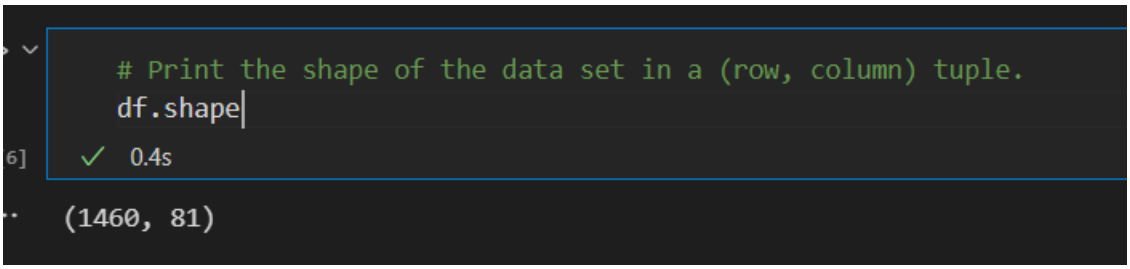
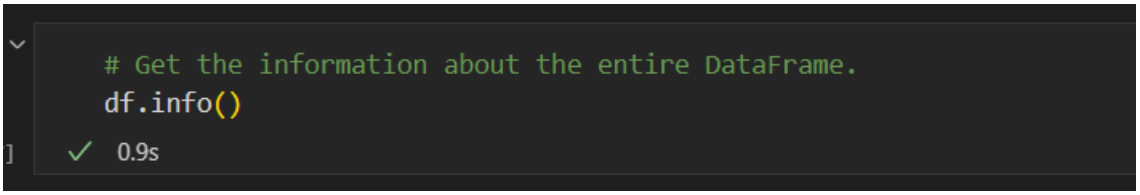
Screenshots of outputs

DataFrame Shape



DataFrame Null Values



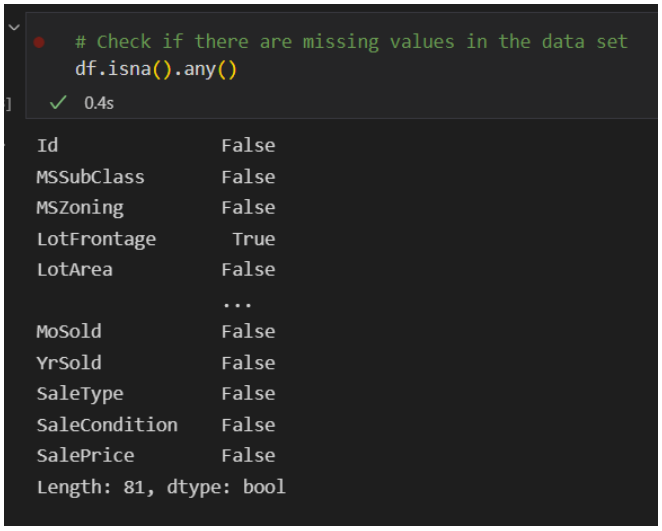
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1460 entries, 0 to 1459
Data columns (total 81 columns):

#	Column	Non-Null Count	Dtype
0	Id	1460 non-null	int64
1	MSSubClass	1460 non-null	int64
2	MSZoning	1460 non-null	object
3	LotFrontage	1201 non-null	float64
4	LotArea	1460 non-null	int64
5	Street	1460 non-null	object
6	Alley	91 non-null	object
7	LotShape	1460 non-null	object
8	LandContour	1460 non-null	object
9	Utilities	1460 non-null	object
10	LotConfig	1460 non-null	object
11	LandSlope	1460 non-null	object
12	Neighborhood	1460 non-null	object
13	Condition1	1460 non-null	object
14	Condition2	1460 non-null	object
15	BldgType	1460 non-null	object
16	HouseStyle	1460 non-null	object
17	OverallQual	1460 non-null	int64
18	OverallCond	1460 non-null	int64
19	YearBuilt	1460 non-null	int64

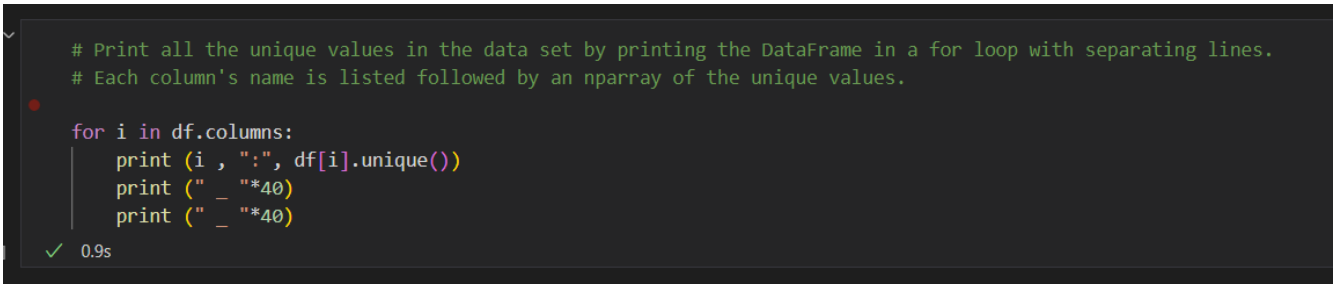
20 YearRemodAdd 1460 non-null int64
21 RoofStyle 1460 non-null object
22 RoofMatl 1460 non-null object
23 Exterior1st 1460 non-null object
24 Exterior2nd 1460 non-null object
25 MasVnrType 1452 non-null object
26 MasVnrArea 1452 non-null float64
27 ExterQual 1460 non-null object
28 ExterCond 1460 non-null object
29 Foundation 1460 non-null object
30 BsmtQual 1423 non-null object
31 BsmtCond 1423 non-null object
32 BsmtExposure 1422 non-null object
33 BsmtFinType1 1423 non-null object
34 BsmtFinSF1 1460 non-null int64
35 BsmtFinType2 1422 non-null object
36 BsmtFinSF2 1460 non-null int64
37 BsmtUnfSF 1460 non-null int64
38 TotalBsmtSF 1460 non-null int64
39 Heating 1460 non-null object
40 HeatingQC 1460 non-null object
41 CentralAir 1460 non-null object
42 Electrical 1459 non-null object
43 1stFlrSF 1460 non-null int64
44 2ndFlrSF 1460 non-null int64
45 LowQualFinSF 1460 non-null int64
46 GrLivArea 1460 non-null int64
47 BsmtFullBath 1460 non-null int64
48 BsmtHalfBath 1460 non-null int64
49 FullBath 1460 non-null int64
50 HalfBath 1460 non-null int64
51 BedroomAbvGr 1460 non-null int64
52 KitchebvGr 1460 non-null int64
53 KitchenQual 1460 non-null object
54 TotRmsAbvGrd 1460 non-null int64
55 Functiol 1460 non-null object
56 Fireplaces 1460 non-null int64
57 FireplaceQu 770 non-null object
58 GarageType 1379 non-null object
59 GarageYrBlt 1379 non-null float64
60 GarageFinish 1379 non-null object
61 GarageCars 1460 non-null int64
62 GarageArea 1460 non-null int64
63 GarageQual 1379 non-null object
64 GarageCond 1379 non-null object
65 PavedDrive 1460 non-null object
66 WoodDeckSF 1460 non-null int64
67 OpenPorchSF 1460 non-null int64
68 EnclosedPorch 1460 non-null int64

```
 69  3SsnPorch      1460 non-null   int64
 70  ScreenPorch    1460 non-null   int64
 71  PoolArea       1460 non-null   int64
 72  PoolQC         7 non-null      object
 73  Fence          281 non-null    object
 74  MiscFeature    54 non-null     object
 75  MiscVal        1460 non-null   int64
 76  MoSold         1460 non-null   int64
 77  YrSold         1460 non-null   int64
 78  SaleType       1460 non-null   object
 79  SaleCondition  1460 non-null   object
 80  SalePrice      1460 non-null   int64
dtypes: float64(3), int64(35), object(43)
memory usage: 924.0+ KB
```

Alternatively



DataFrame Unique Values



```
Id : [   1    2    3 ... 1458 1459 1460]
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
MSSubClass : [ 60  20  70  50 190  45  90 120  30  85  80 160  75 180  40]
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
MSZoning : ['RL' 'RM' 'C (all)' 'FV' 'RH']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
LotFrontage : [ 65.  80.  68.  60.  84.  85.  75.  nan  51.  50.  70.  91.  72.  66.
 101.  57.  44. 110.  98.  47. 108. 112.  74. 115.  61.  48.  33.  52.
 100.  24.  89.  63.  76.  81.  95.  69.  21.  32.  78. 121. 122.  40.
 105.  73.  77.  64.  94.  34.  90.  55.  88.  82.  71. 120. 107.  92.
 134.  62.  86. 141.  97.  54.  41.  79. 174.  99.  67.  83.  43. 103.
  93.  30. 129. 140.  35.  37. 118.  87. 116. 150. 111.  49.  96.  59.
  36.  56. 102.  58.  38. 109. 130.  53. 137.  45. 106. 104.  42.  39.
 144. 114. 128. 149. 313. 168. 182. 138. 160. 152. 124. 153.  46.]
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
LotArea : [ 8450  9600 11250 ... 17217 13175  9717]
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Street : ['Pave' 'Grvl']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Alley : [nan 'Grvl' 'Pave']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
LotShape : ['Reg' 'IR1' 'IR2' 'IR3']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
LandContour : ['Lvl' 'Bnk' 'Low' 'HLS']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Utilities : ['AllPub' 'NoSeWa']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
LotConfig : ['Inside' 'FR2' 'Corner' 'CulDSac' 'FR3']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
LandSlope : ['Gtl' 'Mod' 'Sev']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Neighborhood : ['CollgCr' 'Veenker' 'Crawfor' 'NoRidge' 'Mitchel' 'Somerst' 'NWAmes'
 'OldTown' 'BrkSide' 'Sawyer' 'NridgHt' 'mes' 'SawyerW' 'IDOTRR' 'MeadowV'
 'Edwards' 'Timber' 'Gilbert' 'StoneBr' 'ClearCr' 'NPkVill' 'Blmngtn'
 'BrDale' 'SWISU' 'Blueste']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
```

Condition1 : ['Norm' 'Feedr' 'PosN' 'Artery' 'RRAe' 'RRNn' 'RRAn' 'PosA' 'RRNe']

Condition2 : ['Norm' 'Artery' 'RRNn' 'Feedr' 'PosN' 'PosA' 'RRAn' 'RRAe']

BldgType : ['1Fam' '2fmCon' 'Duplex' 'TwnhsE' 'Twnhs']

HouseStyle : ['2Story' '1Story' '1.5Fin' '1.5Unf' 'SFoyer' 'SLvl' '2.5Unf' '2.5Fin']

OverallQual : [7 6 8 5 9 4 10 3 1 2]

OverallCond : [5 8 6 7 4 2 3 9 1]

YearBuilt : [2003 1976 2001 1915 2000 1993 2004 1973 1931 1939 1965 2005 1962 2006
 1960 1929 1970 1967 1958 1930 2002 1968 2007 1951 1957 1927 1920 1966
 1959 1994 1954 1953 1955 1983 1975 1997 1934 1963 1981 1964 1999 1972
 1921 1945 1982 1998 1956 1948 1910 1995 1991 2009 1950 1961 1977 1985
 1979 1885 1919 1990 1969 1935 1988 1971 1952 1936 1923 1924 1984 1926
 1940 1941 1987 1986 2008 1908 1892 1916 1932 1918 1912 1947 1925 1900
 1980 1989 1992 1949 1880 1928 1978 1922 1996 2010 1946 1913 1937 1942
 1938 1974 1893 1914 1906 1890 1898 1904 1882 1875 1911 1917 1872 1905]

YearRemodAdd : [2003 1976 2002 1970 2000 1995 2005 1973 1950 1965 2006 1962 2007 1960
 2001 1967 2004 2008 1997 1959 1990 1955 1983 1980 1966 1963 1987 1964
 1972 1996 1998 1989 1953 1956 1968 1981 1992 2009 1982 1961 1993 1999
 1985 1979 1977 1969 1958 1991 1971 1952 1975 2010 1984 1986 1994 1988
 1954 1957 1951 1978 1974]

RoofStyle : ['Gable' 'Hip' 'Gambrel' 'Mansard' 'Flat' 'Shed']

RoofMatl : ['CompShg' 'WdShngl' 'Metal' 'WdShake' 'Membran' 'Tar&Grv' 'Roll'
 'ClyTile']

Exterior1st : ['VinylSd' 'MetalSd' 'Wd Sdng' 'HdBoard' 'BrkFace' 'WdShing' 'CemntBd'
 'Plywood' 'AsbShng' 'Stucco' 'BrkComm' 'AsphShn' 'Stone' 'ImStucc'
 'CBlock']

Exterior2nd : ['VinylSd' 'MetalSd' 'Wd Shng' 'HdBoard' 'Plywood' 'Wd Sdng' 'CmentBd'
 'BrkFace' 'Stucco' 'AsbShng' 'Brk Cmn' 'ImStucc' 'AsphShn' 'Stone'

'Other' 'CBlock']

_ _
_ _

MasVnrType : ['BrkFace' 'None' 'Stone' 'BrkCmn' nan]

_ _
_ _

MasVnrArea : [1.960e+02 0.000e+00 1.620e+02 3.500e+02 1.860e+02 2.400e+02 2.860e+02
3.060e+02 2.120e+02 1.800e+02 3.800e+02 2.810e+02 6.400e+02 2.000e+02
2.460e+02 1.320e+02 6.500e+02 1.010e+02 4.120e+02 2.720e+02 4.560e+02
1.031e+03 1.780e+02 5.730e+02 3.440e+02 2.870e+02 1.670e+02 1.115e+03
4.000e+01 1.040e+02 5.760e+02 4.430e+02 4.680e+02 6.600e+01 2.200e+01
2.840e+02 7.600e+01 2.030e+02 6.800e+01 1.830e+02 4.800e+01 2.800e+01
3.360e+02 6.000e+02 7.680e+02 4.800e+02 2.200e+02 1.840e+02 1.129e+03
1.160e+02 1.350e+02 2.660e+02 8.500e+01 3.090e+02 1.360e+02 2.880e+02
7.000e+01 3.200e+02 5.000e+01 1.200e+02 4.360e+02 2.520e+02 8.400e+01
6.640e+02 2.260e+02 3.000e+02 6.530e+02 1.120e+02 4.910e+02 2.680e+02
7.480e+02 9.800e+01 2.750e+02 1.380e+02 2.050e+02 2.620e+02 1.280e+02
2.600e+02 1.530e+02 6.400e+01 3.120e+02 1.600e+01 9.220e+02 1.420e+02
2.900e+02 1.270e+02 5.060e+02 2.970e+02 nan 6.040e+02 2.540e+02
3.600e+01 1.020e+02 4.720e+02 4.810e+02 1.080e+02 3.020e+02 1.720e+02
3.990e+02 2.700e+02 4.600e+01 2.100e+02 1.740e+02 3.480e+02 3.150e+02
2.990e+02 3.400e+02 1.660e+02 7.200e+01 3.100e+01 3.400e+01 2.380e+02
1.600e+03 3.650e+02 5.600e+01 1.500e+02 2.780e+02 2.560e+02 2.250e+02
3.700e+02 3.880e+02 1.750e+02 2.960e+02 1.460e+02 1.130e+02 1.760e+02
6.160e+02 3.000e+01 1.060e+02 8.700e+02 3.620e+02 5.300e+02 5.000e+02
5.100e+02 2.470e+02 3.050e+02 2.550e+02 1.250e+02 1.000e+02 4.320e+02
1.260e+02 4.730e+02 7.400e+01 1.450e+02 2.320e+02 3.760e+02 4.200e+01
1.610e+02 1.100e+02 1.800e+01 2.240e+02 2.480e+02 8.000e+01 3.040e+02
2.150e+02 7.720e+02 4.350e+02 3.780e+02 5.620e+02 1.680e+02 8.900e+01
2.850e+02 3.600e+02 9.400e+01 3.330e+02 9.210e+02 7.620e+02 5.940e+02
2.190e+02 1.880e+02 4.790e+02 5.840e+02 1.820e+02 2.500e+02 2.920e+02
2.450e+02 2.070e+02 8.200e+01 9.700e+01 3.350e+02 2.080e+02 4.200e+02
1.700e+02 4.590e+02 2.800e+02 9.900e+01 1.920e+02 2.040e+02 2.330e+02
1.560e+02 4.520e+02 5.130e+02 2.610e+02 1.640e+02 2.590e+02 2.090e+02
2.630e+02 2.160e+02 3.510e+02 6.600e+02 3.810e+02 5.400e+01 5.280e+02
2.580e+02 4.640e+02 5.700e+01 1.470e+02 1.170e+03 2.930e+02 6.300e+02
4.660e+02 1.090e+02 4.100e+01 1.600e+02 2.890e+02 6.510e+02 1.690e+02
9.500e+01 4.420e+02 2.020e+02 3.380e+02 8.940e+02 3.280e+02 6.730e+02
6.030e+02 1.000e+00 3.750e+02 9.000e+01 3.800e+01 1.570e+02 1.100e+01
1.400e+02 1.300e+02 1.480e+02 8.600e+02 4.240e+02 1.047e+03 2.430e+02
8.160e+02 3.870e+02 2.230e+02 1.580e+02 1.370e+02 1.150e+02 1.890e+02
2.740e+02 1.170e+02 6.000e+01 1.220e+02 9.200e+01 4.150e+02 7.600e+02
2.700e+01 7.500e+01 3.610e+02 1.050e+02 3.420e+02 2.980e+02 5.410e+02
2.360e+02 1.440e+02 4.230e+02 4.400e+01 1.510e+02 9.750e+02 4.500e+02
2.300e+02 5.710e+02 2.400e+01 5.300e+01 2.060e+02 1.400e+01 3.240e+02
2.950e+02 3.960e+02 6.700e+01 1.540e+02 4.250e+02 4.500e+01 1.378e+03
3.370e+02 1.490e+02 1.430e+02 5.100e+01 1.710e+02 2.340e+02 6.300e+01
7.660e+02 3.200e+01 8.100e+01 1.630e+02 5.540e+02 2.180e+02 6.320e+02
1.140e+02 5.670e+02 3.590e+02 4.510e+02 6.210e+02 7.880e+02 8.600e+01

7.960e+02 3.910e+02 2.280e+02 8.800e+01 1.650e+02 4.280e+02 4.100e+02
5.640e+02 3.680e+02 3.180e+02 5.790e+02 6.500e+01 7.050e+02 4.080e+02
2.440e+02 1.230e+02 3.660e+02 7.310e+02 4.480e+02 2.940e+02 3.100e+02
2.370e+02 4.260e+02 9.600e+01 4.380e+02 1.940e+02 1.190e+02]

_ _
_ _

ExterQual : ['Gd' 'TA' 'Ex' 'Fa']

_ _
_ _

ExterCond : ['TA' 'Gd' 'Fa' 'Po' 'Ex']

_ _
_ _

Foundation : ['PConc' 'CBlock' 'BrkTil' 'Wood' 'Slab' 'Stone']

_ _
_ _

BsmtQual : ['Gd' 'TA' 'Ex' nan 'Fa']

_ _
_ _

BsmtCond : ['TA' 'Gd' nan 'Fa' 'Po']

_ _
_ _

BsmtExposure : ['No' 'Gd' 'Mn' 'Av' nan]

_ _
_ _

BsmtFinType1 : ['GLQ' 'ALQ' 'Unf' 'Rec' 'BLQ' nan 'LwQ']

_ _
_ _

BsmtFinSF1 : [706 978 486 216 655 732 1369 859 0 851 906 998 737 733
578 646 504 840 188 234 1218 1277 1018 1153 1213 731 643 967
747 280 179 456 1351 24 763 182 104 1810 384 490 649 632
941 739 912 1013 603 1880 565 320 462 228 336 448 1201 33
588 600 713 1046 648 310 1162 520 108 569 1200 224 705 444
250 984 35 774 419 170 1470 938 570 300 120 116 512 567
445 695 405 1005 668 821 432 1300 507 679 1332 209 680 716
1400 416 429 222 57 660 1016 370 351 379 1288 360 639 495
288 1398 477 831 1904 436 352 611 1086 297 626 560 390 566
1126 1036 1088 641 617 662 312 1065 787 468 36 822 378 946
341 16 550 524 56 321 842 689 625 358 402 94 1078 329
929 697 1573 270 922 503 1334 361 672 506 714 403 751 226
620 546 392 421 905 904 430 614 450 210 292 795 1285 819
420 841 281 894 1464 700 262 1274 518 1236 425 692 987 970
28 256 1619 40 846 1124 720 828 1249 810 213 585 129 498
1270 573 1410 1082 236 388 334 874 956 773 399 162 712 609
371 540 72 623 428 350 298 1445 218 985 631 1280 241 690
266 777 812 786 1116 789 1056 50 1128 775 1309 1246 986 616
1518 664 387 471 385 365 1767 133 642 247 331 742 1606 916
185 544 553 326 778 386 426 368 459 1350 1196 630 994 168
1261 1567 299 897 607 836 515 374 1231 111 356 400 698 1247
257 380 27 141 991 650 521 1436 2260 719 377 1330 348 1219

783 969 673 1358 1260 144 584 554 1002 619 180 559 308 866
895 637 604 1302 1071 290 728 2 1441 943 231 414 349 442
328 594 816 1460 1324 1338 685 1422 1283 81 454 903 605 990
206 150 457 48 871 41 674 624 480 1154 738 493 1121 282
500 131 1696 806 1361 920 1721 187 1138 988 193 551 767 1186
892 311 827 543 1003 1059 239 945 20 1455 965 980 863 533
1084 1173 523 1148 191 1234 375 808 724 152 1180 252 832 575
919 439 381 438 549 612 1163 437 394 1416 422 762 975 1097
251 686 656 568 539 862 197 516 663 608 1636 784 249 1040
483 196 572 338 330 156 1390 513 460 659 364 564 306 505
932 750 64 633 1170 899 902 1238 528 1024 1064 285 2188 465
322 860 599 354 63 223 301 443 489 284 294 814 165 552
833 464 936 772 1440 748 982 398 562 484 417 699 696 896
556 1106 651 867 854 1646 1074 536 1172 915 595 1237 273 684
324 1165 138 1513 317 1012 1022 509 900 1085 1104 240 383 644
397 740 837 220 586 535 410 75 824 592 1039 510 423 661
248 704 412 1032 219 708 415 1004 353 702 369 622 212 645
852 1150 1258 275 176 296 538 1157 492 1198 1387 522 658 1216
1480 2096 1159 440 1456 883 547 788 485 340 1220 427 344 756
1540 666 803 1000 885 1386 319 534 125 1314 602 192 593 804
1053 532 1158 1014 194 167 776 5644 694 1572 746 1406 925 482
189 765 80 1443 259 735 734 1447 548 315 1282 408 309 203
865 204 790 1320 769 1070 264 759 1373 976 781 25 1110 404
580 678 958 1336 1079 49 830]

_ _
_ _

BsmtFinType2 : ['Unf' 'BLQ' nan 'ALQ' 'Rec' 'LwQ' 'GLQ']

_ _
_ _

BsmtFinSF2 : [0 32 668 486 93 491 506 712 362 41 169 869 150 670
28 1080 181 768 215 374 208 441 184 279 306 180 580 690
692 228 125 1063 620 175 820 1474 264 479 147 232 380 544
294 258 121 391 531 344 539 713 210 311 1120 165 532 96
495 174 1127 139 202 645 123 551 219 606 612 480 182 132
336 468 287 35 499 723 119 40 117 239 80 472 64 1057
127 630 128 377 764 345 1085 435 823 500 290 324 634 411
841 1061 466 396 354 149 193 273 465 400 682 557 230 106
791 240 547 469 177 108 600 492 211 168 1031 438 375 144
81 906 608 276 661 68 173 972 105 420 546 334 352 872
110 627 163 1029]

_ _
_ _

BsmtUnfSF : [150 284 434 540 490 64 317 216 952 140 134 177 175 1494
520 832 426 0 468 525 1158 637 1777 200 204 1566 180 486
207 649 1228 1234 380 408 1117 1097 84 326 445 383 167 465
1296 83 1632 736 192 612 816 32 935 321 860 1410 148 217
530 1346 576 318 1143 1035 440 747 701 343 280 404 840 724
295 1768 448 36 1530 1065 384 1288 684 1013 402 635 163 168
176 370 350 381 410 741 1226 1053 641 516 793 1139 550 905

104 310 252 1125 203 728 732 510 899 1362 30 958 556 413
479 297 658 262 891 1304 519 1907 336 107 432 403 811 396
970 506 884 400 896 253 409 93 1200 572 774 769 1335 340
882 779 112 470 294 1686 360 441 354 700 725 320 554 312
968 504 1107 577 660 99 871 474 289 600 755 625 1121 276
186 1424 1140 375 92 305 1176 78 274 311 710 686 457 1232
1498 1010 160 2336 630 638 162 70 1357 1194 773 483 235 125
1390 594 1694 488 357 626 916 1020 1367 798 452 392 975 361
270 602 1482 680 606 88 342 212 1095 96 628 1560 744 2121
768 386 1468 1145 244 698 1079 570 476 131 184 143 1092 324
1541 1470 536 319 599 622 179 292 286 80 712 291 153 1088
1249 166 906 604 100 818 844 596 210 1603 115 103 673 726
995 967 721 1656 972 460 208 191 438 1869 371 624 552 322
598 268 130 484 785 733 953 847 333 1580 411 982 808 1293
939 784 595 229 114 522 735 405 117 961 1286 672 1141 806
165 1064 1063 245 1276 892 1008 499 1316 463 242 444 281 35
356 988 580 651 619 544 387 901 926 135 648 75 788 1307
1078 1258 273 1436 557 930 780 813 878 122 248 588 524 288
389 424 1375 1626 406 298 2153 417 739 225 611 237 290 264
238 363 190 1969 697 414 316 466 420 254 960 397 1191 548
50 178 1368 169 748 689 1264 467 605 1257 551 678 707 880
378 223 578 969 379 765 149 912 620 1709 132 993 197 1374
90 195 706 1163 367 1122 1515 55 1497 450 846 23 390 861
285 1050 331 2042 1237 113 742 924 512 119 314 308 293 537
126 427 309 914 173 1774 823 485 1116 978 636 564 108 1184
796 366 300 542 645 664 756 247 776 849 1392 38 1406 111
545 121 2046 161 261 567 1195 874 1342 151 989 1073 927 219
224 526 1164 761 461 876 859 171 718 138 941 464 250 72
508 1584 415 82 948 893 864 1349 76 487 652 1240 801 279
1030 348 234 1198 740 89 586 323 1836 480 456 1935 338 1594
102 374 1413 491 1129 255 1496 650 1926 154 999 1734 124 1417
15 834 1649 936 778 1489 442 1434 352 458 1221 1099 416 1800
227 907 528 189 1273 563 372 702 1090 435 198 1372 174 1638
894 299 105 676 1120 431 218 110 795 1098 1043 481 666 142
447 783 1670 277 412 794 239 662 1072 717 546 430 422 188
266 1181 1753 964 1450 1905 1480 772 1032 220 187 29 495 640
193 196 720 918 1428 77 1266 1128 692 770 750 1442 1007 501
691 1550 1680 1330 1710 746 814 515 571 359 355 301 668 920
1055 1420 1752 304 1302 833 133 549 705 722 799 462 429 810
155 170 230 1459 1082 758 1290 1074 251 172 868 797 365 418
730 533 671 1012 1528 1005 1373 500 762 752 399 1042 40 26
932 278 459 568 1502 543 574 977 449 983 731 120 538 831
994 341 879 815 1212 866 1630 328 141 364 1380 81 303 940
764 1048 334 1689 690 792 585 473 246 1045 1405 201 14 841
1104 241 925 2002 74 661 708 1152 256 804 812 1085 344 425
1616 976 496 349 971 1393 1622 1352 1795 1017 1588 428 803 693
858 1284 1203 1652 39 539 1217 257 715 616 240 315 1351 1026
1571 156 61 95 482 1094 60 862 221 791 398 777 503 734
709 1252 656 1319 1422 560 1573 589 877 136]

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TotalBsmtSF : [856 1262 920 756 1145 796 1686 1107 952 991 1040 1175 912 1494
1253 832 1004 0 1114 1029 1158 637 1777 1060 1566 900 1704 1484
520 649 1228 1234 1398 1561 1117 1097 1297 1057 1088 1350 840 938
1150 1752 1434 1656 736 955 794 816 1842 384 1425 970 860 1410
780 530 1370 576 1143 1947 1453 747 1304 2223 845 1086 462 672
1768 440 896 1237 1563 1065 1288 684 612 1013 990 1235 876 1214
824 680 1588 960 458 950 1610 741 1226 1053 641 789 793 1844
994 1264 1809 1028 729 1092 1125 1673 728 732 1080 1199 1362 1078
660 1008 924 992 1063 1267 1461 1907 928 864 1734 910 1490 1728
715 884 969 1710 825 1602 1200 572 774 1392 1232 1572 1541 882
1149 644 1617 1582 720 1064 1606 1202 1151 1052 2216 968 504 1188
1593 853 725 1431 855 1726 1360 755 1713 1121 1196 617 848 1424
1140 1100 1157 1212 689 1070 1436 686 798 1248 1498 1010 713 2392
630 1203 483 1373 1194 1462 894 1414 996 1694 735 540 626 948
1845 1020 1367 1444 1573 1302 1314 975 1604 963 1482 506 926 1422
802 740 1095 1385 1152 1240 1560 2121 1160 807 1468 1575 625 858
698 1079 768 795 1416 1003 702 1165 1470 2000 700 319 861 1896
697 972 2136 716 1347 1372 1249 1136 1502 1162 710 1719 1383 844
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1268 953 744 608 847 683 870 1580 1856 982 1026 1293 939 784
1256 658 1041 1682 804 788 1144 961 1260 1310 1141 806 1281 1034
1276 1340 1344 988 651 1518 907 901 765 799 648 3094 1440 1258
915 1517 930 813 1533 872 1242 1364 588 709 560 1375 1277 1626
1488 808 547 1976 2153 1705 1833 1792 1216 999 1113 1073 954 264
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1452 528 2035 611 707 880 1051 1581 1838 1650 723 654 1204 1069
1709 998 993 1374 1389 1163 1122 1496 846 372 1164 1050 2042 1868
1437 742 770 1722 1814 1430 1058 908 600 965 1032 1299 1120 936
783 1822 1522 980 1116 978 1156 636 1554 1386 811 1520 1952 1766
981 1094 2109 525 776 1486 1629 1138 2077 1406 1021 1408 738 1477
2046 923 1291 1195 1190 874 551 1419 2444 1210 927 1112 1391 1800
360 1473 1643 1324 270 859 718 1176 1311 971 1742 941 1698 1584
1595 868 1153 893 1349 1337 1720 1479 1030 1318 1252 983 1860 836
1935 1614 761 1413 956 712 650 773 1926 731 1417 1024 849 1442
1649 1568 778 1489 2078 1454 1516 1067 1559 1127 1390 1273 918 1763
1090 1054 1039 1148 1002 1638 105 676 1184 1109 892 2217 1505 1059
951 2330 1670 1623 1017 1105 1001 546 480 1134 1104 1272 1316 1126
1181 1753 964 1466 925 1905 1500 585 1632 819 1616 1161 828 945
979 561 696 1330 817 1098 1428 673 1241 944 1225 1266 1128 485
1930 1396 916 822 750 1700 1007 1187 691 1574 1680 1346 985 1657
602 1022 1082 810 1504 1220 1132 1565 1338 1654 1620 1055 800 1306
1475 2524 1992 1193 973 854 662 1103 1154 942 1048 727 690 1096
1459 1251 1247 1074 1271 290 655 1463 1836 803 833 408 533 1012
1552 1005 1530 974 1567 1006 1042 1298 704 932 1219 1296 1198 959
1261 1598 1683 818 1600 2396 1624 831 1224 663 879 815 1630 2158
931 1660 559 1300 1702 1075 1361 1106 1476 1689 2076 792 2110 1405

1192 746 1986 841 2002 1332 935 1019 661 1309 1328 1085 6110 1246
 771 976 1652 1278 1902 1274 1393 1622 1352 420 1795 544 1510 911
 693 1284 1732 2033 570 1980 814 873 757 1108 2633 1571 984 1205
 714 1746 1525 482 1356 862 839 1286 1485 1594 622 791 708 1223
 913 656 1319 1932 539 1221 1542]

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Heating : ['GasA' 'GasW' 'Grav' 'Wall' 'OthW' 'Floor']

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HeatingQC : ['Ex' 'Gd' 'TA' 'Fa' 'Po']

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CentralAir : ['Y' 'N']

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Electrical : ['SBrkr' 'FuseF' 'FuseA' 'FuseP' 'Mix' nan]

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1stFlrSF : [856 1262 920 961 1145 796 1694 1107 1022 1077 1040 1182 912 1494
 1253 854 1004 1296 1114 1339 1158 1108 1795 1060 1600 900 1704 520
 649 1228 1234 1700 1561 1132 1097 1297 1057 1152 1324 1328 884 938
 1150 1752 1518 1656 736 955 794 816 1842 1360 1425 983 860 1426
 780 581 1370 902 1143 2207 1479 747 1304 2223 845 885 1086 840
 526 952 1072 1768 682 1337 1563 1065 804 1301 684 612 1013 990
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 1047 789 997 1844 1216 774 1282 2259 1436 729 1092 1125 1699 728
 988 772 1080 1199 1586 958 660 1327 1721 1682 1214 1959 928 864
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 1232 1572 1541 882 1149 808 1867 1707 1064 1362 1651 2158 1164 2234
 968 769 901 1340 936 1217 1224 1593 1549 725 1431 855 1726 929
 1713 1121 1279 865 848 720 1442 1696 1100 1180 1212 932 689 1236
 810 1137 1248 1498 1010 811 2392 630 483 1555 1194 1490 894 1414
 1014 798 1566 866 889 626 1222 1872 908 1375 1444 1306 1625 1302
 1314 1005 1604 963 1382 1482 926 764 1422 802 1052 778 1113 1095
 1363 1632 1560 2121 1156 1175 1468 1575 625 1085 858 698 1079 1148
 1644 1003 975 1041 1336 1210 1675 2000 1122 1035 861 1944 697 972
 793 2036 832 716 1153 1088 1372 1472 1249 1136 1553 1163 1898 803
 1719 1383 1445 596 1056 1629 1358 943 1619 1922 1536 1621 1215 993
 841 1684 536 1478 1848 1869 1453 616 1192 1167 1142 1352 495 790
 672 1394 1268 1287 953 1120 752 1319 847 904 914 1580 1856 1007
 1026 939 784 1269 658 1742 788 735 1144 876 1112 1288 1310 1165
 806 1620 1166 1071 1050 1276 1028 756 1344 1602 1470 1196 707 907
 1208 1412 765 827 734 694 2402 1440 1128 1258 933 1689 1888 956
 679 813 1533 888 786 1242 624 1663 833 979 575 849 1277 1634
 1502 1161 1976 1652 1493 2069 1718 1131 1850 1792 916 999 1073 1484
 1766 886 3228 1133 899 1801 1218 1368 2020 1378 1244 3138 1266 1476
 605 2515 1509 751 334 820 880 1159 1601 1838 1680 767 664 1377
 915 768 825 1069 1717 1126 1006 1048 897 1557 1389 996 1134 1496

846 576 877 1320 703 1429 2042 1521 989 2028 838 1473 779 770
924 1826 1402 1647 1058 927 600 1186 1940 1029 1032 1299 1054 807
1828 1548 980 1012 1116 1520 1350 1089 1554 1411 800 1567 981 1094
1051 822 755 909 2113 525 851 1486 1686 1181 2097 1454 1465 1679
1437 738 1839 792 2046 923 1291 1668 1195 1190 874 551 1419 2444
1238 1067 1391 1800 1264 372 1824 859 1576 1178 1325 971 1698 1776
1616 1146 948 1349 1464 1720 1038 742 757 1506 1836 1690 1220 1117
1973 1204 1614 1430 1110 1342 966 976 1062 1127 1285 773 1966 1428
1075 1309 1044 686 1661 1008 944 1489 2084 1434 1160 941 1516 1559
1099 1701 1307 1456 918 1779 702 1512 1039 1002 1646 1547 1036 676
1184 1462 1155 1090 1187 954 892 1709 1712 872 2217 1505 1068 951
2364 1670 1063 1636 1020 1105 1015 1001 546 480 1229 1272 1316 1617
1098 1788 1466 925 1905 1500 1207 1188 1381 965 1168 561 696 1542
824 783 673 869 1241 1118 1407 750 691 1574 1504 985 1657 1664
1082 2898 1687 1654 1055 1803 1532 2524 1733 1992 1771 930 1526 1091
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1390 438 950 887 1021 1552 812 1530 974 986 1042 1298 1811 1265
1640 1432 959 1831 1261 1170 2129 818 1124 2411 949 1624 831 1622
842 663 879 815 1630 1074 2196 1283 1660 1318 1211 2136 1138 1702
1507 1361 1024 1141 1173 2076 1140 1034 2110 1405 760 1987 1104 713
2018 1968 1332 935 1357 661 1724 1573 1582 1659 4692 1246 753 1203
1294 1902 1274 1787 1061 708 1584 1334 693 1284 1172 2156 2053 992
1078 1980 1281 814 2633 1571 984 754 2117 998 1416 1746 1525 1221
741 1569 1223 962 1537 1932 1423 913 1578 2073 1256]

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2ndFlrSF : [854   0 866 756 1053 566 983 752 1142 1218 668 1320 631 716
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1116 876 612 1031 881 790 755 592 939 520 639 656 1414 884
729 1523 728 351 688 941 1032 848 836 475 739 1151 448 896
524 1194 956 1070 1096 467 547 551 880 703 901 720 316 1518
704 1178 754 601 1360 929 445 564 882 920 518 817 1257 741
672 1306 504 1304 1100 730 689 591 888 1020 828 700 842 1286
864 829 1092 709 844 1106 596 807 625 649 698 840 780 568
795 648 975 702 1242 1818 1121 371 804 325 809 1200 871 1274
1347 1332 1177 1080 695 167 915 576 605 862 495 403 838 517
1427 784 711 468 1081 886 793 665 858 874 526 590 406 1157
299 936 438 1098 766 1101 1028 1017 1254 378 1160 682 110 600
678 834 384 512 930 868 224 1103 560 811 878 574 910 620
687 546 902 1000 846 1067 914 660 1538 1015 1237 611 707 527
1288 832 806 1182 1040 439 717 511 1129 1370 636 533 745 584
812 684 595 988 800 677 573 1066 778 661 1440 872 788 843
713 567 651 762 482 738 586 679 644 900 887 1872 1281 472
1312 319 978 1093 473 664 1540 1276 441 348 1060 714 744 1203
783 1097 734 767 1589 742 686 1128 1111 1174 787 1072 1088 1063
545 966 623 432 581 540 769 1051 761 779 514 455 1426 785
521 252 813 1120 1037 1169 1001 1215 928 1140 1243 571 1196 1038
561 979 701 332 368 883 1336 1141 634 912 798 985 826 831
750 456 602 855 336 408 980 998 1168 1208 797 850 898 1054

895 954 772 1230 727 454 370 628 304 582 1122 1134 885 640
580 1112 653 220 240 1362 534 539 650 918 933 712 1796 971
1175 743 523 1216 2065 272 685 776 630 984 875 913 464 1039
1259 940 892 725 924 764 925 1479 192 589 992 903 430 748
587 994 950 1323 732 1357 557 1296 390 1185 873 1611 457 796
908 550 989 932 358 1392 349 691 1349 768 208 622 857 556
1044 708 626 904 510 1104 830 981 870 694 1152]

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LowQualFinSF : [0 360 513 234 528 572 144 392 371 390 420 473 156 515 80 53 232 481
120 514 397 479 205 384]

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GrLivArea : [1710 1262 1786 1717 2198 1362 1694 2090 1774 1077 1040 2324 912 1494
1253 854 1004 1296 1114 1339 2376 1108 1795 1060 1600 900 1704 520
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1150 1752 2149 1656 1452 955 1470 1176 816 1842 1360 1425 1739 1720
2945 780 1158 1111 1370 2034 2473 2207 1479 747 2287 2223 845 1718
1086 1605 988 952 1285 1768 1230 2142 1337 1563 1065 1474 2417 1560
1224 1526 990 1235 964 2291 1588 960 835 1225 1610 1732 1535 1226
1818 1992 1047 789 1517 1844 1855 1430 2696 2259 2320 1458 1092 1125
3222 1456 1123 1080 1199 1586 754 958 840 1348 1053 2157 2054 1327
1721 1682 1214 1959 1852 1764 864 1734 1385 1501 1728 1709 875 2035
1344 969 1993 1252 1200 1096 1968 1947 2462 1232 2668 1541 882 1616
1355 1867 2161 1707 1382 1767 1651 2158 2060 1920 2234 968 1525 1802
1340 2082 3608 1217 1593 2727 1431 1726 3112 2229 1713 1121 1279 1310
848 1284 1442 1696 1100 2062 1212 1392 1236 1436 1954 1248 1498 2267
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866 1440 2110 1872 1928 1375 1668 2144 1306 1625 1640 1314 1604 1792
2574 1316 764 1422 1511 2192 778 1113 1939 1363 2270 1632 1548 2121
2022 1982 1468 1575 1250 858 1396 1919 1716 2263 1644 1003 1558 1950
1743 1336 3493 2000 2243 1406 861 1944 972 1118 2036 1641 1432 2353
2646 1472 2596 2468 2730 1163 2978 803 1719 1383 2134 1192 1056 1629
1358 1638 1922 1536 1621 1215 1908 841 1684 1112 1577 1478 1626 2728
1869 1453 720 1595 1167 1142 1352 1924 1505 1574 1394 1268 1287 1664
752 1319 904 914 2466 1856 1800 1691 1301 1797 784 1953 1269 1184
2332 1367 1961 788 1034 1144 1812 1550 1288 672 1572 1620 1639 1680
2172 2078 1276 1028 2097 1400 2624 1134 1602 2630 1196 1389 907 1208
1412 1198 1365 630 1661 694 2402 1573 1258 1689 1888 1886 1376 1183
813 1533 1756 1590 1242 1663 1666 1203 1935 1135 1660 1277 1634 1502
1969 1072 1976 1652 970 1493 2643 1131 1850 1826 1216 999 1073 1484
2414 1304 1578 886 3228 1820 899 1218 1801 1322 1911 1378 1041 1368
2020 2119 2344 1796 2080 1294 1244 4676 2398 1266 928 2713 605 2515
1509 827 334 1347 1724 1159 1601 1838 2285 767 1496 2183 1635 768
825 2094 1069 1126 2046 1048 1446 1557 996 1674 2295 1647 2504 2132
943 1692 1109 1477 1320 1429 2042 2775 2028 838 860 1473 935 1582
2296 924 1402 1556 1904 1915 1986 2008 3194 1029 2153 1032 1120 1054
832 1828 2262 2614 980 1512 1790 1116 1520 1350 1750 1554 1411 3395
800 1387 796 1567 1518 1929 2704 1766 981 1094 1839 1665 1510 1469

2113 1486 2448 1181 1936 2380 1679 1437 1180 1476 1369 1136 1441 792
 923 1291 1761 1102 1419 4316 2519 1539 1137 616 1148 1391 1164 2576
1824 729 1178 2554 2418 971 1742 1698 1776 1146 2031 948 1349 1464
2715 2256 2640 1529 1140 2098 1026 1471 1386 2531 1547 2365 1506 1714
1836 3279 1220 1117 1973 1204 1614 1603 1110 1342 2084 901 2087 1145
1062 2013 1895 1564 773 3140 1688 2822 1128 1428 1576 2138 1309 1044
1008 1052 936 1733 1489 1434 2126 1223 1829 1516 1067 1559 1099 1482
1165 1416 1701 1775 2358 1646 1445 1779 1481 2654 1426 1039 1372 1002
1949 910 2610 2224 1155 1090 2230 892 1712 1393 2217 1683 1068 951
2240 2364 1670 902 1063 1636 2057 2274 1015 2002 480 1229 2127 2200
1617 1686 2374 1978 1788 2236 1466 925 1905 1500 2069 1971 1962 2403
1381 965 1958 2872 1894 1308 1098 1095 918 2019 869 1241 2612 2290
1940 2030 1851 1050 944 691 1504 985 1657 1522 1271 1022 1082 1132
2898 1264 3082 1654 954 1803 2329 2524 2868 1771 930 1977 1989 1523
1364 2184 1991 1338 2337 1103 1154 2260 1571 1611 2521 893 1240 1740
1459 1251 1247 1088 438 950 2622 2021 1690 1658 1964 833 1012 698
1005 1530 1981 974 2210 986 1020 1868 2828 1006 1298 932 1811 1265
1580 1876 1671 2108 3627 1261 3086 2345 1343 1124 2514 4476 1130 1221
1699 1624 1804 1622 1863 1630 1074 2196 1283 1845 1902 1211 1846 2136
1490 1138 1933 1702 1507 2620 1190 1188 1784 1948 1141 1173 2076 1553
2058 1405 874 2167 1987 1166 1675 1889 2018 3447 1524 1357 1395 2447
1659 1970 2372 5642 1246 1983 2526 1708 1122 1274 2810 2599 2112 1787
1923 708 774 2792 1334 693 1861 872 2169 1913 2156 2634 3238 1865
1078 1980 2601 1738 1475 1374 2633 790 2117 1762 2784 1746 1584 1912
2482 1687 1513 1608 2093 1840 1848 1569 2450 2201 804 1537 1932 1725
2555 2007 913 1346 2073 2340 1256]

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BsmtFullBath : [1 0 2 3]

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BsmtHalfBath : [0 1 2]

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FullBath : [2 1 3 0]

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HalfBath : [1 0 2]

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BedroomAbvGr : [3 4 1 2 0 5 6 8]

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KitchebvGr : [1 2 3 0]

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KitchenQual : ['Gd' 'TA' 'Ex' 'Fa']

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TotRmsAbvGrd : [ 8  6  7  9  5 11  4 10 12  3  2 14]
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Functiol : ['Typ' 'Min1' 'Maj1' 'Min2' 'Mod' 'Maj2' 'Sev']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Fireplaces : [0 1 2 3]
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
FireplaceQu : [nan 'TA' 'Gd' 'Fa' 'Ex' 'Po']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
GarageType : ['Attchd' 'Detchd' 'BuiltIn' 'CarPort' nan 'Basment' '2Types']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
GarageYrBlt : [2003. 1976. 2001. 1998. 2000. 1993. 2004. 1973. 1931. 1939. 1965. 2005.
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 1963. 1981. 1964. 1999. 1935. 1990. 1945. 1987. 1989. 1915. 1956. 1948.
 1974. 2009. 1950. 1961. 1921. 1900. 1979. 1951. 1969. 1936. 1975. 1971.
 1923. 1984. 1926. 1955. 1986. 1988. 1916. 1932. 1972. 1918. 1980. 1924.
 1996. 1940. 1949. 1994. 1910. 1978. 1982. 1992. 1925. 1941. 2010. 1927.
 1947. 1937. 1942. 1938. 1952. 1928. 1922. 1934. 1906. 1914. 1946. 1908.
 1929. 1933.]
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_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
GarageFinish : ['RFn' 'Unf' 'Fin' nan]
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_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
GarageCars : [2 3 1 0 4]
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_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
GarageArea : [ 548  460  608  642  836  480  636  484  468  205  384  736  352  840
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  388  528  894  565  641  288  645  852  558  220  667  360  427  490
  379  297  283  509  405  758  461  400  462  420  432  506  684  472
  366  476  410  740  648  273  546  325  792  450  180  430  594  390
  540  264  530  435  453  750  487  624  471  318  766  660  470  720
  577  380  434  866  495  564  312  625  680  678  726  532  216  303
  789  511  616  521  451 1166  252  497  682  666  786  795  856  473
  398  500  349  454  644  299  210  431  438  675  968  721  336  810
  494  457  818  463  604  389  538  520  309  429  673  884  868  492
  413  924 1053  439  671  338  573  732  505  575  626  898  529  685
  281  539  418  588  282  375  683  843  552  870  888  746  708  513
 1025  656  872  292  441  189  880  676  301  474  706  617  445  200
  592  566  514  296  244  610  834  639  501  846  560  596  600  373
  947  350  396  864  304  784  696  569  628  550  493  578  198  422
  228  526  525  908  499  508  694  874  164  402  515  286  603  900
```

```
 583  889  858  502  392  403  527  765  367  426  615  871  570  406
 590  612  650 1390  275  452  842  816  621  544  486  230  261  531
 393  774  749  364  627  260  256  478  442  562  512  839  330  711
1134  416  779  702  567  832  326  551  606  739  408  475  704  983
 768  632  541  320  800  831  554  878  752  614  481  496  423  841
 895  412  865  630  605  602  618  444  397  455  409  820 1020  598
 857  595  433  776 1220  458  613  456  436  812  686  611  425  343
 479  619  902  574  523  414  738  354  483  327  756  690  284  833
 601  533  522  788  555  689  796  808  510  255  424  305  368  824
 328  160  437  665  290  912  905  542  716  586  467  582 1248 1043
 254  712  719  862  928  782  466  714 1052  225  234  324  306  830
 807  358  186  693  482  813  995  757 1356  459  701  322  315  668
 404  543  954  850  477  276  518 1014  753 1418  213  844  860  748
 248  287  825  647  342  770  663  377  804  936  722  208  662  754
 622  620  370 1069  372  923  192]
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
GarageQual : ['TA' 'Fa' 'Gd' nan 'Ex' 'Po']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
GarageCond : ['TA' 'Fa' nan 'Gd' 'Po' 'Ex']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
PavedDrive : ['Y' 'N' 'P']
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
WoodDeckSF : [  0 298 192  40 255 235  90 147 140 160  48 240 171 100 406 222 288  49
 203 113 392 145 196 168 112 106 857 115 120  12 576 301 144 300  74 127
 232 158 352 182 180 166 224  80 367  53 188 105  24  98 276 200 409 239
 400 476 178 574 237 210 441 116 280 104  87 132 238 149 355  60 139 108
 351 209 216 248 143 365 370  58 197 263 123 138 333 250 292  95 262  81
 289 124 172 110 208 468 256 302 190 340 233 184 201 142 122 155 670 135
 495 536 306  64 364 353  66 159 146 296 125  44 215 264  88  89  96 414
 519 206 141 260 324 156 220  38 261 126  85 466 270  78 169 320 268  72
 349  42  35 326 382 161 179 103 253 148 335 176 390 328 312 185 269 195
  57 236 517 304 198 426  28 316 322 307 257 219 416 344 380  68 114 327
 165 187 181  92 228 245 503 315 241 303 133 403  36  52 265 207 150 290
 486 278  70 418 234  26 342  97 272 121 243 511 154 164 173 384 202  56
 321  86 194 421 305 117 550 509 153 394 371  63 252 136 186 170 474 214
 199 728 436  55 431 448 361 362 162 229 439 379 356  84 635 325  33 212
 314 242 294  30 128  45 177 227 218 309 404 500 668 402 283 183 175 586
 295  32 366 736]
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
OpenPorchSF : [ 61   0  42  35  84  30  57 204   4  21  33 213 112 102 154 159 110  90
  56  32  50 258  54  65  38  47  64  52 138 104  82  43 146  75  72  70
  49  11  36 151  29  94 101 199  99 234 162  63  68  46  45 122 184 120
  20  24 130 205 108  80  66  48  25  96 111 106  40 114   8 136 132  62
 228  60 238 260  27  74  16 198  26  83  34  55  22  98 172 119 208 105
```

140 168 28 39 148 12 51 150 117 250 10 81 44 144 175 195 128 76
 17 59 214 121 53 231 134 192 123 78 187 85 133 176 113 137 125 523
100 285 88 406 155 73 182 502 274 158 142 243 235 312 124 267 265 87
288 23 152 341 116 160 174 247 291 18 170 156 166 129 418 240 77 364
188 207 67 69 131 191 41 118 252 189 282 135 95 224 169 319 58 93
244 185 200 92 180 263 304 229 103 211 287 292 241 547 91 86 262 210
141 15 126 236]

_ _
_ _

EnclosedPorch : [0 272 228 205 176 87 172 102 37 144 64 114 202 128 156 44 77 192
140 180 183 39 184 40 552 30 126 96 60 150 120 112 252 52 224 234
244 268 137 24 108 294 177 218 242 91 160 130 169 105 34 248 236 32
 80 115 291 116 158 210 36 200 84 148 136 240 54 100 189 293 164 216
239 67 90 56 129 98 143 70 386 154 185 134 196 264 275 230 254 68
194 318 48 94 138 226 174 19 170 220 214 280 190 330 208 145 259 81
 42 123 162 286 168 20 301 198 221 212 50 99]

_ _
_ _

3SsnPorch : [0 320 407 130 180 168 140 508 238 245 196 144 182 162 23 216 96 153
290 304]

_ _
_ _

ScreenPorch : [0 176 198 291 252 99 184 168 130 142 192 410 224 266 170 154 153 144
128 259 160 271 234 374 185 182 90 396 140 276 180 161 145 200 122 95
120 60 126 189 260 147 385 287 156 100 216 210 197 204 225 152 175 312
222 265 322 190 233 63 53 143 273 288 263 80 163 116 480 178 440 155
220 119 165 40]

_ _
_ _

PoolArea : [0 512 648 576 555 480 519 738]

_ _
_ _

PoolQC : [nan 'Ex' 'Fa' 'Gd']

_ _
_ _

Fence : [nan 'MnPrv' 'GdWo' 'GdPrv' 'MnWw']

_ _
_ _

MiscFeature : [nan 'Shed' 'Gar2' 'Othr' 'TenC']

_ _
_ _

MiscVal : [0   700   350   500   400   480   450 15500 1200   800 2000   600
  3500 1300   54   620   560 1400 8300 1150 2500]

_ _
_ _

MoSold : [2 5 9 12 10 8 11 4 1 7 3 6]

_ _
_ _

YrSold : [2008 2007 2006 2009 2010]

_ _
_ _

SaleType : ['WD' 'New' 'COD' 'ConLD' 'ConLI' 'CWD' 'ConLw' 'Con' 'Oth']

_ _
_ _

SaleCondition : ['Normal' 'Abnorml' 'Partial' 'AdjLand' 'Alloca' 'Family']

_ _
_ _

SalePrice : [208500 181500 223500 140000 250000 143000 307000 200000 129900 118000
129500 345000 144000 279500 157000 132000 149000 90000 159000 139000
325300 139400 230000 154000 256300 134800 306000 207500 68500 40000
149350 179900 165500 277500 309000 145000 153000 109000 82000 160000
170000 130250 141000 319900 239686 249700 113000 127000 177000 114500
110000 385000 130000 180500 172500 196500 438780 124900 158000 101000
202500 219500 317000 180000 226000 80000 225000 244000 185000 144900
107400 91000 135750 136500 193500 153500 245000 126500 168500 260000
174000 164500 85000 123600 109900 98600 163500 133900 204750 214000
94750 83000 128950 205000 178000 118964 198900 169500 100000 115000
190000 136900 383970 217000 259500 176000 155000 320000 163990 136000
153900 181000 84500 128000 87000 150000 150750 220000 171000 231500
166000 204000 125000 105000 222500 122000 372402 235000 79000 109500
269500 254900 162500 412500 103200 152000 127500 325624 183500 228000
128500 215000 239000 163000 184000 243000 211000 501837 200100 120000
475000 173000 135000 153337 286000 315000 192000 148500 311872 104000
274900 171500 112000 143900 277000 98000 186000 252678 156000 161750
134450 210000 107000 311500 167240 204900 97000 386250 290000 106000
192500 148000 403000 94500 128200 216500 89500 185500 194500 318000
262500 110500 241500 137000 76500 276000 151000 73000 175500 179500
120500 266000 124500 201000 415298 228500 244600 179200 164700 88000
153575 233230 135900 131000 167000 142500 175000 158500 267000 149900
295000 305900 82500 360000 165600 119900 375000 188500 270000 187500
342643 354000 301000 126175 242000 324000 145250 214500 78000 119000
284000 207000 228950 377426 202900 87500 140200 151500 157500 437154
318061 95000 105900 177500 134000 280000 198500 147000 165000 162000
172400 134432 123000 61000 340000 394432 179000 187750 213500 76000
240000 81000 191000 426000 106500 129000 67000 241000 245500 164990
108000 258000 168000 339750 60000 222000 181134 149500 126000 142000
206300 275000 109008 195400 85400 79900 122500 212000 116000 90350
555000 162900 199900 119500 188000 256000 161000 263435 62383 188700
124000 178740 146500 187000 440000 251000 132500 208900 380000 297000
89471 326000 374000 164000 86000 133000 172785 91300 34900 430000
226700 289000 208300 164900 202665 96500 402861 265000 234000 106250
184750 315750 446261 200624 107500 39300 111250 272000 248000 213250
179665 229000 263000 112500 255500 121500 268000 325000 316600 135960
142600 224500 118500 146000 131500 181900 253293 369900 79500 185900
451950 138000 319000 114504 194201 217500 221000 359100 313000 261500
75500 137500 183200 105500 314813 305000 165150 139900 209500 93000
264561 274000 370878 143250 98300 205950 350000 145500 97500 197900
402000 423000 230500 173500 103600 257500 372500 159434 285000 227875

```
148800 392000 194700 755000 335000 108480 141500  89000 123500 138500
196000 312500 361919 213000  55000 302000 254000 179540  52000 102776
189000 130500 159500 341000 103000 236500 131400  93500 239900 299800
236000 265979 260400 275500 158900 179400 215200 337000 264132 216837
538000 134900 102000 395000 221500 175900 187100 161500 233000 107900
160200 146800 269790 143500 485000 582933 227680 135500 159950 144500
 55993 157900 224900 271000 224000 183000 139500 232600 147400 237000
139950 174900 133500 189950 250580 248900 169000 200500  66500 303477
132250 328900 122900 154500 118858 142953 611657 125500 255000 154300
173733  75000  35311 238000 176500 145900 169990 193000 117500 184900
253000 239799 244400 150900 197500 172000 116500 214900 178900  37900
 99500 182000 167500  85500 178400 336000 159895 255900 117000 395192
195000 197000 348000 173900 337500 121600 206000 232000 136905 119200
227000 203000 213490 194000 287000 293077 310000 119750  84000 315500
262280 278000 139600 556581  84900 176485 200141 185850 328000 167900
151400  91500 138800 155900  83500 252000  92900 176432 274725 134500
184100 133700 118400 212900 163900 259000 239500  94000 424870 174500
116900 201800 218000 235128 108959 233170 245350 625000 171900 154900
392500 745000 186700 104900 262000 219210 116050 271900 229456  80500
137900 367294 101800 138887 265900 248328 465000 186500 169900 171750
294000 165400 301500  99900 128900 183900 378500 381000 185750  68400
150500 281000 333168 206900 295493 111000 156500  72500  52500 155835
108500 283463 410000 156932 144152 216000 274300 466500  58500 237500
377500 246578 281213 137450 193879 282922 257000 223000 274970 182900
192140 143750  64500 394617 149700 149300 121000 179600  92000 287090
266500 142125 147500]
```

– –
– –

Alternatively, for just one column

```
# Print the uniques values in just one column to see what the output looks like
df['LotFrontage'].unique()
```

[10] ✓ 0.4s

```
array([ 65.,  80.,  68.,  60.,  84.,  85.,  75.,  nan,  51.,  50.,  70.,
        91.,  72.,  66., 101.,  57.,  44., 110.,  98.,  47., 108., 112.,
        74., 115.,  61.,  48.,  33.,  52., 100.,  24.,  89.,  63.,  76.,
        81.,  95.,  69.,  21.,  32.,  78., 121., 122.,  40., 105.,  73.,
        77.,  64.,  94.,  34.,  90.,  55.,  88.,  82.,  71., 120., 107.,
        92., 134.,  62.,  86., 141.,  97.,  54.,  41.,  79., 174.,  99.,
        67.,  83.,  43., 103.,  93.,  30., 129., 140.,  35.,  37., 118.,
        87., 116., 150., 111.,  49.,  96.,  59.,  36.,  56., 102.,  58.,
        38., 109., 130.,  53., 137.,  45., 106., 104.,  42.,  39., 144.,
       114., 128., 149., 313., 168., 182., 138., 160., 152., 124., 153.,
        46.])
```

Numerical and Categorical Data Separation

```
# Select numeric and categorical data by putting the data into two new DataFrames for each type.
numericDF = df.select_dtypes(include=[np.number])
categoricDF = df.select_dtypes(exclude=[np.number])
```

✓ 0.4s Python

```
# Print the numerical and categorical data column names as two lists.

numericCol = numericDF.columns.tolist()
categoryCol = categoricDF.columns.tolist()
print ("Categorical data column names:", categoryCol)
print ("\n Numerical data column names:", numericCol)
```

✓ 0.6s Python

```
Categorical data column names: ['MSZoning', 'Street', 'Alley', 'LotShape', 'LandContour', 'Utilities', 'LotConfig', 'LandSlope', 'Neighborhood', 'Condition1', 'Condition2',
'BldgType', 'HouseStyle', 'RoofStyle', 'RoofMatl', 'Exterior1st', 'Exterior2nd', 'MasVnrType', 'ExterQual', 'ExterCond', 'Foundation', 'BsmtQual', 'BsmtCond', 'BsmtExposure',
'BsmtFinType1', 'BsmtFinType2', 'Heating', 'HeatingQC', 'CentralAir', 'Electrical', 'KitchenQual', 'Functiol', 'FireplaceQu', 'GarageType', 'GarageFinish', 'GarageQual', 'GarageCond',
'PavedDrive', 'PoolQC', 'Fence', 'MiscFeature', 'SaleType', 'SaleCondition']

 Numerical data column names: ['Id', 'MSSubClass', 'LotFrontage', 'LotArea', 'OverallQual', 'OverallCond', 'YearBuilt', 'YearRemodAdd', 'MasVnrArea', 'BsmtFinSF1', 'BsmtFinSF2',
'BsmtUnfSF', 'TotalBsmtSF', '1stFlrSF', '2ndFlrSF', 'LowQualFinSF', 'GrLivArea', 'BsmtFullBath', 'BsmtHalfBath', 'FullBath', 'HalfBath', 'BedroomAbvGr', 'KitchebvGr', 'TotRmsAbvGrd',
'Fireplaces', 'GarageYrBlt', 'GarageCars', 'GarageArea', 'WoodDeckSF', 'OpenPorchSF', 'EnclosedPorch', '3SsnPorch', 'ScreenPorch', 'PoolArea', 'MiscVal', 'MoSold', 'YrSold',
'SalePrice']
```

Numerical Data Missing Value Treatment: Mean Imputation

```
# Some of the values are missing from the LotFrontage, MasVnrArea, and GarageYrBlt columns.

# We can fill the missing values with either the mean or median in each column. Let's make an imputer for each variation.

# Make the mean imputer
meanImputer = SimpleImputer(missing_values = np.nan, strategy = "mean")
meanImputer = meanImputer.fit(numericDF)

# Make the median imputer
medianImputer = SimpleImputer(missing_values = np.nan, strategy = "median")
medianImputer = medianImputer.fit(numericDF)
```

[17] ✓ 0.4s Python

```
# Use the mean imputer to make an new DataFrame that fills the missing values with the mean of each column

meanImputedNumDFArr = meanImputer.transform(numericDF)                              # Make a np array that contains the imputed values
meanImputedNumDF = pd.DataFrame(data = meanImputedNumDFArr, columns = numericDF.columns)    # Make a DF using the np array's data

meanImputedNumDF.head()
```

[18] ✓ 0.7s Python

	Id	MSSubClass	LotFrontage	LotArea	OverallQual	OverallCond	YearBuilt	YearRemodAdd	MasVnrArea	BsmtFinSF1	...	WoodDeckSF	OpenPorchSF	EnclosedPorch	3SsnPorch	ScreenPorch
0	1.0	60.0	65.0	8450.0	7.0	5.0	2003.0	2003.0	196.0	706.0	...	0.0	61.0	0.0	0.0	0.0
1	2.0	20.0	80.0	9600.0	6.0	8.0	1976.0	1976.0	0.0	978.0	...	298.0	0.0	0.0	0.0	0.0
2	3.0	60.0	68.0	11250.0	7.0	5.0	2001.0	2002.0	162.0	486.0	...	0.0	42.0	0.0	0.0	0.0
3	4.0	70.0	60.0	9550.0	7.0	5.0	1915.0	1970.0	0.0	216.0	...	0.0	35.0	272.0	0.0	0.0
4	5.0	60.0	84.0	14260.0	8.0	5.0	2000.0	2000.0	350.0	655.0	...	192.0	84.0	0.0	0.0	0.0

5 rows × 38 columns

And, for the columns with missing values only

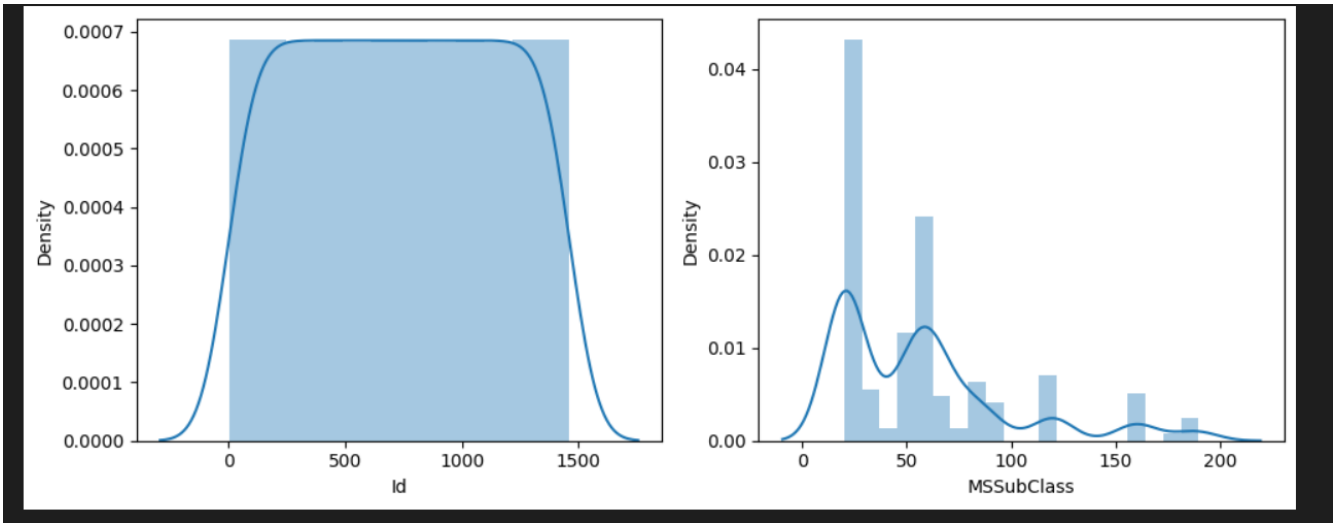
```
# Print out the columns that contained missing values to examine the mean imputation results.
meanImputedNumDF[["LotFrontage", "MasVnrArea", "GarageYrBlt"]]
```

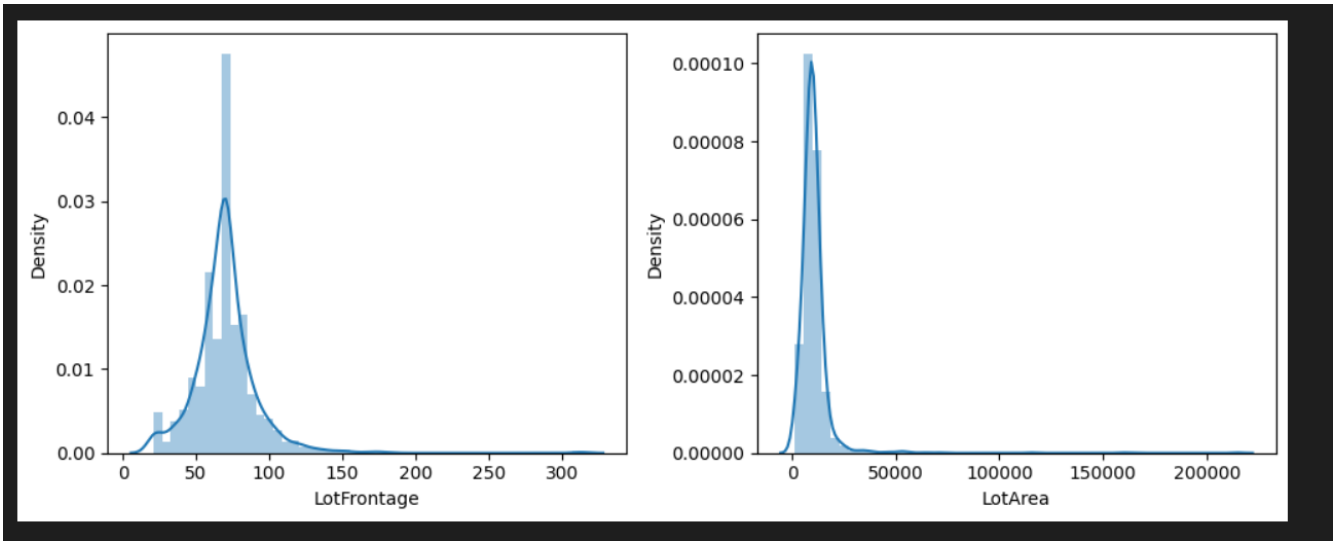
[20] ✓ 0.4s

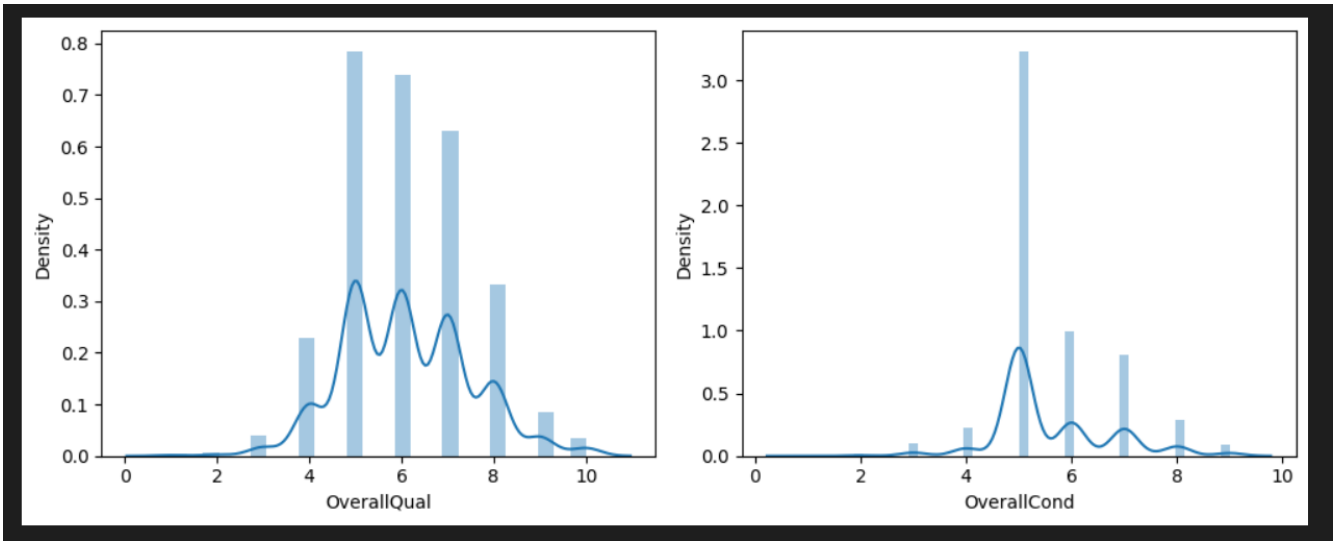
	LotFrontage	MasVnrArea	GarageYrBlt
0	65.0	196.0	2003.0
1	80.0	0.0	1976.0
2	68.0	162.0	2001.0
3	60.0	0.0	1998.0
4	84.0	350.0	2000.0
...	...	...	...
1455	62.0	0.0	1999.0
1456	85.0	119.0	1978.0
1457	66.0	0.0	1941.0
1458	68.0	0.0	1950.0
1459	75.0	0.0	1965.0

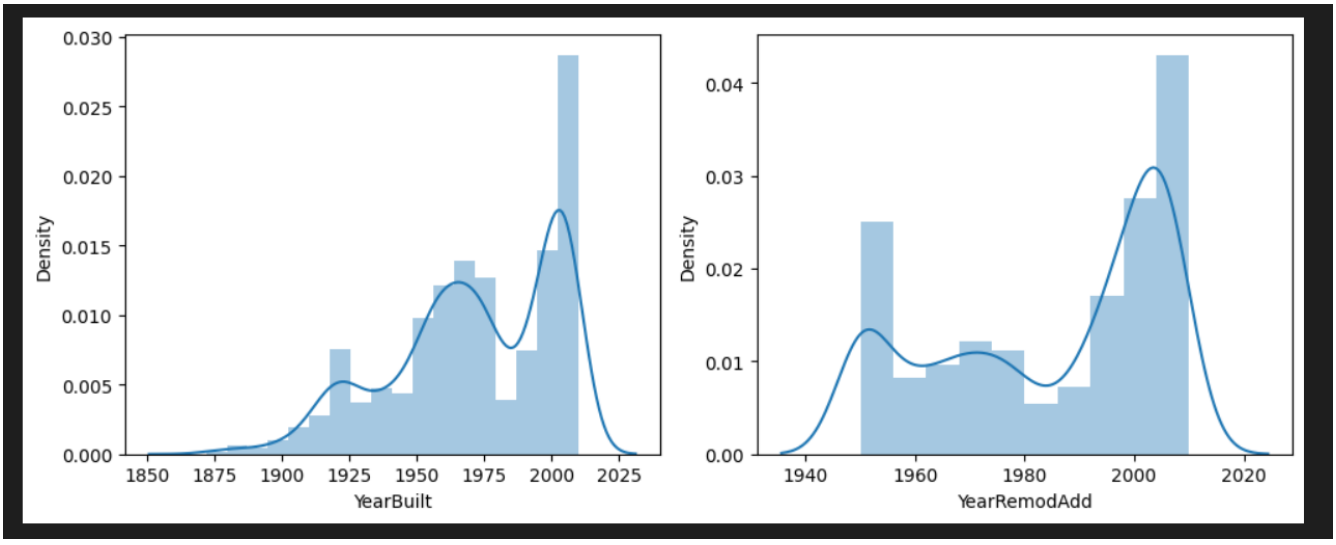
1460 rows × 3 columns

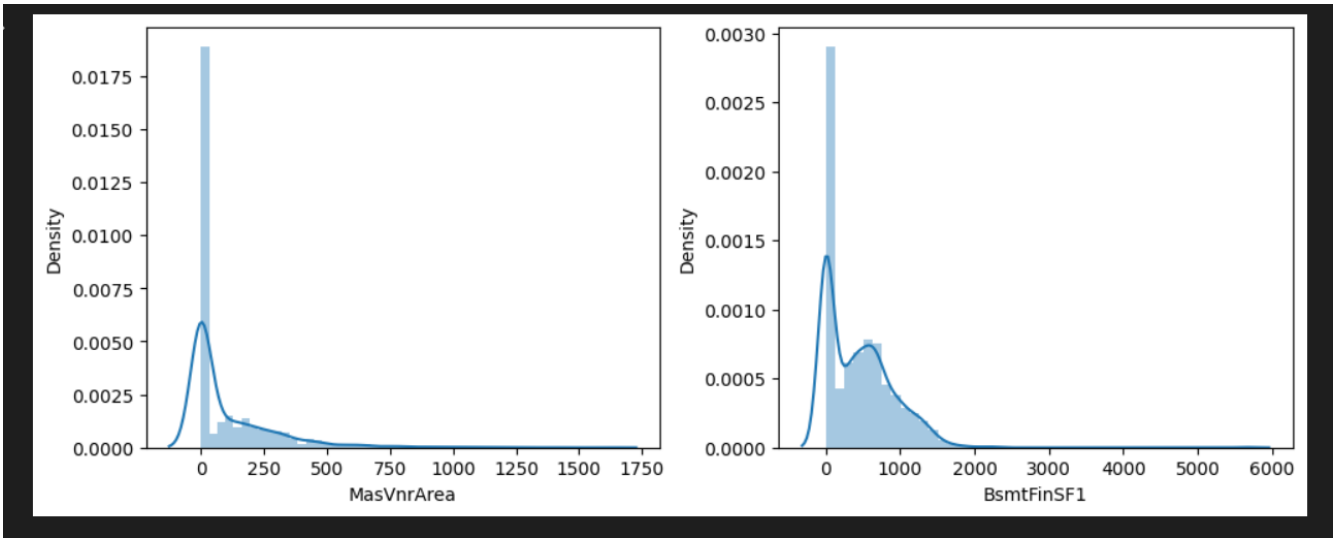
Histograms of all numerical data columns

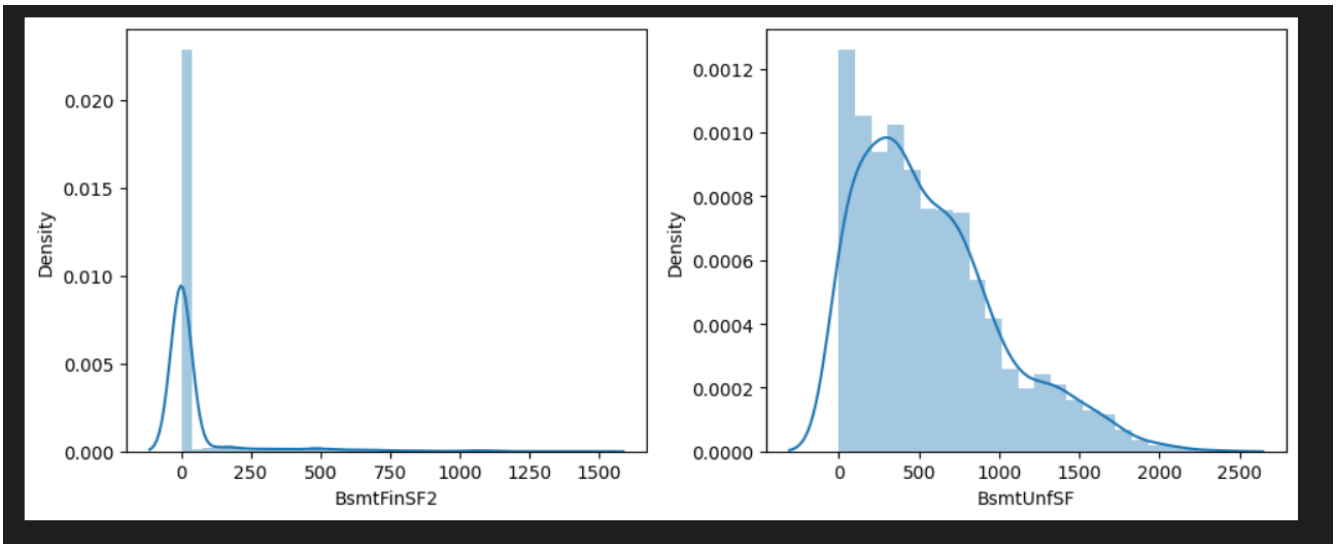


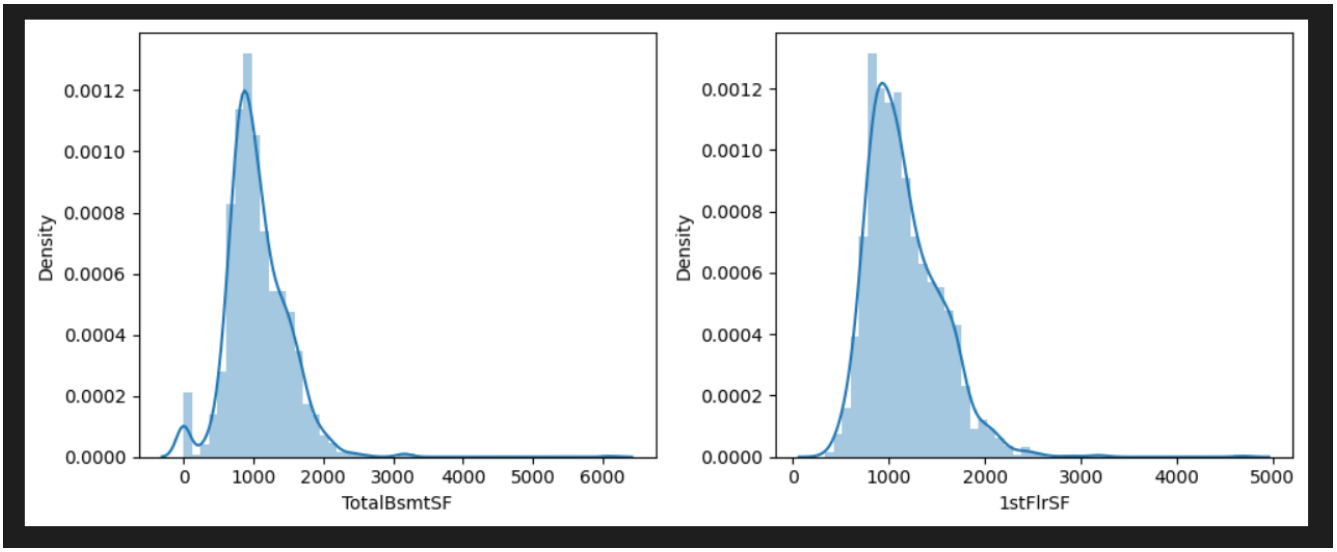

Density
LotFrontage
0.04
0.03
0.02
0.01
0.00
0
50
100
150
200
250
300
Density
LotArea
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
0
50000
100000
150000
200000

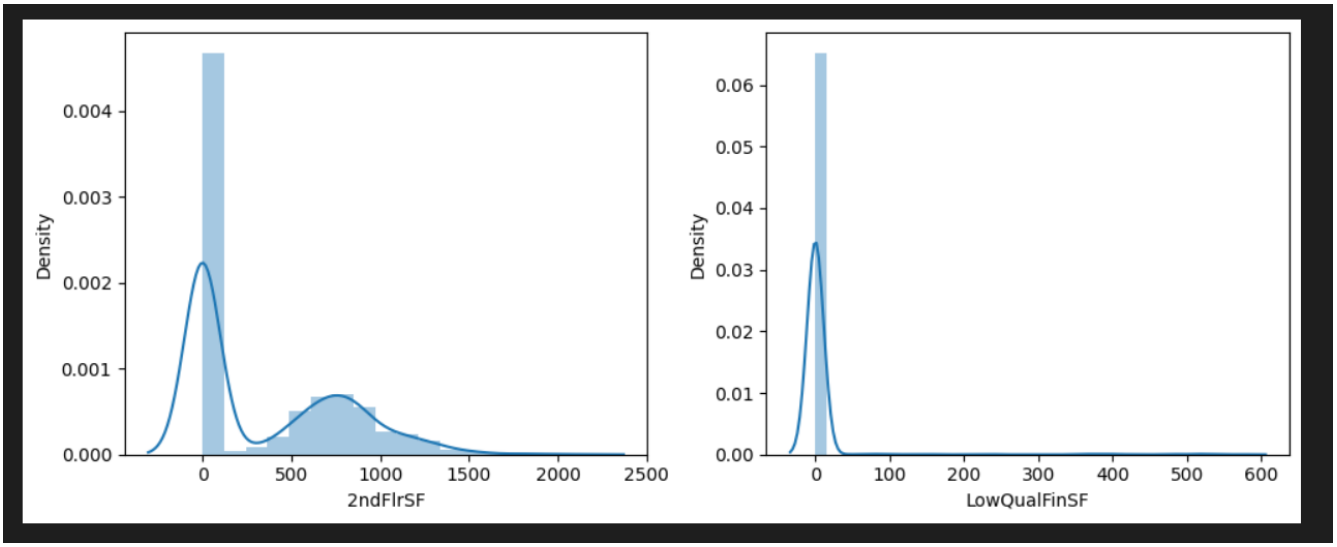

Density
OverallQual
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
2
4
6
8
10
Density
OverallCond
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10

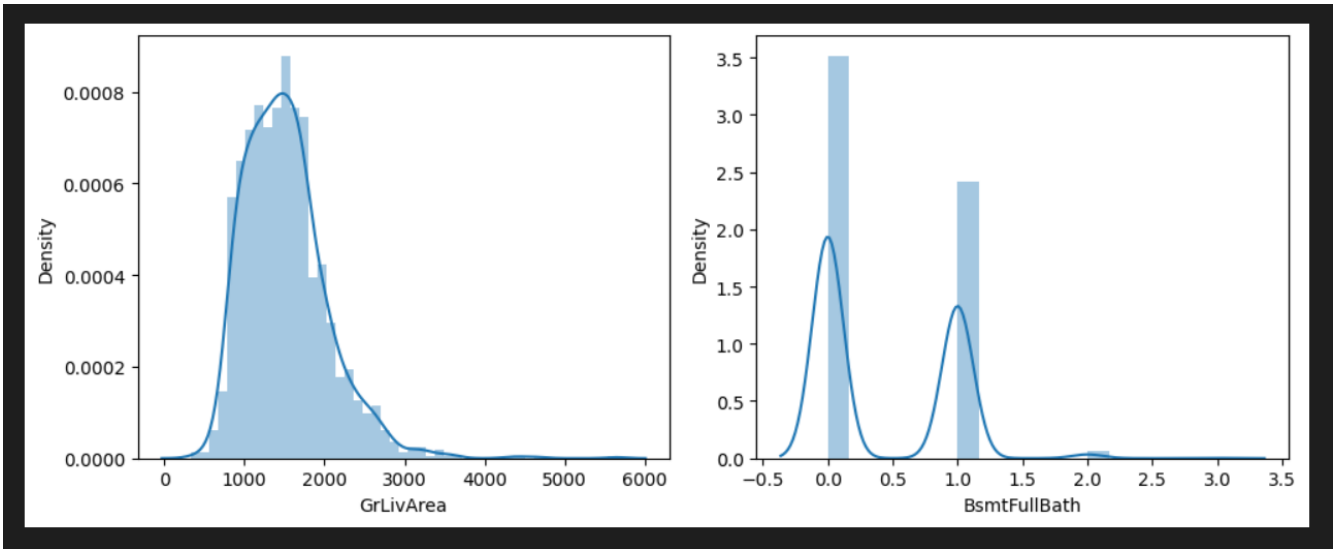

Density
YearBuilt
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1850
1875
1900
1925
1950
1975
2000
2025
Density
YearRemodAdd
0.04
0.03
0.02
0.01
0.00
1940
1960
1980
2000
2020

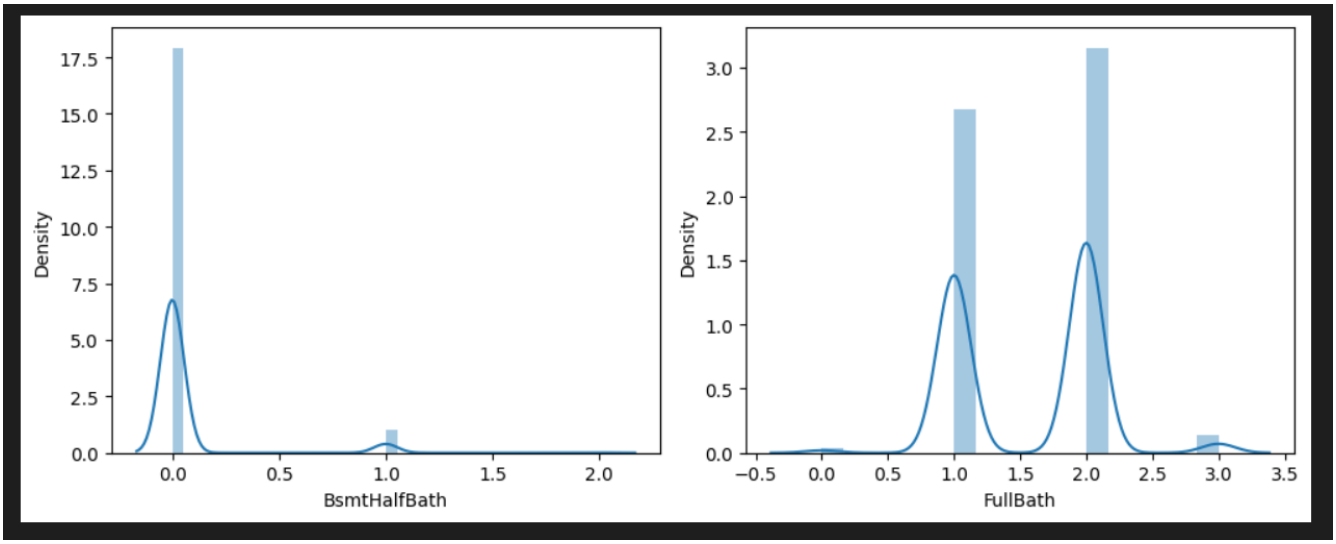

Density
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0
250
500
750
1000
1250
1500
1750
MasVnrArea
Density
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0
1000
2000
3000
4000
5000
6000
BsmtFinSF1

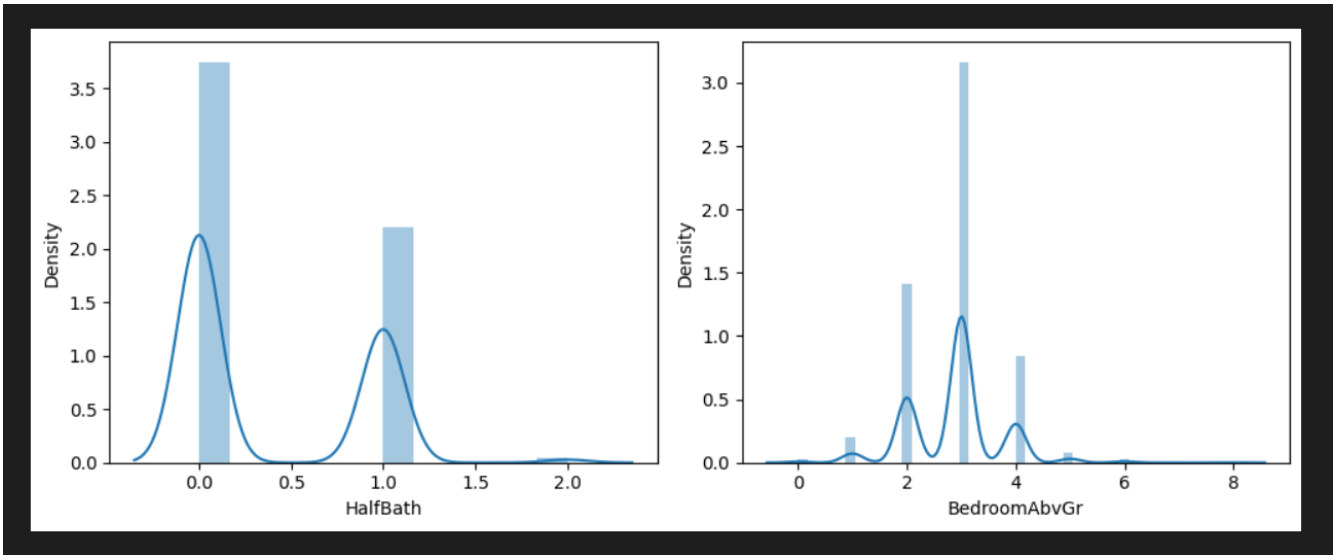

Density
0.020
0.015
0.010
0.005
0.000
0
250
500
750
1000
1250
1500
BsmtFinSF2
Density
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
0
500
1000
1500
2000
2500
BsmtUnfSF

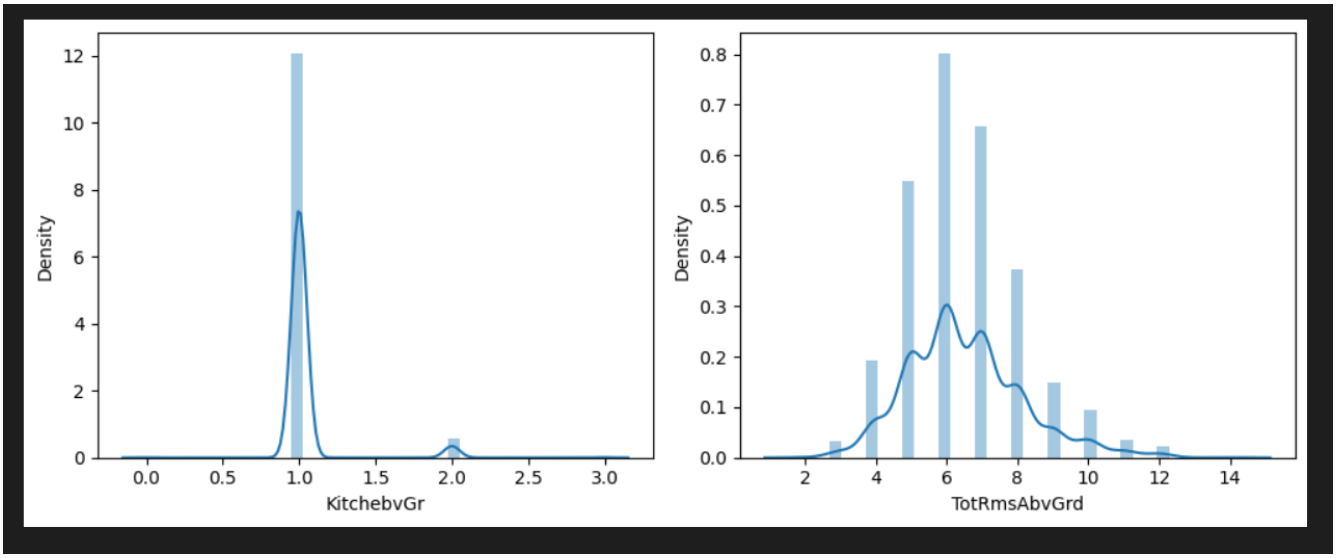

Density
TotalBsmtSF
1stFlrSF

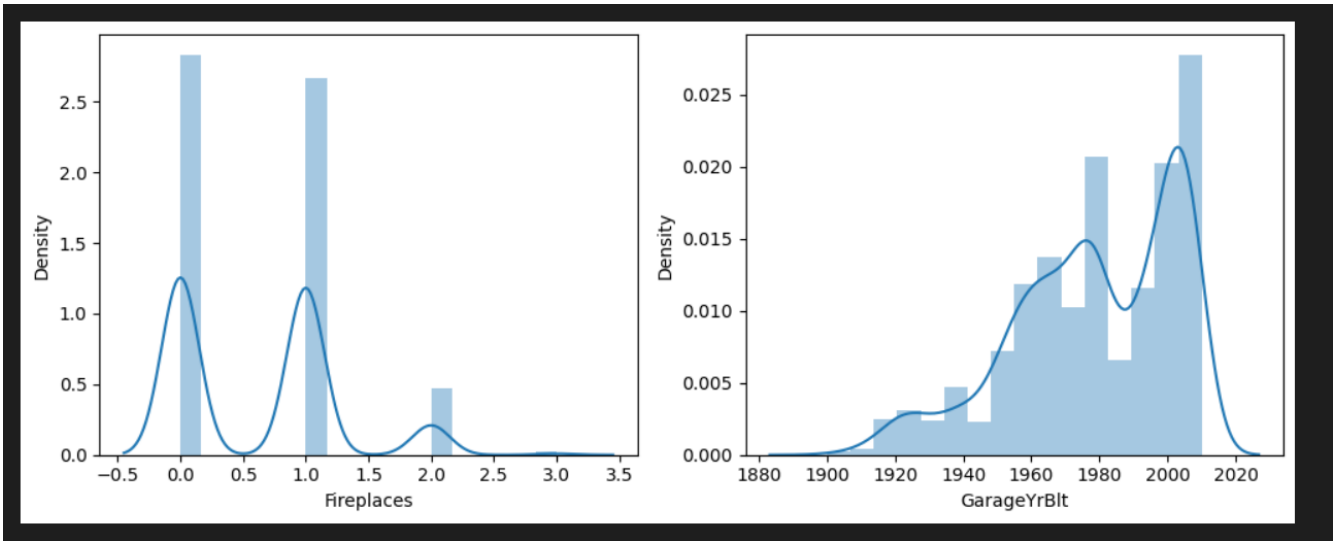

Density
2ndFlrSF
LowQualFinSF

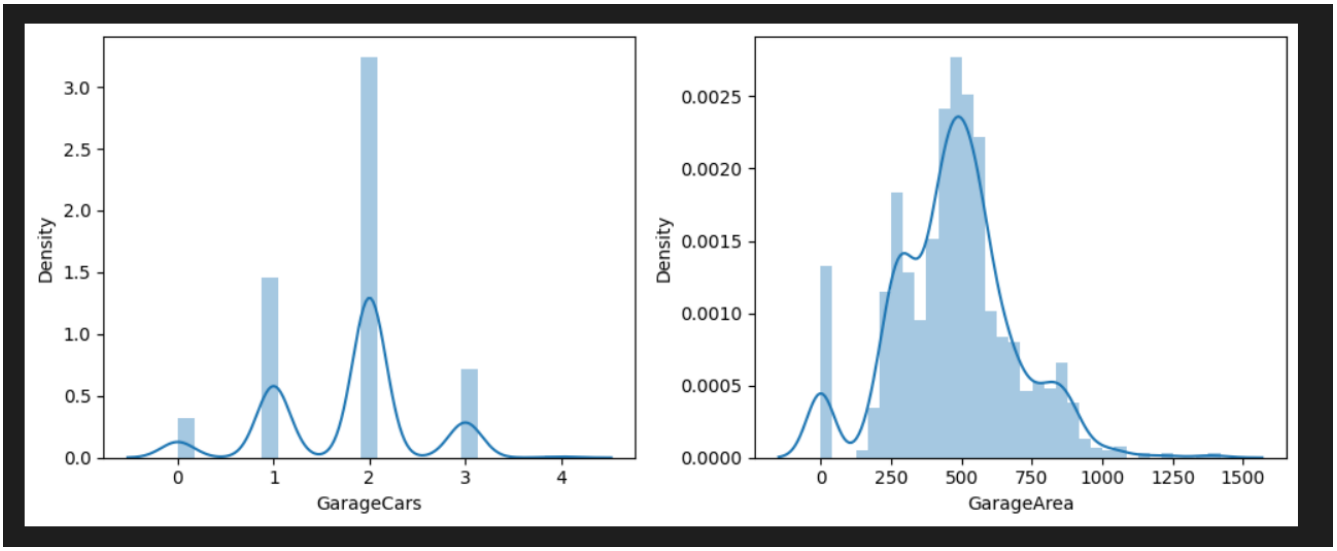

Density
GrLivArea
BsmtFullBath

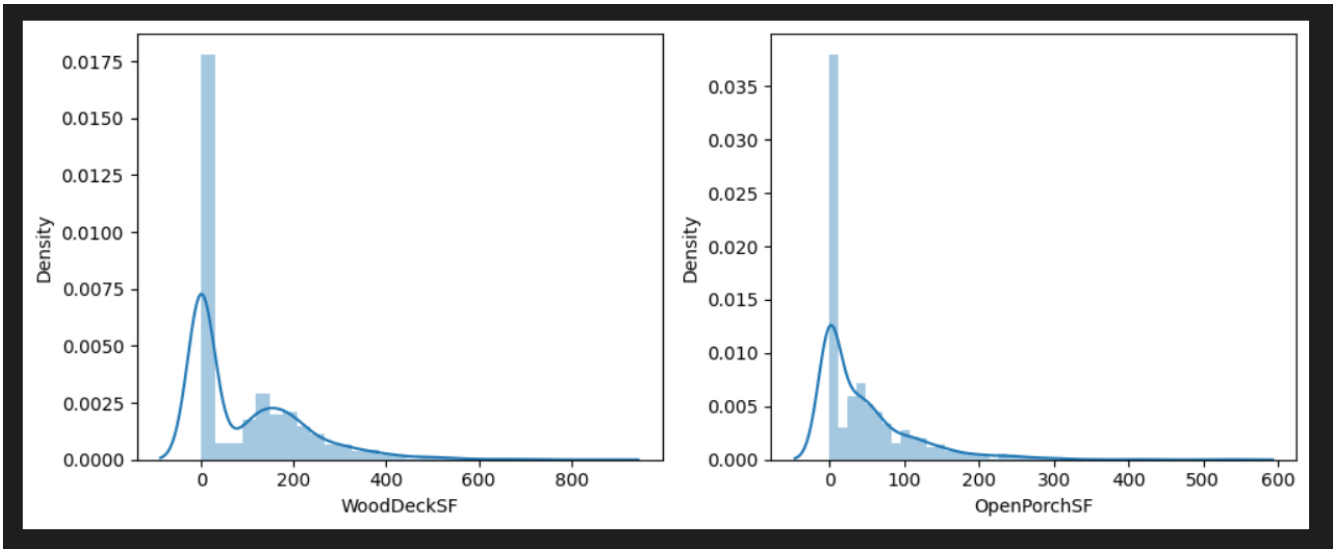

Density
BsmtHalfBath
Density
FullBath

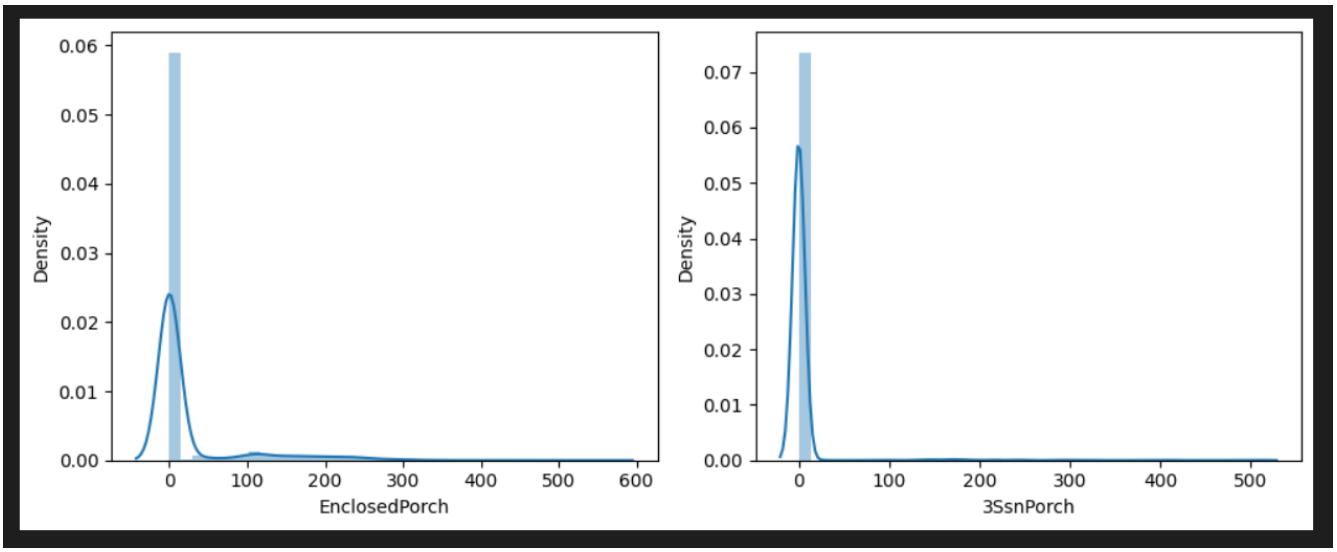

Density
HalfBath
Density
BedroomAbvGr

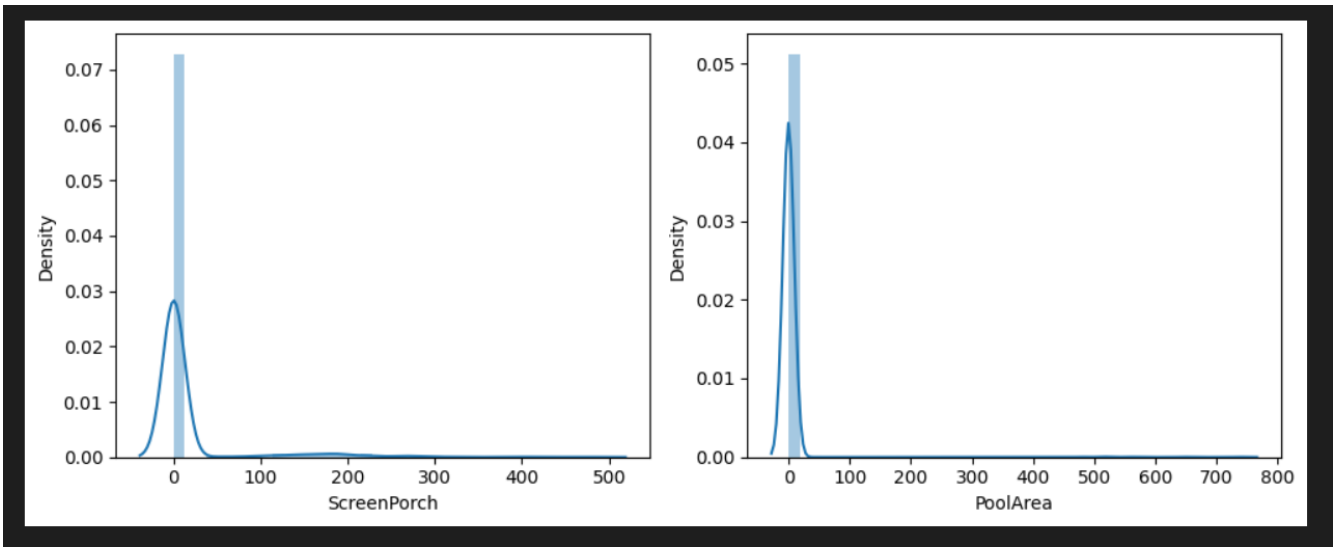

Density
KitchebvGr
Density
TotRmsAbvGrd

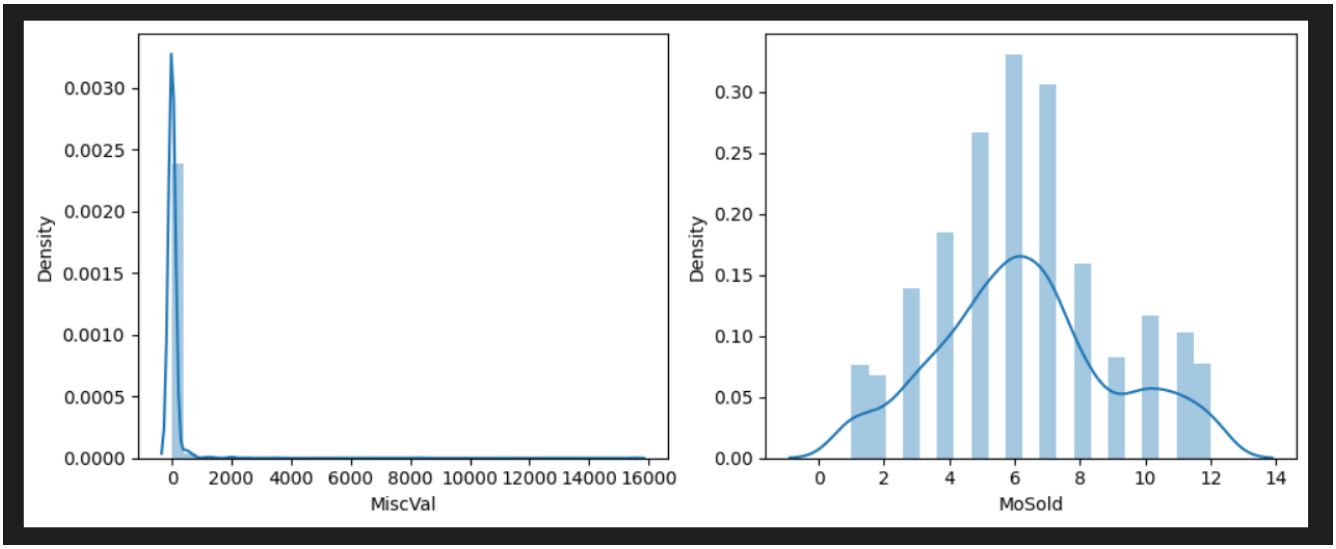

Density
Fireplaces
Density
GarageYrBlt

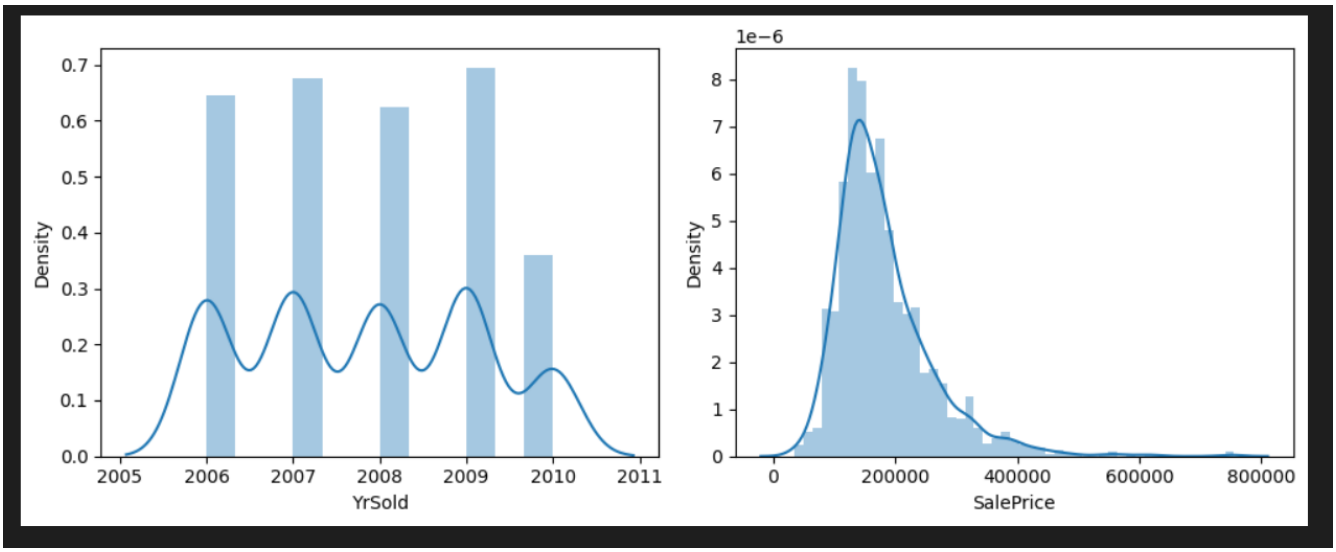

Density
GarageCars
Density
GarageArea


Density
WoodDeckSF
Density
OpenPorchSF

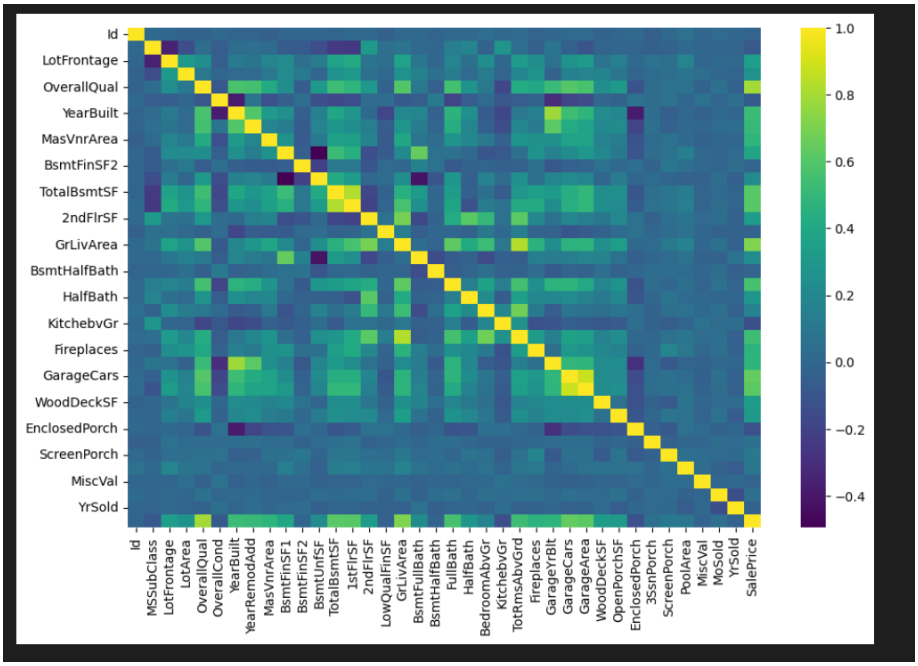

Density
EnclosedPorch
Density
3SsnPorch


Density
ScreenPorch
Density
PoolArea

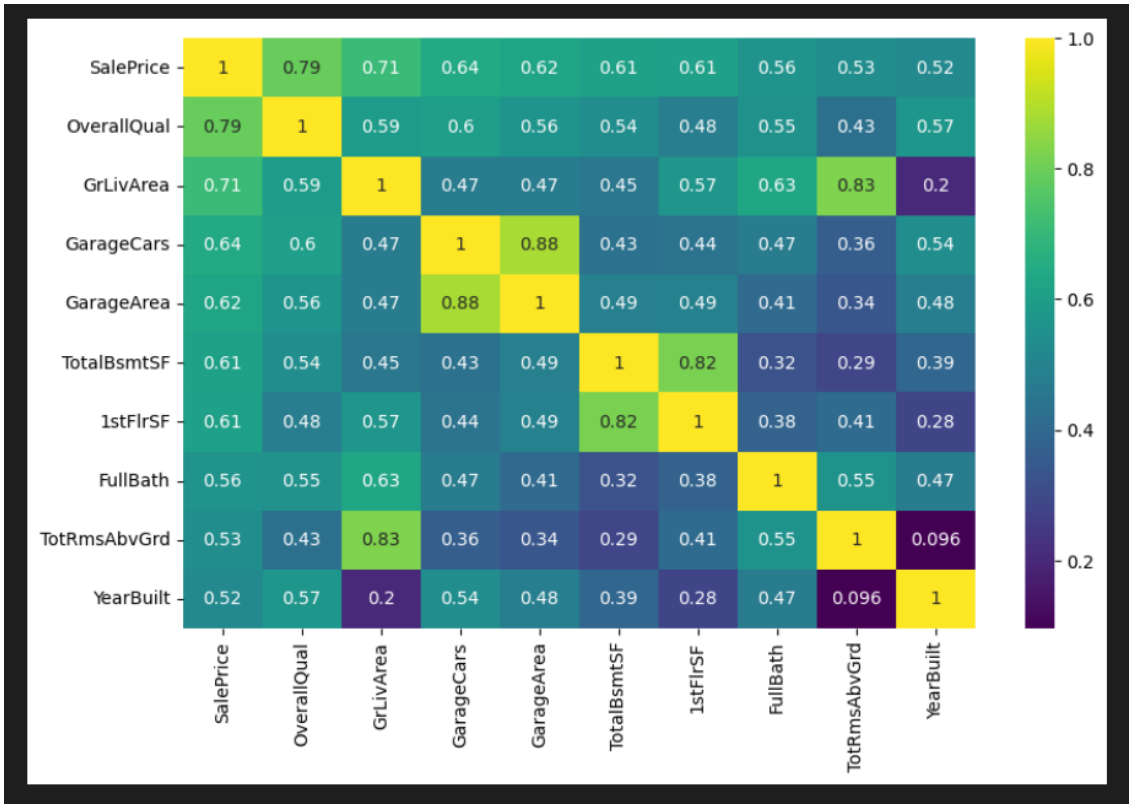

Density
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0 2000 4000 6000 8000 10000 12000 14000 16000
MiscVal
Density
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0 2 4 6 8 10 12 14
MoSold


Density
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2005 2006 2007 2008 2009 2010 2011
YrSold
1e−6
Density
8
7
6
5
4
3
2
1
0
0 200000 400000 600000 800000
SalePrice

Correlation heat maps



Smaller size heat map



Numerical Data Pair Plot

See the attached image files for the pair plot.

Categorical Data Count Plot

See the attached image files for the count plots.

p-value and chi-square tests

P-value and Chi-squared test

```
# Use KMO to check if we can perform tests on our data. We will use imputed numerical data only since we are dealing with numbers in these tests.

from factor_analyzer.factor_analyzer import calculate_kmo
kmo_all, kmo_model = calculate_kmo(meanImputedNumDF)
```

✓ 0.6s

```
kmo_model
```

✓ 0.3s

```
0.657887252069187
```

```
# Import the necessary libraries and packages from factor_analyzer
```

Using Scikit-learn to attempt the p-value and Chi-squared test

+ Code + Markdown

```
# Import sklearn packages
from sklearn.feature_selection import SelectKBest
from sklearn.feature_selection import chi2
```

✓ 0.3s

```
x = categoricDF
y = df['SalePrice']

chi2_selector = SelectKBest(chi2, k = 2)
```

✓ 0.8s

```
# This line doesn't work for some reason. I assume this problem is the result of me trying to use the categorical DataFrame as the x-value.

X_kbest = chi2_selector.fit_transform(x, y)
```

⊗ 0.1s

```
Output exceeds the size limit. Open the full output data in a text editor
```

```
# This line doesn't work for some reason. I assume this problem is the result of me trying to use the categorical DataFrame as the x-value.

X_kbest = chi2_selector.fit_transform(x, y)
```

0.1s

```
Output exceeds the size limit. Open the full output data in a text editor
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In [48], line 3
      1 # This line doesn't work for some reason. I assume this problem is the result of me trying to use the categorical DataFrame as the x-value.
----> 3 X_kbest = chi2_selector.fit_transform(x, y)

File ~\AppData\Roaming\Python\Python310\site-packages\sklearn\base.py:870, in TransformerMixin.fit_transform(self, X, y, **fit_params)
    867     return self.fit(X, **fit_params).transform(X)
    868 else:
    869     # fit method of arity 2 (supervised transformation)
--> 870     return self.fit(X, y, **fit_params).transform(X)

File ~\AppData\Roaming\Python\Python310\site-packages\sklearn\feature_selection\_univariate_selection.py:461, in _BaseFilter.fit(self, X, y)
    444 def fit(self, X, y):
    445     """Run score function on (X, y) and get the appropriate features.
    446
    447     Parameters
   (...)
    459         Returns the instance itself.
    460     """
--> 461     X, y = self._validate_data(
    462         X, y, accept_sparse=["csr", "csc"], multi_output=True
    463     )
    465     if not callable(self.score_func):
    466         raise TypeError(

...

File ~\AppData\Roaming\Python\Python310\site-packages\pandas\core\generic.py:2070, in NDFrame.__array__(self, dtype)
   2069 def __array__(self, dtype: npt.DTypeLike | None = None) -> np.ndarray:
-> 2070     return np.asarray(self._values, dtype=dtype)

ValueError: could not convert string to float: 'RL'
```

Final Significant columns/variables

```
# Make dataframes for the important data points

importantNumDF = meanImputedNumDF[['SalePrice', 'OverallQual', 'GrLivArea', 'GarageCars', '1stFlrSF', 'FullBath', 'YearBuilt']]

importantCatDF = categoricDF[['LotConfig', 'Neighborhood', 'HouseStyle', 'RoofStyle', 'Exterior1st', 'Exterior2nd', 'MasVnrType',
                              'ExterQual', 'Foundation', 'BsmtQual', 'BsmtFinType1', 'HeatingQC', 'KitchenQual', 'FireplaceQu', 'GarageType', 'GarageFinish', 'PoolQC', 'Fence']]
```

0.4s

```
# This final dataframe will contain all the important data.

finalDF = pd.concat([importantNumDF, importantCatDF])
```

0.4s

Numerical Data Box Plots

See the attached image files for the box plots. Note that there was no encoding performed on the categorical data, so the box plots only show data for the numerical data instead of all the significant data.

The