



BOSTON STUDENT HOUSING ANALYSIS

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INTRODUCTION

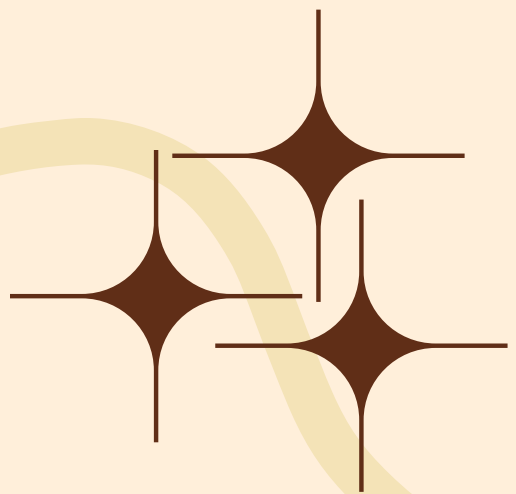
Boston's academic vibrancy, anchored by renowned institutions like Harvard, MIT, Northeastern, and Boston University, draws thousands of students annually, creating a thriving but highly competitive housing market. With limited availability and soaring rents, affordable and accessible housing remains one of the city's most pressing challenges. Students, particularly those on tight budgets, often face difficult trade-offs, sacrificing proximity, affordability, or quality.

This project delves into the state of student housing in Boston, focusing on three critical parameters: rent prices, distance from universities, and the number of bedrooms. By exploring these factors, it aims to shed light on the constraints students face and identify pathways for improvement.

PROBLEM STATEMENT

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Boston, home to world-renowned institutions such as Harvard, MIT, Boston University, and Northeastern University, faces a critical challenge in providing affordable and accessible housing for its growing student population. The high demand for housing driven by thousands of students annually, coupled with a competitive housing market, results in limited availability, skyrocketing rental prices, and a scarcity of convenient locations near universities. As a result, students, particularly those on tight budgets, are forced to make difficult compromises between affordability, proximity, and quality of living. This situation not only affects students' academic performance, well-being, and social life but also places pressure on universities, developers, and local policymakers. There is a need for a comprehensive analysis of the student housing market to identify trends, assess student housing needs, and provide actionable insights for addressing the challenges faced by students and other stakeholders.



OBJECTIVE

The overall objective of this study is to deeply analyze the student housing market in Boston, focusing on the unique challenges that students face. Specifically, the project will aim to understand the diversity of housing options available to students, including one-, two-, and three-bedroom apartments to identify what choices exist for students. It will also conduct an affordability analysis by visualizing rent prices across different neighborhoods to help students locate areas within their budgets, while comparing housing costs to location-specific expenses. The study will assess the proximity of housing options to major universities, highlighting the importance of location for students who require ease of access to their campuses for both academic and social activities. These insights aim to guide not only students but also key stakeholders such as universities, developers, and policymakers. Through these objectives, the project seeks to offer a comprehensive understanding of the student housing landscape, identifying current challenges and opportunities for improvement.

METHODOLOGY

The data undergoes preprocessing to ensure accuracy and consistency before being analyzed using Python. Key libraries like Pandas are leveraged for data manipulation. For interactive insights, Folium is employed to create geographic visualizations, complemented by the Google Maps API to calculate proximity to universities.

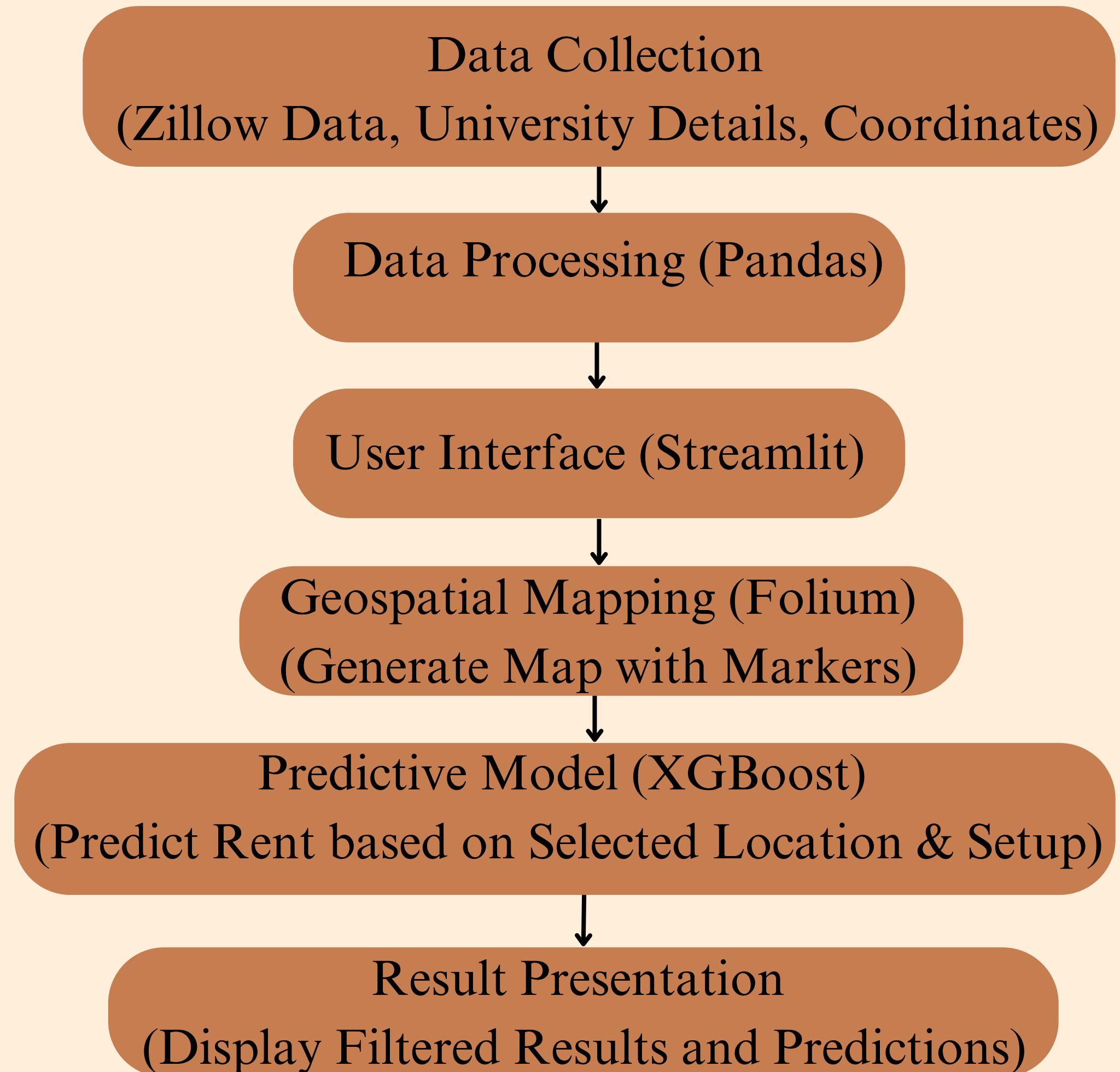
An interactive Streamlit dashboard is developed, presenting insights on cost trends, location analysis, and proximity measures, with dynamic visualizations enabling in-depth exploration. Additionally, the project integrates the XGBoost machine learning algorithm to predict housing prices based on specific GPS coordinates, offering valuable tools for students and stakeholders to navigate Boston's complex housing market effectively.



FEATURES OF THE DASHBOARD

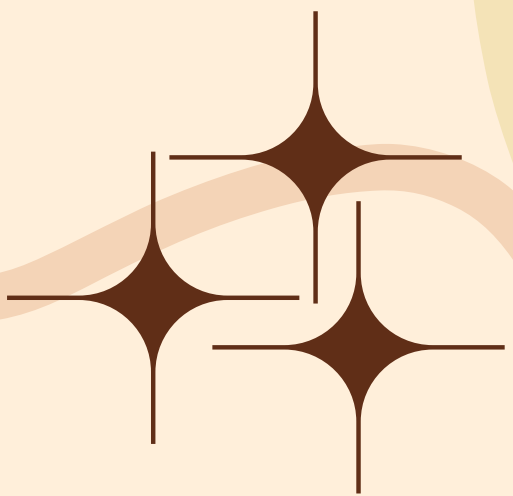
The dashboard offers two primary functionalities: a database mode and a predictive model mode. In the database mode, users can filter rental options based on distance to their university, rent range, and the number of bedrooms, displaying the results in an interactive map. In predictive mode, users can pick any location on a map and predict the rent for different bedroom configurations using a pre-trained XGBoost model. These features ensure the dashboard caters to diverse needs, offering practical insights for students and stakeholders.

FLOWCHART



TECHNICAL ARCHITECTURE

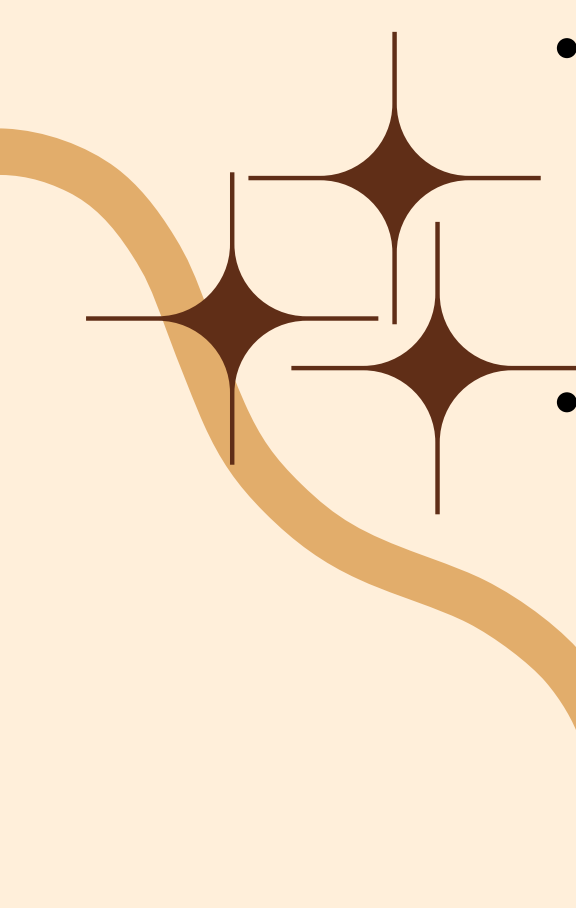
The backend of our dashboard is powered by Python, with data processing done using Pandas and geospatial visualization achieved through Folium. The predictive functionality is driven by an XGBoost model trained on processed rental data. On the frontend, we used Streamlit to provide an interactive interface where users can explore data in real time. Geospatial analysis is further enhanced using university coordinates stored in a JSON file, and predictive results are fetched using pre-trained models saved in pickle format.



IMPACT AND BENEFITS



This dashboard has the potential to create a transformative impact.

- For students, it simplifies the decision-making process by providing clarity on affordability and proximity.
 - Universities can use the insights to improve on-campus and off-campus housing support.
 - Developers benefit from a clear indication of high-demand areas, enabling targeted investments.
 - Policymakers can leverage the data to enact strategies promoting affordable housing near academic hubs, ultimately fostering a more balanced housing ecosystem in Boston.
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FUTURE WORK




The project lays the groundwork for broader applications. The dashboard can be expanded to other cities with large student populations, adapting to their unique challenges. Additional factors, such as transit options and neighborhood safety ratings, can be integrated into the analysis. Long-term data collection could enable trend analysis and improve predictive capabilities. Partnering with universities and housing platforms for live data integration would enhance its real-time accuracy and relevance.



CONCLUSION

In conclusion, the Boston Student Housing Dashboard addresses immediate and long-term challenges in the student housing market. By empowering students with data and insights, it improves their housing experience. Simultaneously, it equips universities, developers, and policymakers with actionable intelligence to address housing gaps and foster sustainable solutions. Collaboration across all stakeholders is key to realizing a more accessible housing market in Boston and beyond.



THANK
YOU

