GENTRIFICATION PREDICTION FOR UK CITIES

Using our interactive gentrification prediction map, residents of UK cities can check if their neighborhoods are on the verge of gentrification and take steps to make the transition positive.

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PROBLEM

Gentrification, influenced by economic forces, entails:

- Influx of predominantly white, middle-class residents into affordable neighbourhoods.
- Resulting in rising prices and displacement of long term residents.
- Impacting racial diversity, income inequality, crime rates, business closures, and public health, with both positive and negative effects.

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

WHO CARES?

- Urban planners and policymakers
- Small-time investors
- Homebuyers and real estate investors

OUR APPROACH & 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 with better accuracy.
- User's ability to interact with the map for multiple cities in UK and view top 3 features driving gentrification.

DATA

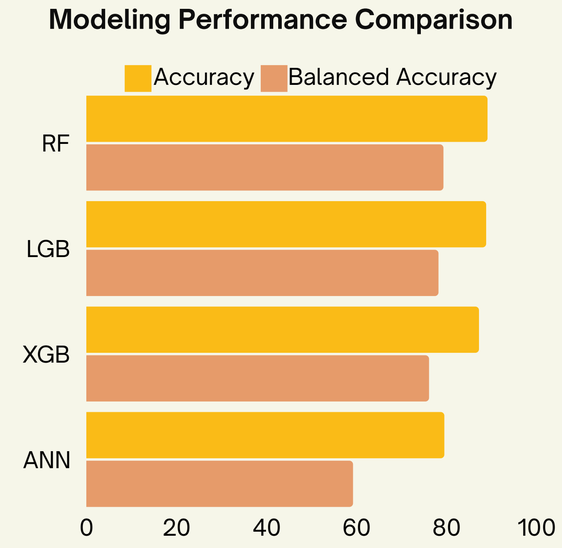
Office for National Statistics

Dataset:

- UK Census Data(2011 &2021) using Nomis API
- 2011-(3260x 393)
- 2021-(3260x 1212)
- Housing Price Data from ONS survey
- Geomapping data from Geoportal

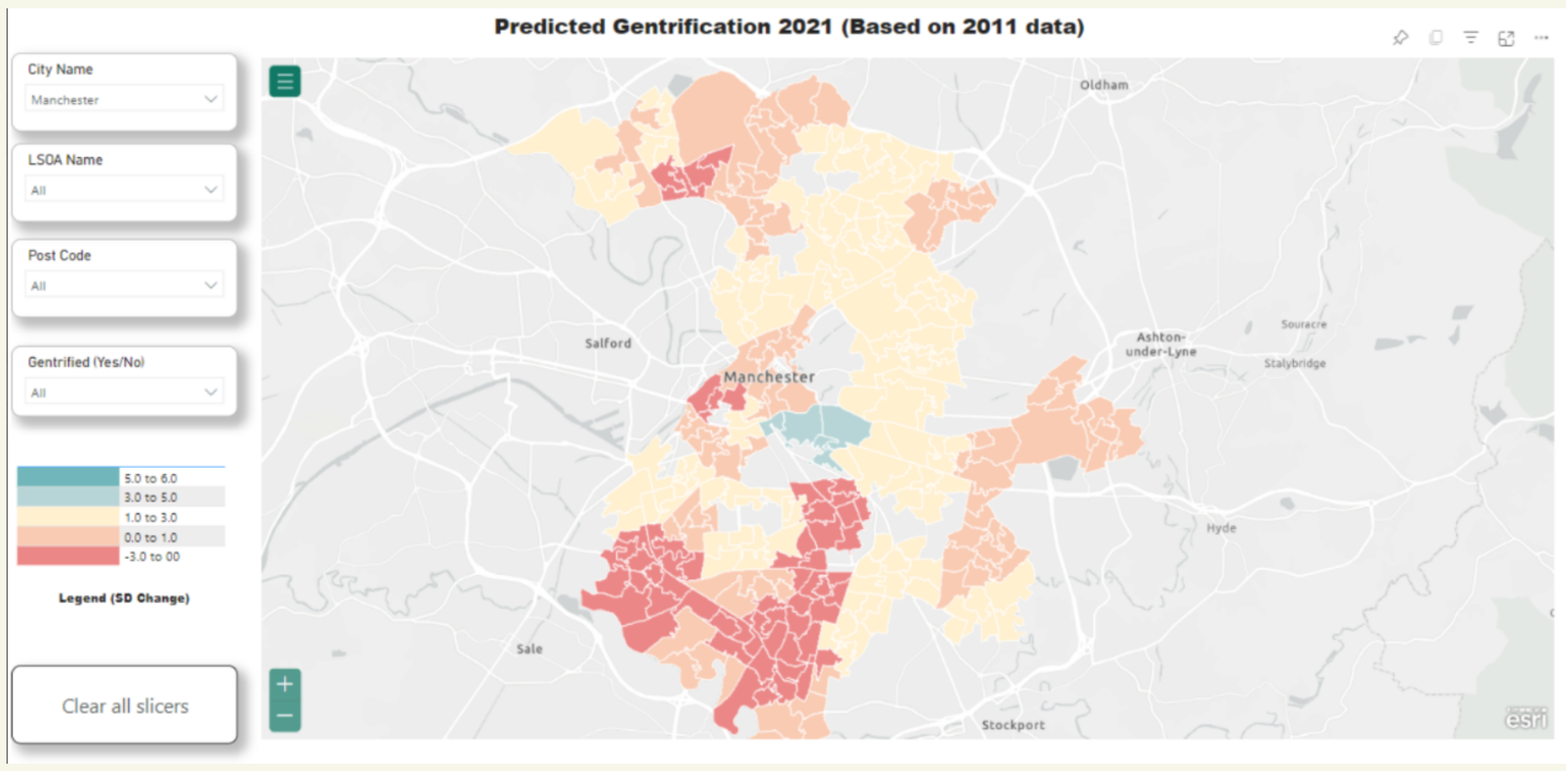
Level of Detail : MSOA Level

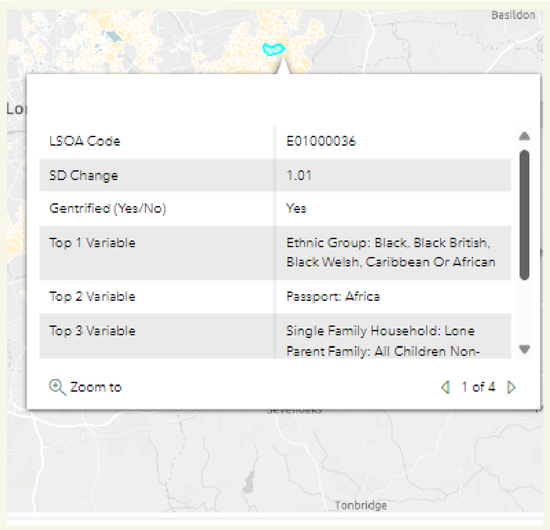
Data Cleanup : Feature engineering, Robust scaling, Normalizing, PCA were performed.

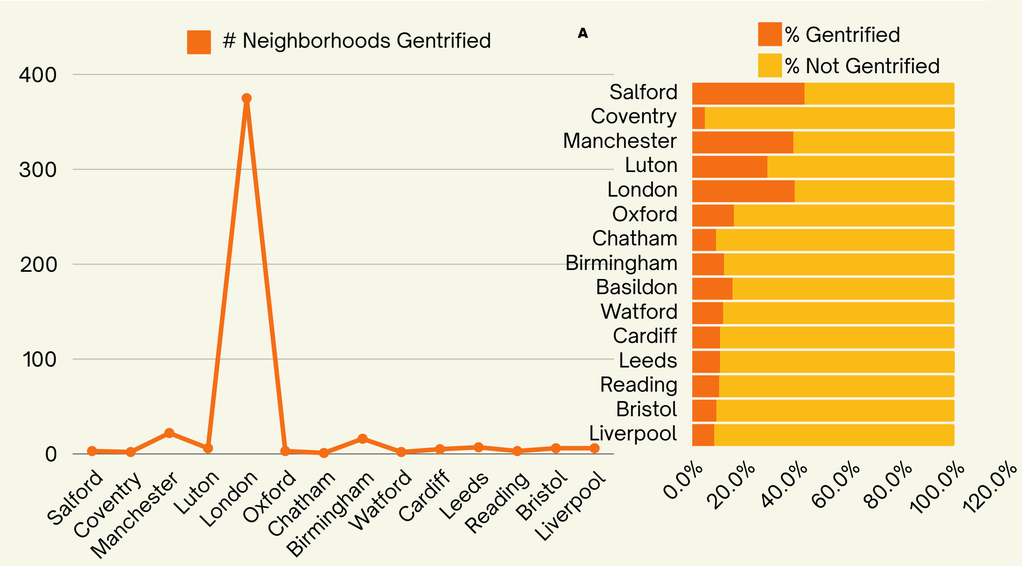


MODELING & EXPERIMENTATION

- Tested Random Forest (RF), XGBoost (XGB), LightGBM (LGB), and fully connected artificial neural net (ANN).
- RF: Bagging model aggregating decision trees to decrease variance.
- XGB and LGB: Boosting models using sequential trees to reduce variance and bias.
- ANN: Deep learning model using layers of affine transformations and non-linear activation functions.
- Hyperparameter tuning required for optimization; MSE used for tuning.
- Final performance metrics: accuracy and balanced accuracy.
- We selected RF since it has the best metrics- test accuracy and balance accuracy of 89.1% and 79.3% which is better than what Reades et al. and Thackaway et al. were able to get.







Power BI is used for predicting gentrification visually at the LSOA level for both 2021 and 2031. A tooltip gives further details like-Gentrification Status, SD Change, Top 3 variables driving gentrification for every LSOA. We also generate the numberof neighbourhoods gentrified and distribution of gentrification.

KEY TAKEAWAYS

In our prediction for 2031, London, Manchester, Birmingham, Leeds, and Luton had the most gentrified neighbourhoods. Salford, London, Manchester, Luton, and Milton Keynes showed the highest percentage of gentrification, indicating a broader trend beyond London and Manchester. Based on the top 3 driving factors, we can establish that the presence of minority groups in a MSOA are highly predictive of gentrification.