**Course-End Project: Feature Engineering**

**Project Statement:**

While searching for the dream house, the buyer looks at various factors, not just at the height of the basement ceiling or the proximity to an east-west railroad.

Using the dataset, find the factors that influence price negotiations while buying a house.

There are 79 explanatory variables describing every aspect of residential homes in Ames, Iowa.

**Dataset Description:**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| SalePrice | The property's sale price is in dollars. This is the target variable that you're trying to predict. |
| MSSubClass | The building class |
| MSZoning | The general zoning classification |
| LotFrontage | Linear feet of street connected to property |
| LotArea | Lot size in square feet |
| Street | Type of road access |
| Alley | Type of alley access |
| LotShape | General shape of property |
| LandContour | Flatness of the property |
| Utilities | Type of utilities available |
| LotConfig | Lot configuration |
| LandSlope | Slope of property |
| Neighborhood | Physical locations within Ames city limits |
| Condition1 | Proximity to main road or railroad |
| Condition2 | Proximity to main road or railroad (if a second is present) |
| BldgType | Type of dwelling |
| HouseStyle | Style of dwelling |
| OverallQual | Overall material and finish quality |
| OverallCond | Overall condition rating |
| YearBuilt | Original construction date |
| YearRemodAdd | Remodel date |
| RoofStyle | Type of roof |
| RoofMatl | Roof material |
| Exterior1st | Exterior covering on house |
| Exterior2nd | Exterior covering on house (if more than one material) |
| MasVnrType | Masonry veneer type |
| MasVnrArea | Masonry veneer area in square feet |
| ExterQual | Exterior material quality |
| ExterCond | Present condition of the material on the exterior |
| Foundation | Type of foundation |
| BsmtQual | Height of the basement |
| BsmtCond | General condition of the basement |
| BsmtExposure | Walkout or garden level basement walls |
| BsmtFinType1 | Quality of the basement finished area |
| BsmtFinSF1 | Type 1 finished square feet |
| BsmtFinType2 | Quality of second finished area (if present) |
| BsmtFinSF2 | Type 2 finished square feet |
| BsmtUnfSF | Unfinished square feet of basement area |
| TotalBsmtSF | Total square feet of basement area |
| Heating | Type of heating |
| HeatingQC | Heating quality and condition |
| CentralAir | Central air conditioning |
| Electrical | Electrical system |
| 1stFlrSF | First Floor square feet |
| 2ndFlrSF | Second floor square feet |
| LowQualFinSF | Low quality finished square feet (all floors) |
| GrLivArea | Above grade (ground) living area square feet |
| BsmtFullBath | Basement full bathrooms |
| BsmtHalfBath | Basement half bathrooms |
| FullBath | Full bathrooms above grade |
| HalfBath | Half bathrooms above grade |
| Bedroom | Number of bedrooms above basement level |
| Kitchen | Number of kitchens |
| KitchenQual | Kitchen quality |
| TotRmsAbvGrd | Total rooms above grade (does not include bathrooms) |
| Functional | Home functionality rating |
| Fireplaces | Number of fireplaces |
| FireplaceQu | Fireplace quality |
| GarageType | Garage location |
| GarageYrBlt | Year garage was built |
| GarageFinish | Interior finish of the garage |
| GarageCars | Size of the garage in car capacity |
| GarageArea | Size of the garage in square feet |
| GarageQual | Garage quality |
| GarageCond | Garage condition |
| PavedDrive | Paved driveway |
| WoodDeckSF | Wood deck area in square feet |
| OpenPorchSF | Open porch area in square feet |
| EnclosedPorch | Enclosed porch area in square feet |
| 3SsnPorch | Three season porch area in square feet |
| ScreenPorch | Screen porch area in square feet |
| PoolArea | Pool area in square feet |
| PoolQC | Pool quality |
| Fence | Fence quality |
| MiscFeature | Miscellaneous feature not covered in other categories |
| MiscVal | $Value of miscellaneous feature |
| MoSold | Month Sold |
| YrSold | Year Sold |
| SaleType | Type of sale |
| SaleCondition | Condition of sale |

**Note:**

* Download the “PEP1.csv” using the link given in the Feature Engineering project problem statement
* For a detailed description of the dataset, you can download and refer to data\_description.txt using the link given in the Feature Engineering project problem statement

**Perform the following steps:**

* Understand the dataset:
* Identify the shape of the dataset
* Identify variables with null values
* Identify variables with unique values
* Generate a separate dataset for numerical and categorical variables
* EDA of numerical variables:
* Missing value treatment
* Identify the skewness and distribution
* Identify significant variables using a correlation matrix
* Pair plot for distribution and density
* EDA of categorical variables
* Missing value treatment
* Count plot for bivariate analysis
* Identify significant variables using p-values and Chi-Square values
* Combine all the significant categorical and numerical variables
* Plot box plot for the new dataset to find the variables with outliers

**Note:** The last two points are performed to make the new dataset ready for training and prediction.