Predicting the assessed property value for the purpose of property tax assessment using ML techniques

Problem Statement

- **Main Objective:** Predict assessed property value for the purpose of property tax assessment.
- The Municipal council is facing the problem of many citizens challenging the assessment of property taxes and is criticized for complicated assessment procedure systems as well as multiple required filings throughout the year to challenge one's assessment.
- Therefore, the Council wants to rationalize the tax assessment system.
- So this can be benefitted for citizens to reduce the unfairness within the tax system.
- The idea is to achieve a consistent, rational, and objective assessment of properties based on a predictive model by automating the property valuation process.

Code Explanation

- It is a supervised learning model since we need to estimate property evaluation value based on multiple variables such as location, building class for understanding constructive use, area (land and/or buildup), year of construction, etc.
- Here we have both train and test datasets.
- For unique PropertyID, we have to predict the target variable property evaluation value.
- Here we use MAPE for accuracy metrics.
- The EDA involves finding the correlation between the target value and other features.
- While plotting the graph, I observed that GrossAreainSqFt and LandAreaInSqFt variable is inconsistent with the target variable.
- As per my observation, there are no missing values in any columns.

- Many numerical columns have to be converted into categorical columns (they are Borough, TaxClass_AtEvaluationTime, YearOfConstruction, ZipCode, DateOfEvaluation).
- And they were normalized using label Encoder.
- The target variables were skewed to be normal.
- Next involves the model prediction where I used advanced ML algorithms such as lasso, Enet, KRR, Gboost, XGBoost.
- I also used ensemble and stacking techniques.
- Finally, I got a MAPE value of 41.63.

Conclusion

- Therefore this problem will be beneficial for the municipal council for computation of assessed value and assessment of property tax within the framework of state laws.
- Also, they want to structure benefit programs based on certain variables of statistical significance to incentivize additional construction activity or activity of conversion/modification of properties for reducing the tax burden and/or to make the contemplated projects more economically feasible.