```
In [25]: import numpy as np
           import pandas as pd
           import matplotlib.pyplot
           import seaborn as san
In [26]: df=pd.read_csv("Downloads\\train.csv")
In [27]: df.head()
Out[27]:
                   MSSubClass
                                                                  Street Alley
                                                                                LotShape
                                                                                          LandContour Utilities LotConfig
                                                                                                                             LandSlope
               ld
                                MSZoning LotFrontage
                                                         LotArea
                                                                                                                                         Neighborhood
                                                                                                           AllPub
            0
                1
                             60
                                        RI
                                                    65.0
                                                            8450
                                                                   Pave
                                                                           NaN
                                                                                      Reg
                                                                                                     LvI
                                                                                                                      Inside
                                                                                                                                     Gtl
                                                                                                                                                CollgCr
            1
                2
                                       RL
                                                                                                                        FR2
                             20
                                                   80.0
                                                            9600
                                                                   Pave
                                                                          NaN
                                                                                      Reg
                                                                                                     LvI
                                                                                                           AllPub
                                                                                                                                     Gtl
                                                                                                                                               Veenker
            2
                3
                             60
                                        RI
                                                   68.0
                                                           11250
                                                                   Pave
                                                                           NaN
                                                                                      IR1
                                                                                                     Lvl
                                                                                                           AllPub
                                                                                                                      Inside
                                                                                                                                     Gtl
                                                                                                                                                CollgCr
            3
                4
                             70
                                        RL
                                                    60.0
                                                            9550
                                                                   Pave
                                                                           NaN
                                                                                      IR1
                                                                                                     LvI
                                                                                                           AllPub
                                                                                                                      Corner
                                                                                                                                     Gtl
                                                                                                                                               Crawfor
            4
                5
                             60
                                        RL
                                                    84.0
                                                           14260
                                                                   Pave
                                                                          NaN
                                                                                      IR1
                                                                                                     Lvl
                                                                                                           AllPub
                                                                                                                        FR2
                                                                                                                                     Gtl
                                                                                                                                              NoRidge
In [28]: pd.set_option('display.max_columns', None)
           pd.set_option('display.max_columns', None)
In [29]: df.head()
Out[29]:
                   MSSubClass
                                 MSZoning LotFrontage
                                                         LotArea
                                                                  Street
                                                                         Alley
                                                                                LotShape
                                                                                           LandContour
                                                                                                         Utilities LotConfig
                                                                                                                             LandSlope
                                                                                                                                        Neighborhood
            0
                1
                                                                                                           AllPub
                             60
                                        RL
                                                    65.0
                                                                                                                                     Gtl
                                                            8450
                                                                   Pave
                                                                          NaN
                                                                                      Reg
                                                                                                     Lvl
                                                                                                                      Inside
                                                                                                                                                CollgCr
                2
            1
                             20
                                       RL
                                                   80.0
                                                            9600
                                                                   Pave
                                                                           NaN
                                                                                      Reg
                                                                                                     Lvl
                                                                                                           AllPub
                                                                                                                        FR2
                                                                                                                                     Gtl
                                                                                                                                               Veenker
            2
                3
                             60
                                        RL
                                                    68.0
                                                            11250
                                                                   Pave
                                                                           NaN
                                                                                      IR1
                                                                                                     Lvl
                                                                                                           AllPub
                                                                                                                      Inside
                                                                                                                                     Gtl
                                                                                                                                                CollgCr
            3
                4
                             70
                                        RL
                                                    60.0
                                                            9550
                                                                   Pave
                                                                           NaN
                                                                                      IR1
                                                                                                     Lvl
                                                                                                           AllPub
                                                                                                                      Corner
                                                                                                                                     Gtl
                                                                                                                                                Crawfor
            4
                5
                             60
                                        RI
                                                    84.0
                                                           14260
                                                                   Pave
                                                                          NaN
                                                                                      IR1
                                                                                                     Lvl
                                                                                                           AllPub
                                                                                                                        FR2
                                                                                                                                     Gtl
                                                                                                                                              NoRidge
           first we handling categorical missinge variable and fill mode value, we can fill also globel value
In [30]: cat_ver=df.select_dtypes(include=["object"])
In [31]: cat ver
Out[31]:
                                                                                                                  Condition1 Condition2 BldgType
                   MSZoning
                                                                                        LandSlope
                                                      LandContour
                                                                    Utilities
                              Street
                                     Allev
                                           LotShape
                                                                             LotConfig
                                                                                                    Neighborhood
               0
                          RL
                               Pave
                                      NaN
                                                                Lvl
                                                                      AllPub
                                                                                  Inside
                                                                                                Gtl
                                                                                                           CollgCr
                                                                                                                         Norm
                                                                                                                                     Norm
                                                                                                                                                1Fam
                                                 Reg
                          RL
                               Pave
                                      NaN
                                                                Lvl
                                                                      AllPub
                                                                                   FR2
                                                                                                Gtl
                                                                                                           Veenker
                                                                                                                         Feedr
                                                                                                                                     Norm
                                                                                                                                                1Fam
                                                 Reg
                2
                          RL
                                      NaN
                                                  IR1
                                                                      AllPub
                                                                                  Inside
                                                                                                Gtl
                                                                                                           CollgCr
                                                                                                                                                1Fam
                               Pave
                                                                Lvl
                                                                                                                         Norm
                                                                                                                                     Norm
                3
                          RL
                               Pave
                                      NaN
                                                  IR1
                                                                Lvl
                                                                      AllPub
                                                                                 Corner
                                                                                                Gtl
                                                                                                           Crawfor
                                                                                                                         Norm
                                                                                                                                     Norm
                                                                                                                                                1Fam
                          RL
                               Pave
                                      NaN
                                                  IR1
                                                                      AllPub
                                                                                   FR2
                                                                                                Gtl
                                                                                                          NoRidge
                                                                                                                                                1Fam
                                                                Lvl
                                                                                                                         Norm
                                                                                                                                     Norm
                         RL
                                                                      AllPub
                                                                                                            Gilbert
            1455
                               Pave
                                      NaN
                                                                                 Inside
                                                                                                Gtl
                                                                                                                                                1Fam
                                                 Red
                                                                LvI
                                                                                                                         Norm
                                                                                                                                     Norm
                          RL
                                                                      AllPub
                                                                                                          NWAmes
            1456
                               Pave
                                      NaN
                                                                                  Inside
                                                                                                Gtl
                                                                                                                                                1Fam
                                                 Reg
                                                                LvI
                                                                                                                         Norm
                                                                                                                                     Norm
                          RI
                                                                      AllPub
                                                                                 Inside
                                                                                                Gtl
                                                                                                           Crawfor
                                                                                                                         Norm
                                                                                                                                                1Fam
            1457
                               Pave
                                      NaN
                                                 Rea
                                                                I vI
                                                                                                                                     Norm
            1458
                          RI
                               Pave
                                      NaN
                                                 Reg
                                                                LvI
                                                                      AllPub
                                                                                  Inside
                                                                                                Gtl
                                                                                                           NAmes
                                                                                                                         Norm
                                                                                                                                     Norm
                                                                                                                                                1Fam
            1459
                          RL
                               Pave
                                      NaN
                                                 Reg
                                                                LvI
                                                                      AllPub
                                                                                  Inside
                                                                                                Gtl
                                                                                                          Edwards
                                                                                                                         Norm
                                                                                                                                     Norm
                                                                                                                                                1Fam
           1460 rows × 43 columns
           4
```

```
In [32]: miss_val_per=cat_ver.isnull().mean()*100
          miss_val_per
Out[32]: MSZoning
                              0.000000
                              0.000000
          Street
                             93.767123
          Allev
          LotShape
                              0.000000
          LandContour
                              0.000000
          Utilities
                              0.000000
          LotConfig
                              0.000000
          LandSlope
                              0.000000
          Neighborhood
                              0.000000
          Condition1
                              0.000000
          Condition2
                              0.000000
          BldgType
                              0.000000
          HouseStyle
                              0.000000
          RoofStyle
                              0.000000
          RoofMatl
                              0.000000
          Exterior1st
                              0.000000
          Exterior2nd
                              0.000000
          MasVnrType
                              0.547945
                              0.000000
          ExterQual
In [33]: drop_col=miss_val_per[miss_val_per>20].keys()
          drop_col
Out[33]: Index(['Alley', 'FireplaceQu', 'PoolQC', 'Fence', 'MiscFeature'], dtype='object')
In [35]: cat_ver.drop(columns=drop_col,axis=1,inplace=True)
          cat_ver
Out[35]:
                 MSZoning Street LotShape LandContour
                                                        Utilities LotConfig LandSlope Neighborhood Condition1 Condition2 BldgType Hou
              0
                       RL
                            Pave
                                                         AllPub
                                                                    Inside
                                                                                 Gtl
                                                                                           CollgCr
                                                                                                                  Norm
                                                                                                                            1Fam
                                      Reg
                                                    LvI
                                                                                                        Norm
                       RL
                                                         AllPub
                                                                     FR2
                                                                                 Gtl
              1
                            Pave
                                                    LvI
                                                                                           Veenker
                                                                                                       Feedr
                                                                                                                            1Fam
                                      Rea
                                                                                                                  Norm
              2
                       RL
                                       IR1
                                                         AllPub
                                                                                 GtI
                                                                                           CollaCr
                            Pave
                                                    LvI
                                                                    Inside
                                                                                                        Norm
                                                                                                                  Norm
                                                                                                                            1Fam
              3
                       RL
                                       IR1
                                                         AllPub
                                                                                 Gtl
                            Pave
                                                    LvI
                                                                                           Crawfor
                                                                                                                            1Fam
                                                                   Corner
                                                                                                        Norm
                                                                                                                  Norm
                                                         AllPub
                                                                                          NoRidge
              4
                       RL
                            Pave
                                       IR1
                                                                                 Gtl
                                                    LvI
                                                                     FR2
                                                                                                                            1Fam
                                                                                                        Norm
                                                                                                                  Norm
           1455
                       RL
                                                         AllPub
                                                                                 Gtl
                                                                                            Gilbert
                            Pave
                                      Reg
                                                    Lvl
                                                                    Inside
                                                                                                        Norm
                                                                                                                  Norm
                                                                                                                            1Fam
           1456
                       RL
                            Pave
                                      Reg
                                                    Lvl
                                                         AllPub
                                                                    Inside
                                                                                 Gtl
                                                                                          NWAmes
                                                                                                        Norm
                                                                                                                   Norm
                                                                                                                            1Fam
           1457
                       RL
                            Pave
                                      Reg
                                                    LvI
                                                         AllPub
                                                                    Inside
                                                                                 Gtl
                                                                                           Crawfor
                                                                                                        Norm
                                                                                                                   Norm
                                                                                                                            1Fam
           1458
                       RL
                            Pave
                                      Reg
                                                         AllPub
                                                                    Inside
                                                                                 Gtl
                                                                                           NAmes
                                                                                                        Norm
                                                                                                                   Norm
                                                                                                                            1Fam
                                                          ۸ IID. . L
                                                                    1.....
                                                                                           ________
In [37]: cat_ver.shape
Out[37]: (1460, 38)
In [41]: #finding missing collumns
In [42]: null_per=cat_ver.isnull().mean()*100
          miss_var=null_per[null_per>0].keys()
          miss var
Out[42]: Index(['MasVnrType', 'BsmtQual', 'BsmtCond', 'BsmtExposure', 'BsmtFinType1',
                   'BsmtFinType2', 'Electrical', 'GarageType', 'GarageFinish',
'GarageQual', 'GarageCond'],
                 dtype='object')
In [46]: cat_ver["MasVnrType"].mode()
Out[46]: 0
               None
          Name: MasVnrType, dtype: object
In [47]: cat_ver["MasVnrType"].value_counts()
Out[47]: None
                       864
                       445
          BrkFace
          Stone
                       128
          BrkCmn
                       15
          Name: MasVnrType, dtype: int64
```

```
In [48]: #we fill mode value:
In [49]: cat_ver["MasVnrType"].fillna(cat_ver["MasVnrType"].mode()[0])
Out[49]: 0
                 BrkFace
                    None
         2
                 BrkFace
         3
                    None
         4
                 BrkFace
         1455
                    None
         1456
                   Stone
         1457
                    None
         1458
                    None
         1459
                    None
         Name: MasVnrType, Length: 1460, dtype: object
In [50]: #we have 11 column of missing value now we can fill all column mode value
In [54]: for var in miss_var:
             cat_ver[var].fillna(cat_ver[var].mode()[0],inplace=True)
             print(var,"=",cat_ver[var].mode()[0])
         MasVnrType = None
         BsmtQual = TA
         BsmtCond = TA
         BsmtExposure = No
         BsmtFinType1 = Unf
         BsmtFinType2 = Unf
         Electrical = SBrkr
         GarageType = Attchd
         GarageFinish = Unf
         GarageQual = TA
         GarageCond = TA
In [55]: cat_ver.isnull().sum()
Out[55]: MSZoning
                          0
         Street
                          0
         LotShape
                          0
         LandContour
                          0
         Utilities
                          0
         LotConfig
                          0
         LandSlope
                          0
         Neighborhood
                          0
         Condition1
                          0
         Condition2
                          0
         BldgType
                          0
         HouseStyle
                          0
         RoofStyle
                          0
         RoofMatl
                          0
                          0
         Exterior1st
         Exterior2nd
                          0
         MasVnrType
                          0
         ExterQual
                          0
         ExterCond
                          0
In [56]: #data dis
```

```
In [61]: import matplotlib.pyplot as plt
           import seaborn as sns
           plt.figure(figsize=(16,9))
           for i,var in enumerate(miss_var):
                plt.subplot(4,3,i+1)
                plt.hist(cat_ver[var],label="Inpue")
                plt.hist(df[var].dropna(),label="old")
                plt.legend()
             800
                                                  Inpue
                                                                                              Inpue
                                                                                                                                            Inpue
                                                           600
                                                  old
                                                                                                old
                                                                                                                                              old
                                                                                                        1000
             600
                                                           400
             400
                                                                                                         500
                                                           200
             200
                                                             ٥
                                                                                                           ٥
                BrkFace
                            None
                                        Stone
                                                   BrkCmn
                                                                           ΤA
                                                                                       Ex
                                                                                                              ΤA
                                                                                                                         Gd
                                                                                                                                     Fa
                                                                Gd
                                                                                                   Fa
                                                                                                                                                 Po
             1000
                                                                                              Inpue
                                                                                                                                            Inpue
                                                            400
             750
                                                  old
                                                                                               old
                                                                                                        1000
                                                                                                                                              old
                                                            300
             500
                                                           200
                                                                                                         500
             250
                                                           100
               0
                                                             0
                             Gd
                                         Mn
                                                                GLQ
                                                                      ALQ
                                                                             Unf
                                                                                    Rec
                                                                                           BLQ
                                                                                                  LwQ
                                                                                                             Unf
                                                                                                                    BLQ
                                                                                                                           ALQ
                                                                                                                                  Rec
                                                                                                                                         LwQ
                                                                                                                                                GLQ
                                                  Inpue
                                                                                                Inpue
                                                                                                                                              Inpue
                                                                                                         600
                                                           800
                                                  old
                                                                                               old
                                                                                                                                              old
            1000
                                                           600
                                                                                                         400
                                                           400
             500
                                                                                                         200
                                                           200
                 SBrkr
                         FuseF
                                                                     Detchd Builtin
                                                                                   CarPort Basment 2Types
                                                  Inpue
                                                                                                Inpue
                                                  old
                                                          1000
             500
                                                           500
                  TA
                                   Gd
                                                                                 Gd
                                                                                                   Ex
                           Fa
                                            Ex
                                                     Po
                                                                TΑ
                                                                         Fa
                                                                                          Po
In [62]: df.update(cat_ver)
           df.drop(columns=drop_col,inplace=True)
In [63]: df.head()
Out[63]:
               ld
                   MSSubClass
                                MSZoning
                                           LotFrontage
                                                        LotArea
                                                                 Street LotShape
                                                                                   LandContour
                                                                                                  Utilities
                                                                                                         LotConfig LandSlope
                                                                                                                                 Neighborhood Cond
            0
               1
                            60
                                       RL
                                                   65.0
                                                            8450
                                                                   Pave
                                                                                                   AllPub
                                                                                                                                        CollgCr
                                                                              Reg
                                                                                             Lvl
                                                                                                               Inside
                                                                                                                             Gtl
               2
            1
                            20
                                       RL
                                                   80.0
                                                            9600
                                                                                                   AllPub
                                                                                                                FR2
                                                                                                                             Gtl
                                                                   Pave
                                                                              Reg
                                                                                             Lvl
                                                                                                                                       Veenker
            2
               3
                            60
                                       RL
                                                   68.0
                                                           11250
                                                                               IR1
                                                                                                   AllPub
                                                                   Pave
                                                                                                                             Gtl
                                                                                                                                        CollaCr
                                                                                             Lvl
                                                                                                               Inside
                                                                               IR1
            3
                4
                            70
                                       RL
                                                   60.0
                                                                                                   AllPub
                                                                                                                             Gtl
                                                            9550
                                                                   Pave
                                                                                             Lvl
                                                                                                              Corner
                                                                                                                                       Crawfor
            4
               5
                            60
                                       RL
                                                                               IR1
                                                                                                   AllPub
                                                                                                                FR2
                                                                                                                                       NoRidge
                                                   84.0
                                                          14260
                                                                   Pave
                                                                                                                             Gtl
                                                                                             Lvl
In [65]: df.isnull().sum()
Out[65]: Id
           MSSubClass
                                  0
           MSZoning
                                  a
           LotFrontage
                                259
           LotArea
                                  0
           MoSold
                                  0
           YrSold
                                   0
           SaleType
                                  0
           SaleCondition
                                  0
           SalePrice
           Length: 76, dtype: int64
```

```
In [67]: df.select_dtypes(include=["object"]).isnull().sum()
Out[67]: MSZoning
          Street
                             0
          LotShape
          LandContour
                             0
          Utilities
                             0
          LotConfig
                             0
                             0
          LandSlope
          Neighborhood
                             0
          Condition1
                             0
                             0
          Condition2
          BldgType
                             0
          HouseStyle
                             0
          RoofStyle
                             0
          RoofMat1
                             0
          Exterior1st
                             0
                             0
          Exterior2nd
          MasVnrType
                             a
          ExterQual
                             0
          ExterCond
                             0
          Foundation
                             0
          BsmtQual
                             0
          BsmtCond
                             0
          BsmtExposure
                             0
          BsmtFinType1
                             0
          BsmtFinType2
                             0
          Heating
                             0
          HeatingQC
                             0
          CentralAir
                             0
          Electrical
                             0
          KitchenQual
                             0
          Functional
                             0
          GarageType
                             0
          {\tt GarageFinish}
                             0
          GarageQual
                             0
          GarageCond
                             0
          PavedDrive
                             a
          SaleType
                             0
          SaleCondition
          dtype: int64
In [68]: #categorical value missie is complte now we handle numeric value
In [69]: df.shape
Out[69]: (1460, 76)
In [72]: |df_numeric=df.select_dtypes(include=["int","float"])
          df_numeric
Out[72]:
                                  LotFrontage LotArea OverallQual OverallCond YearBuilt YearRemodAdd MasVnrArea BsmtFinSF1 BsmtFinSF3
                   Id MSSubClass
                                                 8450
                                                                                  2003
                                                                                                             196.0
              0
                               60
                                          65.0
                                                                            5
                                                                                                 2003
                                                                                                                          706
                   2
                                                                                                                          978
              1
                               20
                                          80.0
                                                 9600
                                                                6
                                                                            8
                                                                                  1976
                                                                                                 1976
                                                                                                              0.0
                    3
                                                                7
                                                                            5
              2
                               60
                                          68.0
                                                 11250
                                                                                  2001
                                                                                                 2002
                                                                                                            162.0
                                                                                                                          486
              3
                    4
                               70
                                          60.0
                                                 9550
                                                                7
                                                                            5
                                                                                  1915
                                                                                                 1970
                                                                                                              0.0
                                                                                                                          216
              4
                    5
                               60
                                          84.0
                                                 14260
                                                                8
                                                                            5
                                                                                  2000
                                                                                                 2000
                                                                                                            350.0
                                                                                                                          655
           1455
                 1456
                               60
                                          62.0
                                                  7917
                                                                6
                                                                            5
                                                                                  1999
                                                                                                 2000
                                                                                                              0.0
                                                                                                                            0
                               20
                                          85.0
                                                13175
                                                                            6
                                                                                  1978
                                                                                                 1988
                                                                                                             119.0
                                                                                                                          790
                                                                                                                                      16
           1456
                1457
                               70
           1457
                 1458
                                          66.0
                                                 9042
                                                                            9
                                                                                  1941
                                                                                                 2006
                                                                                                              0.0
                                                                                                                          275
                               20
                                          68.0
                                                 9717
                                                                5
                                                                            6
                                                                                  1950
                                                                                                              0.0
                                                                                                                           49
                                                                                                                                     102
           1458
                1459
                                                                                                 1996
                               20
                                                                            6
                                                                                                              0.0
           1459 1460
                                          75.0
                                                 9937
                                                                                  1965
                                                                                                 1965
                                                                                                                          830
                                                                                                                                      29
          1460 rows × 38 columns
```

```
In [73]: df_numeric.isnull().sum()
Out[73]: Id
                               0
           MSSubClass
                               a
           LotFrontage
                             259
                               0
           LotArea
           OverallQual
                               0
           OverallCond
           YearBuilt
                               0
           YearRemodAdd
                               0
           MasVnrArea
                               8
                               0
           BsmtFinSF1
           BsmtFinSF2
                               0
           BsmtUnfSF
                               0
           TotalBsmtSF
                               0
           1stFlrSF
                               0
           2ndFlrSF
                               0
           LowQualFinSF
                               0
                               a
           GrLivArea
           BsmtFullBath
                               0
           BsmtHalfBath
                               0
In [93]: df_per=df.isnull().sum()/df.shape[0]*100
           df_per
Out[93]: Id
                              0.000000
           MSSubClass
                              0.000000
           MSZoning
                              0.000000
           LotFrontage
                             17.739726
                              0.000000
           LotArea
                              0.000000
           MoSold
           YrSold
                              0.000000
                              0.000000
           SaleType
           {\sf SaleCondition}
                              0.000000
           SalePrice
                              0.000000
           Length: 76, dtype: float64
In [96]: num_cols=[var for var in df_numeric if df_numeric[var].isnull().sum()>0]
           num_cols
Out[96]: ['LotFrontage', 'MasVnrArea', 'GarageYrBlt']
In [99]: num_var=df_numeric[num_cols][df_numeric[num_cols].isnull().any(axis=1)]
           num_var
Out[99]:
                 LotFrontage MasVnrArea GarageYrBlt
                                             1973.0
              7
                       NaN
                                  240.0
             12
                       NaN
                                    0.0
                                            1962.0
                                            1960.0
             14
                       NaN
                                  212.0
             16
                       NaN
                                  180.0
                                            1970.0
             24
                       NaN
                                    0.0
                                            1968 0
            1443
                       NaN
                                    0.0
                                            1916.0
            1446
                       NaN
                                  189.0
                                             1962.0
            1449
                       21.0
                                    0.0
                                              NaN
            1450
                       60.0
                                    0.0
                                              NaN
            1453
                       90.0
                                    0.0
                                              NaN
           339 rows × 3 columns
In [100]: #now we tack references colum
```

```
In [101]: df.head()
Out[101]:
                           loofStyle
                                                  RoofMatl Exterior1st Exterior2nd MasVnrType MasVnrArea ExterQual ExterCond Foundation BsmtQual BsmtCond BsmtExpos
                                  Gable
                                                  CompShg
                                                                                  VinylSd
                                                                                                               VinylSd
                                                                                                                                           BrkFace
                                                                                                                                                                               196.0
                                                                                                                                                                                                             Gd
                                                                                                                                                                                                                                         TA
                                                                                                                                                                                                                                                             PConc
                                                                                                                                                                                                                                                                                              Gd
                                                                                                                                                                                                                                                                                                                         TΑ
                                  Gable
                                                 CompShg
                                                                                MetalSd
                                                                                                              MetalSd
                                                                                                                                                 None
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                                                                                                                                                                                                                                         TΑ
                                                                                                                                                                                                                                                            CBlock
                                                                                                                                                                                                                                                                                              Gd
                                                                                                                                                                                                                                                                                                                         TΑ
                                  Gable
                                                 CompShg
                                                                                 VinylSd
                                                                                                               VinylSd
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                                                                                                                                                                               162.0
                                                                                                                                                                                                             Gd
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                                                                                                                                                                                                                                                                                              Gd
                                                                                                                                                                                                                                                                                                                         TΑ
                                  Gable
                                                 CompShg
                                                                              Wd Sdng
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                                                                                                                                                 None
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                                                                                                                                                                                                                                                               BrkTil
                                                                                                                                                                                                                                                                                               TΑ
                                                                                                                                                                                                                                                                                                                         Gd
                                  Gable
                                                 CompShg
                                                                                  VinylSd
                                                                                                               VinylSd
                                                                                                                                            BrkFace
                                                                                                                                                                               350.0
                                                                                                                                                                                                              Gd
                                                                                                                                                                                                                                         TΑ
                                                                                                                                                                                                                                                             PConc
                                                                                                                                                                                                                                                                                              Gd
                                                                                                                                                                                                                                                                                                                         TΑ
In [103]:
                            cat_ver=["LotConfig","MSZoning","MasVnrType"]
                             num_ver=['LotFrontage','MasVnrArea','GarageYrBlt']
In [104]: for cat ver, num ver in zip(cat ver, num ver):
                                        for var in df[cat_ver].unique():
                                                   In [106]: df.isnull().sum()
Out[106]: Id
                                                                             a
                             MSSubClass
                                                                            0
                             MSZoning
                                                                             0
                                                                             0
                             LotFrontage
                             LotArea
                                                                            0
                             MoSold
                                                                            0
                             YrSold
                                                                            0
                                                                             0
                             SaleType
                             SaleCondition
                                                                            0
                             SalePrice
                                                                            a
                             Length: 76, dtype: int64
In [107]: sns.heatmap(df.isnull())
Out[107]: <Axes: >
                                                                                                                                                                                                                      0.100
                                       57
                                    114 ·
171 ·
                                                                                                                                                                                                                    - 0.075
                                    228
285
                                     342
                                                                                                                                                                                                                    - 0.050
                                     399
                                     456
                                     513
                                                                                                                                                                                                                       0.025
                                    570
                                    627 -
684 -
                                     741 -
                                                                                                                                                                                                                       0.000
                                     798
                                    855
                                    912
969
                                                                                                                                                                                                                       -0.025
                                  1026
                                  1083
                                                                                                                                                                                                                        -0.050
                                  1140
                                  1197
                                  1254 -
                                                                                                                                                                                                                           -0.075
                                 1311
                                  1368
                                                                                                                                                                                                                    - -0.100
                                                                                       RoofMatl - MasVnrType - ExterCond - BamtCond - BamtCond - BamtCond - BamtGond - BamtlinSF - GrLivArea - FullBath - KitchenAbath - Garage YrBlt - BoolArea - PoolArea - 
                                                     LotFrontage LotShape LotConfig Condition1
                                                                            HouseStyle
YearBuilt
In [108]: df.shape
Out[108]: (1460, 76)
```

10/27/23, 2:07 PM

In [ ]: