GENTRIFICATION PREDICTION

Team

INTRODUCTION AND OBJECTIVES

- Our group aims to give more control to the people affected, by giving them a *map-based visual tool* to predict a neighborhood's gentrification levels.

- Gentrification, driven by economic forces, involves the influx of predominantly white and middle-class residents into affordable neighborhoods, leading to rising prices, displacement of long-term residents, and both positive and negative impacts on racial diversity[1], income inequality[1], crime rates[2], business closures, and public health.

- The visual application will include projected rental and property price features that users can *interact* with through a year slider. When users choose a neighborhood and year to predict gentrification, the ML model will output list of *top 5 factors* driving gentrification.

[1] Freeman, Lance (2009). "Neighbourhood Diversity, Metropolitan Segregation and Gentrification: What Are the Links in the US?" *Urban Studies*, vol. 46, no. 10, pp. 2019-2254.
[2] Atems, Bebonchu (2020), "Identifying the Dynamic Effects of Income Inequality on Crime." *Oxford Bulletin of Economics and Statistics*, vol. 82, no. 4, pp. 751-782.

WHO CARES?

Small-time investors can identify neighborhoods with gentrification potential to set up a business.

Homebuyers and real estate investors can make informed decisions.

Urban planners and policymakers interested in understanding and managing gentrification impacts.

EXISTING MODEL & LIMITATIONS

MODEL	LIMITATION	MEASURE
A **Siamese network** with a gated attention mechanism on paired Google street view images to detect major changes in infrastructure as a predictor of gentrification[3].	Deep learning methods are not interpretable.	Balanced Accuracy: 75%
Boosted tree model for gentrification in Sydney, Australia. Using census data, transportation, Airbnb, and discretionary spending venue data[4].	Model generalizability to other metro areas is untested.	Balanced Accuracy: 75%
Regression to measure correlation between café and amenity businesses with gentrification indicators[5].	Regressors may be insignificant in the presence of other predictive factors.	R-squared: ~0.37

[3] Huang, T., Dai, T., Wang, Z., Yoon, H., Sheng, H., Ng, A. Y., Rajagopal, R., Hwang, J. (2023). Detecting Neighborhood Gentrification at Scale via Street-level Visual Data. Retrieved from https://arxiv.org/pdf/2301.01842.pdf

[4] Thackway, W. (2023). "Building a predictive machine learning model of gentrification in Sydney". Volume 134, March 2023, 104192.

[5] Glaeser, Edward, et al (2018). "Nowcasting Gentrification: Using Yelp Data to Quantify Neighborhood Change". Retrieved from https://doi.org/10.1257/pandp.20181034

OUR SOLUTION AND WHAT'S NEW?

- Integration of a gentrification prediction model with an ***interactive map-based interface*** for users.

- Real-time data analytics with predictive modeling of gentrification trends offer a ***more dynamic and forward-looking*** analysis than current static models.

- User's ability to interact with the map and *view top 5 features driving gentrification*.

PROPOSED MODEL

• Our scope will be limited to Atlanta, GA and Washington DC for three primary reasons:

    1. Quality census data.

    2. Extensive data on gentrification, being the birthplace of the term itself [6].

    3. Accessible house pricing data.

• Because we need interpretability, at least enough to see feature importance, we are planning to explore tree-based models to build our predictor. Though we are considering other methods as well, such as k-means. We will validate which model is best using historical data.

• Since we are planning to use government and public access data for our models, and we don't believe our datasets will be big enough to require hosting, we do not anticipate having any monetary costs.

[6] Finio, N. (2021). "Measurement and Definition of Gentrification in Urban Studies and Planning." Retrieved from https://doi.org/10.1177/0885412221105160.

DIFFERENCE AND IMPACT

- Homebuyers and real estate investors will have access to **areas of opportunity**.

- Investors can leverage this information to identify neighborhoods that have the potential for gentrification in the future and **apply the same factors to a neighborhood** that desires gentrification.

- Local governments will be able to **understand drivers of gentrification** and implement effective policies to ensure **positive outcomes**.

MEASURE OF PROGRESS

- Comparing the outcomes from our modeling with **traditional and existing approaches** to test the effectiveness of our predictions.

- In the long run, community **feedback and survey** from stakeholders.

RISKS

Unable to achieve relevant level of accuracy.

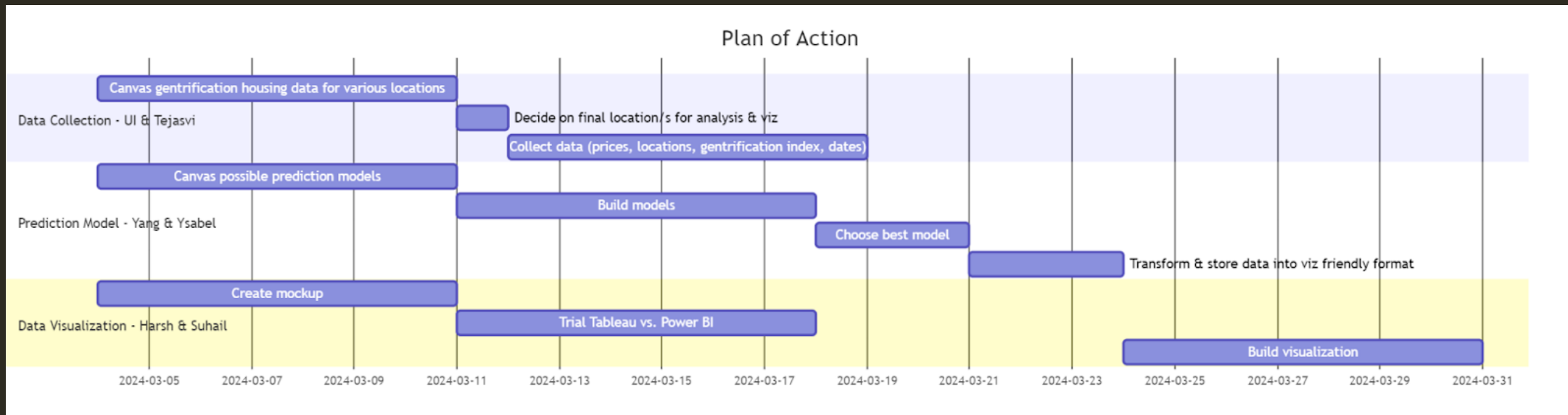Wrongly classifying gentrifyable neighborhoods.

PAYOFFS

Accessibility and easy to understand tool for stakeholders of all levels.

Suggestions of areas of focus for policy.

COST AND DURATION

We do not plan to use exclusive tools for our project, so the estimated monetary   cost is zero.

All team members have contributed a similar amount of effort.

MEASURE OF PROGRESS

CHECKPOINT	GOALS
Project Progress Report(around mid-terms)	• Collected, cleaned and explored data. • Finished model development and testing, with a focus on accuracy.
Project Final Report	• Model incorporated into map tool. • Interactive map visualizer created, tested, and ready for public access.

THANK YOU!

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