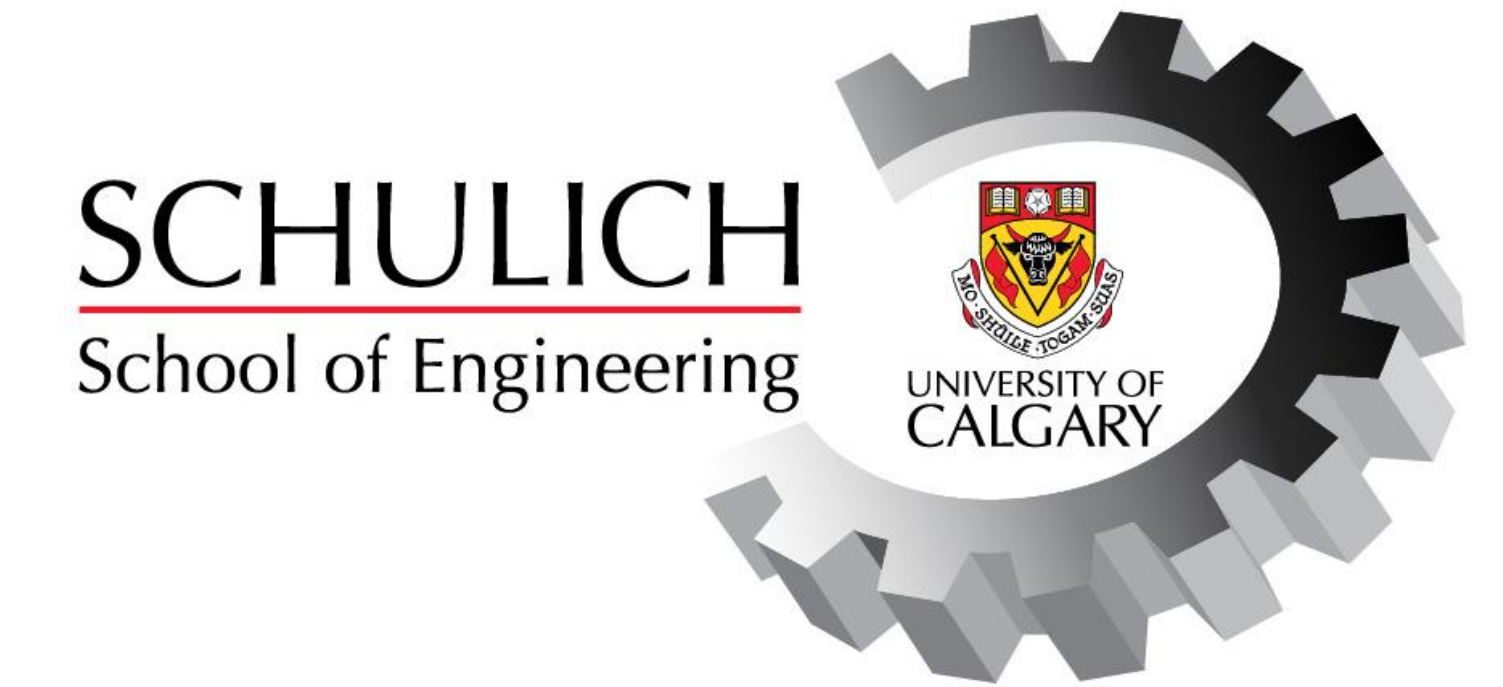# HomeSphere
A Housing Optimization App for Northeast Calgary

Haniya Ahmed, Shahdad Vahdati Daneshmand, Asma Hashmi, Girimer Singh, Tony Vo
Schulich School of Engineering, University of Calgary

Abstract

- HomeSphere leverages unsupervised machine learning algorithms to analyze Calgary's Northeast housing market, providing unique insights through colour-coded maps and data analysis.

- Focused on enhancing urban well-being, the application aids Calgarians and developers in identifying optimal living and development communities and postal codes by allowing customization according to user preferences.

- By narrowing our scope to the Northeast quadrant, we offer precise, actionable data, significantly reducing computation times while ensuring high accuracy.

- Our project demonstrates the potential of open data to inform better urban planning and housing solutions.

Introduction

- Facing a complex housing challenge in Calgary, particularly in the Northeast quadrant, our project, HomeSphere, seeks to address the diverse needs of residents and urban developers amidst rising prices and overcrowding.

- Utilizing Calgary's Open Data Portal and data from the University of Calgary, we harness the power of the unsupervised machine learning algorithm K-Means to analyze and cluster housing data.

- Our solution offers a user-friendly application that visualizes housing trends and potential development areas through interactive, colour-coded maps.

- By providing a platform for customizable analysis based on individual preferences, HomeSphere empowers users to make informed decisions about housing and urban development, fostering a more balanced and accessible urban landscape.

Results

- Our application successfully identified distinct housing clusters within Northeast Calgary, revealing key patterns in housing prices, proximity to amenities, and housing characteristics.

- Users can access detailed, colour-coded maps visually representing these clusters, allowing for easy comparison and informed decision-making.

- Feedback from initial users indicates a high level of satisfaction with the application's ability to tailor insights to individual preferences, significantly aiding in the search for optimal living spaces.

- The project demonstrates the practical application of K-Means clustering in urban planning, offering a novel approach to addressing housing challenges by enabling data-driven strategies for residents and developers.

Discussion

- Our project highlights the power of machine learning and open data in tackling urban challenges, particularly emphasizing the importance of healthcare proximity, a key concern for team members in Biomedical Engineering.

- The positive feedback from users validates our approach and signals the potential for broader applications in urban planning, emphasizing healthcare accessibility.

Conclusions

- HomeSphere has demonstrated the potential of machine learning and open data to revolutionize urban planning and housing solutions in Calgary's Northeast quadrant, offering personalized, data-driven insights for better decision-making.

- Moving forward, the project sets a foundation for expanding this innovative approach to the other quadrants of Calgary, promising a more informed and inclusive future for urban development.
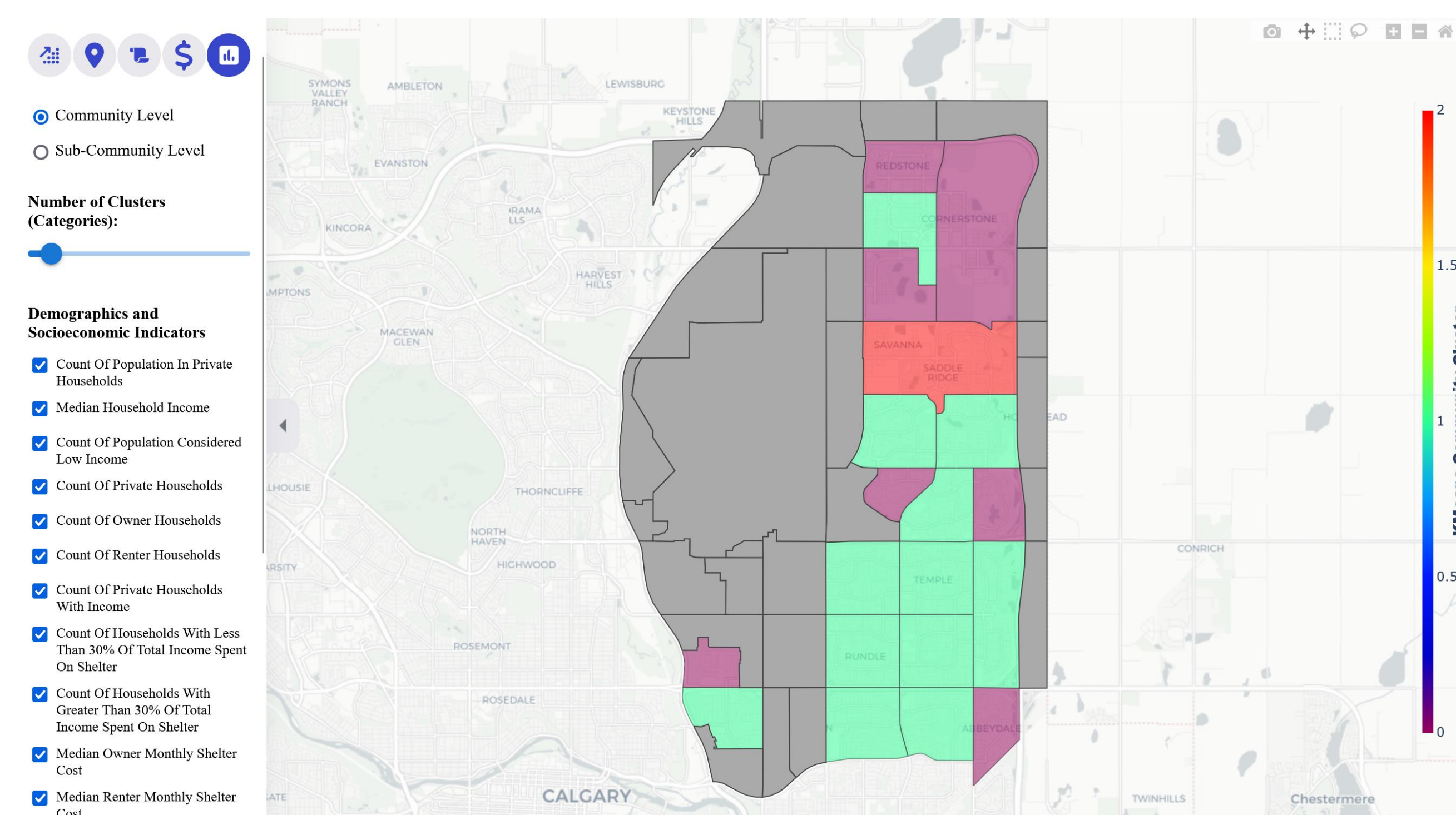
Methods and Materials

- To tackle Calgary's housing challenges, our project utilized data from the City of Calgary's Open Data Portal, focusing on the Northeast quadrant.

- We employed the K-Means clustering algorithm, an unsupervised machine learning technique, to analyze housing-related data, including prices, proximity to amenities, and community features.

- We developed the application's backend using Python and FastAPI, with data processing and analysis facilitated by libraries such as Pandas, NumPy, and scikit-learn.

- Frontend visualizations were created using React and Leaflet for mapping, ensuring an interactive and user-friendly experience.

- Our infrastructure is hosted on Amazon Web Services (AWS), leveraging a PostgreSQL database for data storage, ensuring scalability and performance.

CONTACT
Tony Vo
Email: tony.vo@ucalgary.ca
Phone: (403) 589-9502
Website: https://home-sphere.ca/