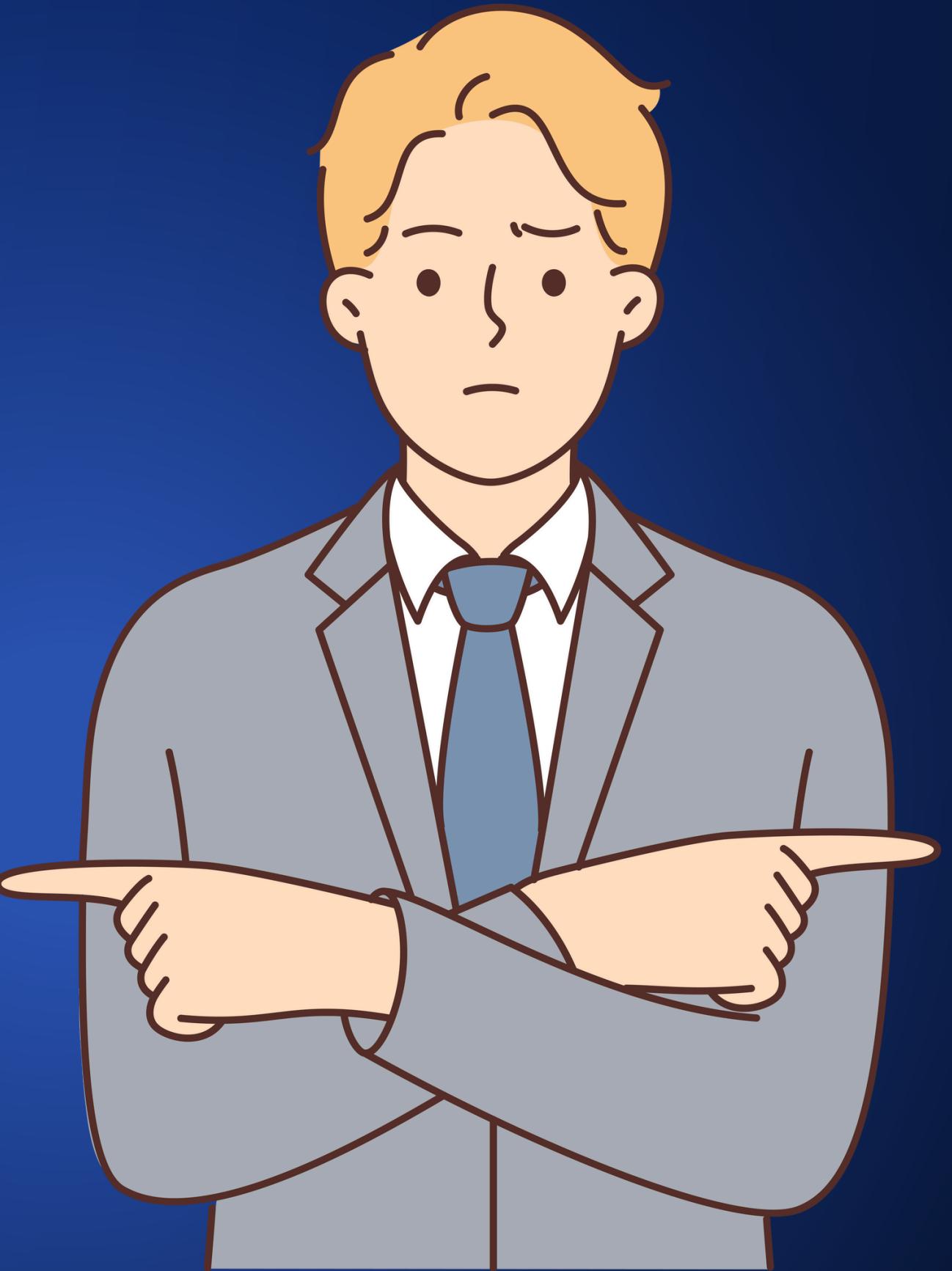




DECISION VARIABLES

The key decision variable ' x_i ' in the model is whether a specific property (housing option) is selected for inclusion in the recommendation. This is represented as a binary variable ' i ' , where:

- $x_i=1$: The property is selected.
- $x_i=0$: The property is not selected.





CONSTRAINTS

- Budget Constraint: Rent $\leq \$700/\text{month}$.
- Proximity Constraint: Walking distance $\leq 1 \text{ mile}$ or near a bus stop.
- Super Market Access: Near a supermarket.
- Housing Type: 2B1B or 2B2B.
- Selection Constraint: Select only one property



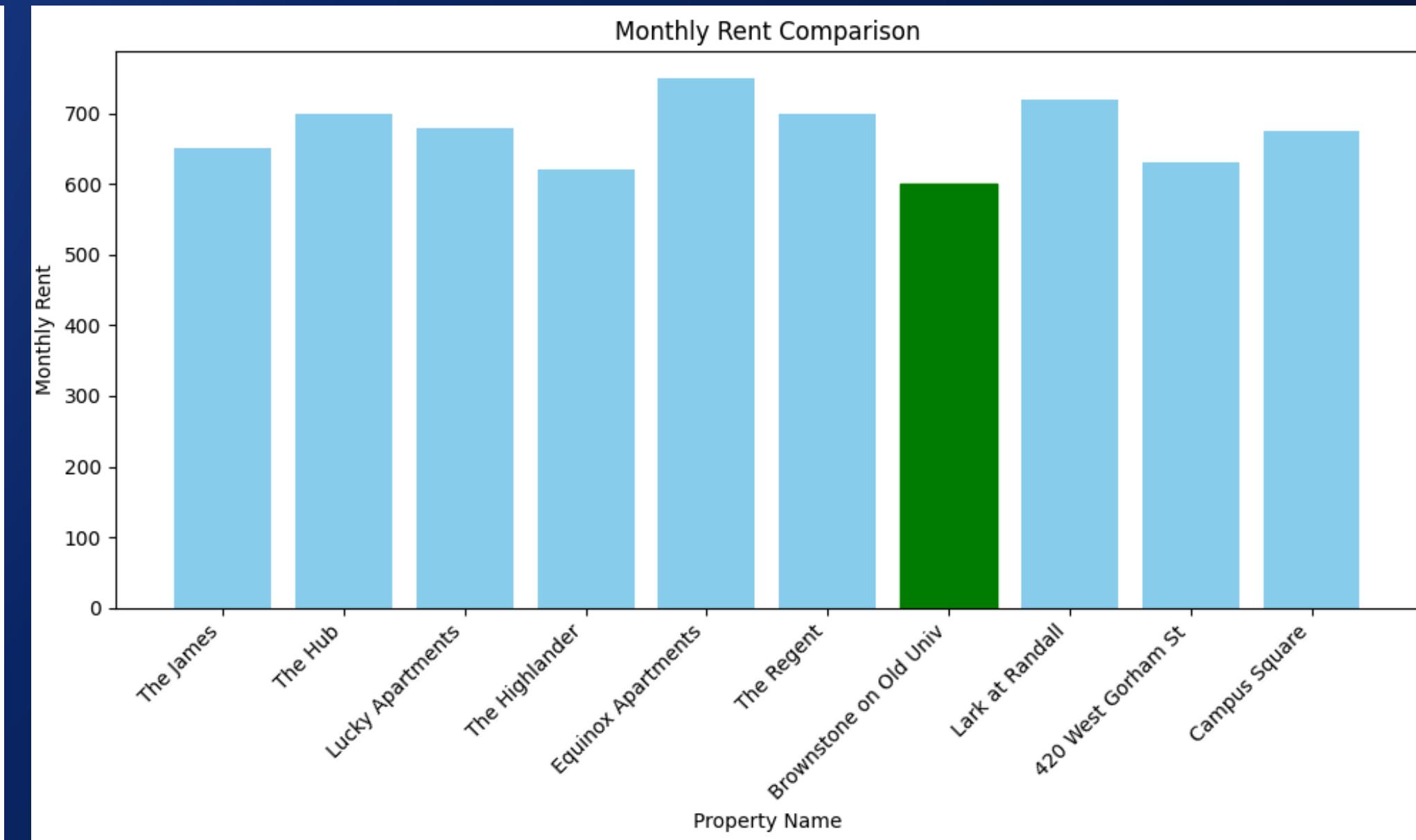
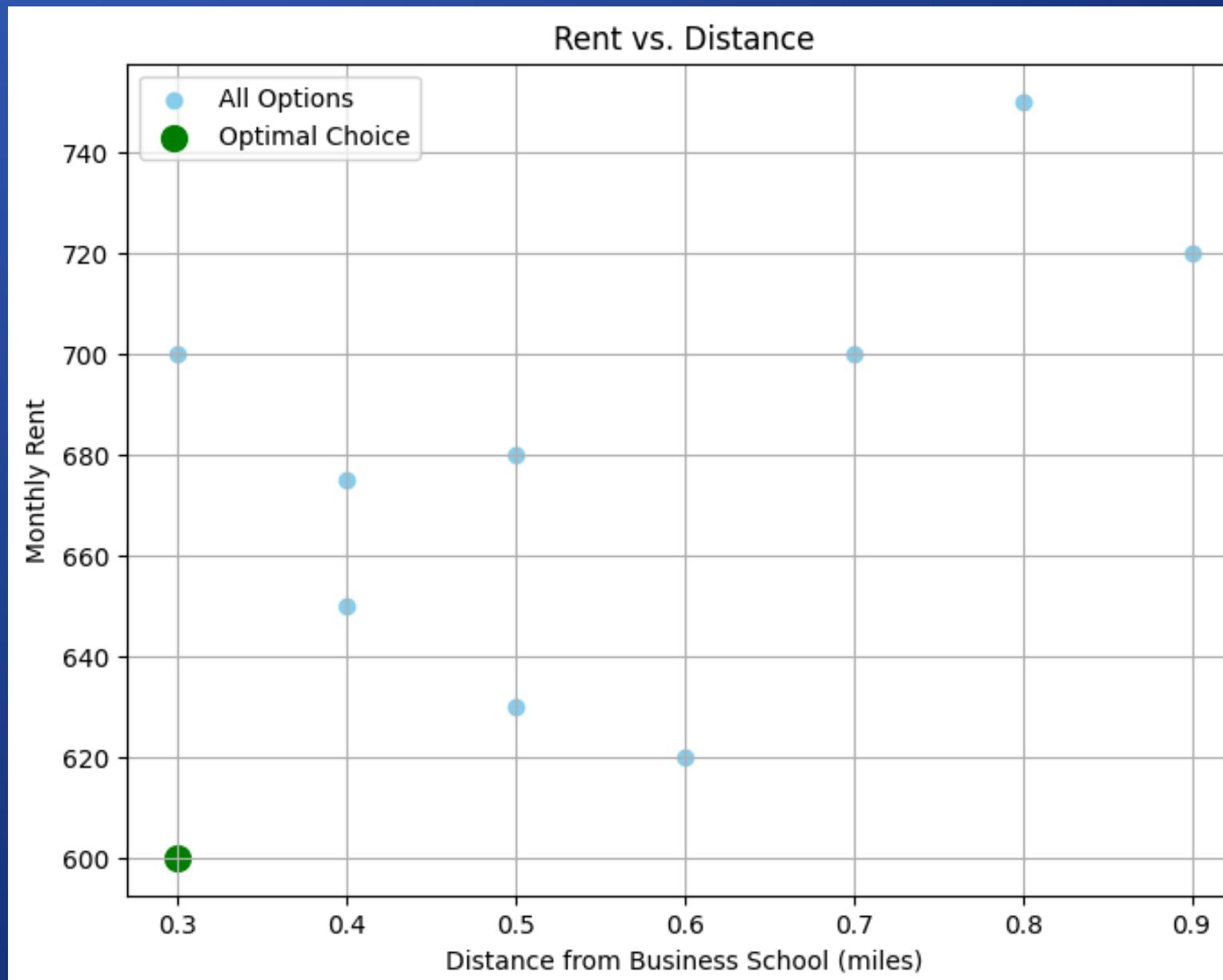


DATASET OVERVIEW

- Properties Considered: 10 housing options near WSB.
- Key Attributes:
Rent (\$), Distance (miles), Proximity to bus stop and supermarket, Housing type.

Property Name	Rent (\$)	Distance (miles)	Near Bus Stop	Near Supermarket	Type
The James	650	0.4	Yes	Yes	2B2B
The Hub	700	0.3	Yes	Yes	2B2B
Lucky Apartments	680	0.5	Yes	Yes	2B1B
The Highlander	620	0.6	Yes	Yes	2B1B
Equinox Apartments	750	0.8	Yes	Yes	2B2B
The Regent	700	0.7	Yes	No	2B2B
Brownstone on Old Univ	600	0.3	Yes	Yes	2B1B
Lark at Randall	720	0.9	Yes	No	2B2B
420 West Gorham St	630	0.5	Yes	Yes	2B1B
Campus Square	675	0.4	Yes	Yes	2B2B

OPTIMIZATION IN ACTION



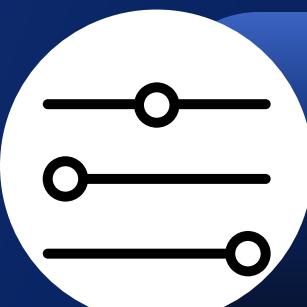
The graphs together illustrate that Brownstone on Old Univ is both the closest property (0.3 miles) and offers the lowest rent (\$600), making it the optimal solution.



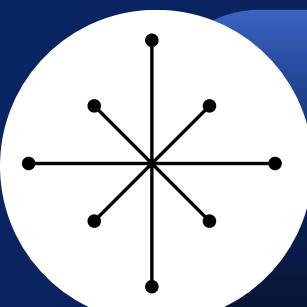
BENEFITS OF THE MODEL



Efficiency



Customization



Scalability



Practicality

Challenges:

- Limited data availability.
- Simplistic binary proximity constraints (near vs. not near).



Future Steps:

- Expand the dataset with real-time listings.
- Incorporate fuzzy constraints for nuanced preferences.
- Develop a user-friendly app for housing recommendations.

