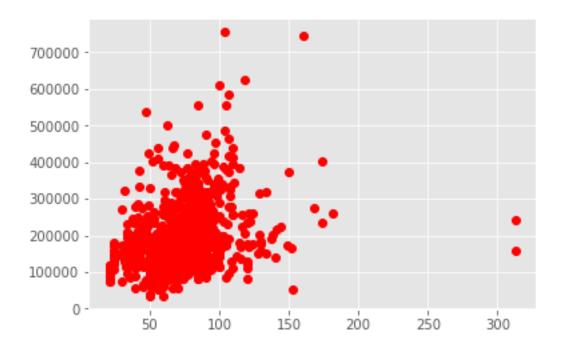
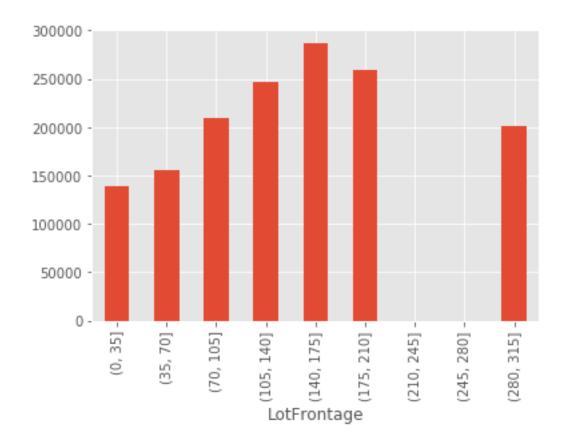
House_price_data_vis_ana

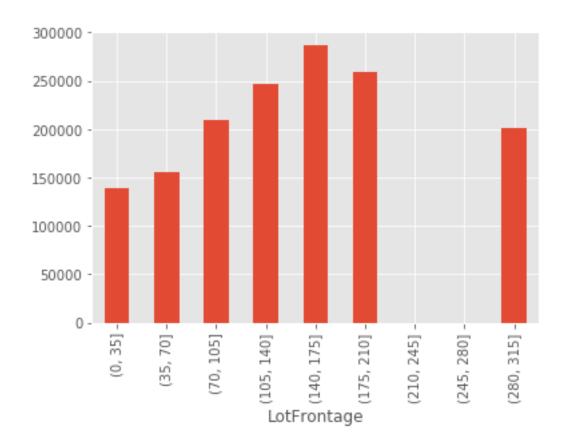
December 11, 2017

```
In [1]: import pandas as pd
        test_df = pd.read_csv('train.csv')
        test_df.head()
Out[1]:
                MSSubClass MSZoning LotFrontage LotArea Street Alley LotShape \
             1
                         60
                                  RL
                                               65.0
                                                        8450
                                                                Pave
                                                                       NaN
        0
                                                                                 Reg
        1
            2
                                  RL
                                               0.08
                         20
                                                        9600
                                                                Pave
                                                                       NaN
                                                                                 Reg
        2
            3
                         60
                                  RL
                                               68.0
                                                       11250
                                                                Pave
                                                                       NaN
                                                                                 IR1
        3
             4
                         70
                                  RL
                                              60.0
                                                        9550
                                                                Pave
                                                                       NaN
                                                                                 IR1
                                  RL
        4
             5
                         60
                                              84.0
                                                       14260
                                                                Pave
                                                                       NaN
                                                                                 IR1
                                              PoolArea PoolQC Fence MiscFeature MiscVal
          LandContour Utilities
                                                      0
        0
                   Lvl
                           AllPub
                                                           NaN
                                                                  NaN
                                                                               NaN
                                                                                          0
        1
                   Lvl
                           AllPub
                                                      0
                                                           {\tt NaN}
                                                                  NaN
                                                                               NaN
                                                                                          0
        2
                   Lvl
                           AllPub
                                                      0
                                                           NaN
                                                                  NaN
                                                                               NaN
                                                                                          0
        3
                   Lvl
                           AllPub
                                                      0
                                                           NaN
                                                                               NaN
                                                                                          0
                                                                  NaN
        4
                           AllPub
                                                                                          0
                   Lvl
                                                           {\tt NaN}
                                                                  NaN
                                                                               NaN
          MoSold YrSold
                          SaleType
                                     SaleCondition
                                                      SalePrice
                2
                                             Normal
        0
                    2008
                                 WD
                                                         208500
        1
                                             Normal
                5
                    2007
                                 WD
                                                         181500
        2
                    2008
                                 WD
                                             Normal
                                                         223500
        3
                2
                    2006
                                 WD
                                            Abnorml
                                                         140000
        4
               12
                    2008
                                             Normal
                                                         250000
                                 WD
         [5 rows x 81 columns]
In [2]: import pylab as plt
        plt.style.use(style='ggplot')
        plt.plot(test_df.LotFrontage,test_df.SalePrice,'ro')
        plt.show()
```

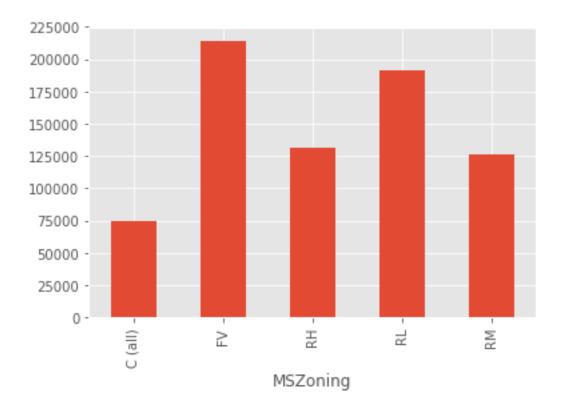


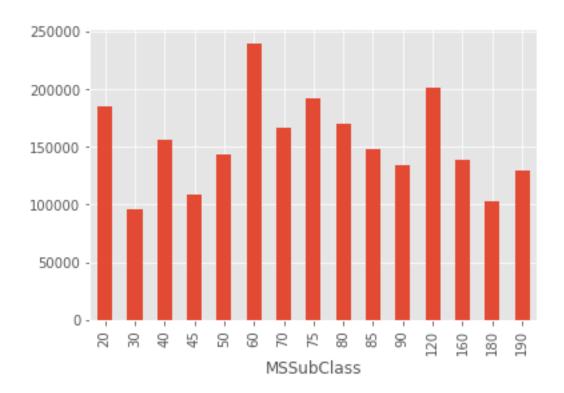


```
In [6]: import numpy as np
        import pylab as plt
        group_by_price = pd.cut(test_df.LotFrontage, np.arange(0, 350, 35))
        price_grouping = test_df.groupby(group_by_price).mean()
        price_grouping['SalePrice'].plot.bar()
        plt.show()
```



In [7]: zone_grouping = test_df.groupby('MSZoning').mean()
 zone_grouping['SalePrice'].plot.bar()
 plt.show()





Out[9]:			Id	LotFrontage	LotArea	OverallQual	\
	MSSubClass	MSZoning					
	20	C (all)	865.000000	58.000000	8856.000000	3.500000	
		FV	644.769231	73.583333	8544.846154	7.307692	
		RH	833.666667	60.000000	8366.666667	4.333333	
		RL	726.568898	78.065693	11945.566929	6.049213	
		RM	635.300000	64.800000	7871.000000	4.600000	
	30	C (all)	779.000000	90.000000	12939.500000	3.500000	
		RH	1327.000000	70.000000	4270.000000	3.000000	
		RL	801.696970	59.535714	8765.575758	4.363636	
		RM	674.515152	58.906250	6814.939394	4.757576	
	40	RL	1072.500000	60.000000	17869.500000	6.000000	
		RM	377.500000	45.000000	7250.000000	5.500000	
	45	RH	384.000000	60.000000	9000.000000	6.000000	
		RL	591.750000	57.250000	8230.250000	5.000000	
		RM	330.428571	53.000000	5923.857143	5.714286	
	50	C (all)	659.750000	72.750000	8930.500000	3.750000	
		RH	682.000000	55.000000	4500.000000	5.000000	
		RL	784.727273	67.564103	12397.693182	5.568182	
		RM	701.862745	57.244444	7407.411765	5.254902	
	60	FV	636.200000	76.913043	9268.360000	7.440000	

	RL	716.575092	81.621359	12345.340659	7.025641	
	RM	426.000000	60.000000	3378.000000	7.000000	
70	C (all)	31.000000	50.000000	8500.000000	4.000000	
	RH	916.000000	54.500000	9103.000000	5.666667	
	RL	787.266667	72.037037	11849.133333	6.333333	
	RM	765.038462	60.280000	8304.884615	6.000000	
75	RL	594.000000	89.800000	12483.666667	6.166667	
, 0	RM	611.400000	71.400000	11120.600000	6.900000	
80	RL	792.155172	80.026316	10895.482759	5.965517	
85	RL	828.200000	71.571429	9317.450000	5.450000	
90	RH	883.000000	74.666667	7268.666667	5.333333	
30	RL	815.767442	70.921053	10122.767442	4.860465	
	RM	578.666667	74.333333	8059.666667	5.500000	
120	FV	994.400000	45.600000	4244.200000	7.600000	
120		904.500000	34.000000	4059.000000		
	RH				6.500000	
	RL	708.661017	47.062500	5810.830508	7.305085	
4.00	RM	749.761905	42.083333	4582.190476	6.285714	
160	FV	759.000000	30.058824	3068.772727	6.772727	
	RL	651.090909	34.700000	3630.818182	6.454545	
	RM	770.700000	24.250000	2086.866667	5.566667	
180	RM	798.000000	25.200000	2247.400000	4.600000	
190	C (all)	94.000000	60.000000	7200.000000	6.000000	
	RH	833.500000	60.000000	8989.000000	5.500000	
	RL	632.375000	70.857143	22805.687500	4.687500	
	RM	720.363636	62.545455	8478.909091	5.181818	
		OverallCond	YearBuilt	YearRemodAdd	MasVnrArea	\
MSSubClass	s MSZoning	Gvorarrooma	rourburro	rouritomounta	nab viii ni oa	`
20	C (all)	4.000000	1950.500000	1951.000000	0.000000	
20	FV	5.000000	2007.000000	2007.230769	64.166667	
	RH	4.333333	1960.333333	1960.333333	0.000000	
	RL	5.566929	1977.811024	1985.694882	108.409901	
	RM	6.100000	1958.600000	1982.100000	0.000000	
20	C (all)					
30	C (all)	4.500000	1927.500000 1931.000000	1950.000000 2006.000000	0.000000	
	пп	6.000000	1931.000000	2006.000000	0.000000	
	DI	E 707073	100E 404040		2 070707	
	RL	5.727273	1925.484848	1966.484848	3.272727	
40	RM	5.848485	1927.606061	1966.484848 1971.272727	22.090909	
40	RM RL	5.848485 6.500000	1927.606061 1964.000000	1966.484848 1971.272727 1964.500000	22.090909 0.000000	
	RM RL RM	5.848485 6.500000 6.500000	1927.606061 1964.000000 1928.000000	1966.484848 1971.272727 1964.500000 1982.000000	22.090909 0.000000 0.000000	
40 45	RM RL RM RH	5.848485 6.500000 6.500000 3.000000	1927.606061 1964.000000 1928.000000 1928.000000	1966.484848 1971.272727 1964.500000 1982.000000	22.090909 0.000000 0.000000 0.000000	
	RM RL RM RH RL	5.848485 6.500000 6.500000 3.000000 6.000000	1927.606061 1964.000000 1928.000000 1928.000000 1946.250000	1966.484848 1971.272727 1964.500000 1982.000000 1950.000000 1965.750000	22.090909 0.000000 0.000000 0.000000 0.000000	
45	RM RL RM RH RL RM	5.848485 6.500000 6.500000 3.000000 6.000000 6.714286	1927.606061 1964.000000 1928.000000 1928.000000 1946.250000 1928.857143	1966.484848 1971.272727 1964.500000 1982.000000 1950.000000 1965.750000	22.090909 0.000000 0.000000 0.000000 0.000000	
	RM RL RM RH RL RM C (all)	5.848485 6.500000 6.500000 3.000000 6.000000 6.714286 4.750000	1927.606061 1964.000000 1928.000000 1928.000000 1946.250000 1928.857143 1913.750000	1966.484848 1971.272727 1964.500000 1982.000000 1950.000000 1965.750000 1965.000000	22.090909 0.000000 0.000000 0.000000 0.000000 0.000000	
45	RM RL RM RH RL C (all)	5.848485 6.500000 6.500000 3.000000 6.000000 6.714286 4.750000 5.000000	1927.606061 1964.000000 1928.000000 1928.000000 1946.250000 1928.857143 1913.750000	1966.484848 1971.272727 1964.500000 1982.000000 1950.000000 1965.750000 1965.000000 1958.000000	22.090909 0.000000 0.000000 0.000000 0.000000 0.000000	
45	RM RL RM RH RL RM C (all) RH RL	5.848485 6.500000 6.500000 3.000000 6.000000 6.714286 4.750000 5.000000 5.886364	1927.606061 1964.000000 1928.000000 1928.000000 1946.250000 1928.857143 1913.750000 1932.000000 1940.261364	1966.484848 1971.272727 1964.500000 1982.000000 1950.000000 1965.750000 1965.000000 1958.000000 2000.000000 1971.022727	22.090909 0.000000 0.000000 0.000000 0.000000 0.000000	
4 5	RM RL RM RH RL RM C (all) RH RL	5.848485 6.500000 6.500000 3.000000 6.000000 6.714286 4.750000 5.000000 5.886364 6.352941	1927.606061 1964.000000 1928.000000 1928.000000 1946.250000 1928.857143 1913.750000 1932.000000 1940.261364 1930.000000	1966.484848 1971.272727 1964.500000 1982.000000 1950.000000 1965.750000 1965.000000 1958.000000 2000.000000 1971.022727 1968.176471	22.090909 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 45.681818 18.333333	
45	RM RL RM RH RL RM C (all) RH RL	5.848485 6.500000 6.500000 3.000000 6.000000 6.714286 4.750000 5.000000 5.886364	1927.606061 1964.000000 1928.000000 1928.000000 1946.250000 1928.857143 1913.750000 1932.000000 1940.261364	1966.484848 1971.272727 1964.500000 1982.000000 1950.000000 1965.750000 1965.000000 1958.000000 2000.000000 1971.022727	22.090909 0.000000 0.000000 0.000000 0.000000 0.000000	

	RM	8.000000	1946.000000	1992.000000	0.000000	
70	C (all)	4.000000	1920.000000	1950.000000	0.000000	
	RH	6.666667	1920.333333	1950.000000	0.000000	
	RL	6.766667	1928.333333	1978.500000	7.466667	
	RM	6.576923	1907.653846	1981.423077	0.000000	
75	RL	5.166667	1924.333333	1975.166667	0.000000	
	RM	6.900000	1905.600000	1977.700000	0.000000	
80	RL	5.896552	1974.275862	1982.155172	128.603448	
85	RL	6.100000	1975.450000	1983.050000	52.550000	
90	RH	5.666667	1957.333333	1959.000000	247.666667	
	RL	4.860465	1967.162791	1970.767442	91.930233	
	RM	5.000000	1972.166667	1972.333333	179.333333	
120	FV	5.000000	2004.000000	2004.600000	15.000000	
	RH	5.000000	1998.000000	1998.500000	91.000000	
	RL	5.033898	1998.152542	1998.525424	93.542373	
	RM	5.095238	2000.333333	2000.476190	190.238095	
160	FV	5.000000	2002.363636	2002.636364	230.090909	
	RL	5.545455	1985.636364	1985.818182	28.909091	
	RM	5.266667	1976.800000	1979.300000	175.600000	
180	RM	5.800000	1981.200000	1984.500000	24.200000	
190	C (all)	6.000000	1910.000000	1998.000000	0.00000	
	RH	7.500000	1915.000000	1995.000000	0.00000	
	RL	5.312500	1938.687500	1970.062500	29.375000	
	RM	6.181818	1917.090909	1967.272727	0.000000	
		BsmtFinSF1	BsmtFinSF2		WoodDeckSF	\
MSSubClass	MG7oning	DSIIICFIIISFI	DSIIICF THOF Z	• • •	WOOdDeckSr	\
mssubclass 20	C (all)	25.000000	0.00000	• • •	0.000000	
20	FV	390.692308	0.000000	• • •	56.000000	
	r v RH	565.666667	0.000000	• • •	223.666667	
	RL	577.446850	73.125984	• • •	99.848425	
	RM	159.200000	142.200000	• • •	41.400000	
30	C (all)	247.500000	0.000000	• • •	0.000000	
30	RH	544.000000	0.000000	• • •	0.000000	
	RL	193.575758	18.363636	• • •	53.636364	
	RM	167.666667	17.878788	• • •	17.3030304	
40	RL	816.500000	0.000000	• • •	134.000000	
40	RM	185.00000	0.000000	• • •	0.000000	
45	RH	0.000000	0.000000	• • •	0.000000	
40	RL	55.000000	0.000000	• • •	0.000000	
	RM	145.142857	0.000000	• • •	6.857143	
ΕO	C (all)	159.250000	0.000000	• • •	24.500000	
50				• • •		
	RH	182.000000	0.000000	• • •	0.000000	
	RL DM	270.125000	40.034091	• • •	76.204545	
60	RM	157.843137	25.078431	• • •	52.549020	
60	FV	274.600000	0.000000	• • •	90.720000	
	RL	457.333333	30.534799	• • •	135.868132	
	RM	0.000000	0.000000		0.000000	

70	C (all)	0.000000	0.000000		0.000000	
	RH	235.666667	0.000000		49.000000	
	RL	273.400000	12.000000		74.866667	
	RM	77.346154	0.000000		35.423077	
75	RL	383.500000	30.666667		66.333333	
	RM	70.900000	0.000000		44.700000	
80	RL	486.068966	85.810345		127.258621	
85	RL	720.900000	53.400000		95.900000	
90	RH	256.000000	0.00000		0.000000	
	RL	387.930233	20.255814		44.720930	
	RM	613.500000	118.666667		25.833333	
120	FV	679.800000	0.00000		50.600000	
	RH	425.000000	69.500000		132.000000	
	RL	527.084746	55.220339		127.372881	
	RM	831.619048	0.00000		134.857143	
160	FV	271.363636	0.000000		21.545455	
	RL	405.818182	81.090909		100.818182	
	RM	216.466667	43.000000		97.200000	
180	RM	436.800000	97.900000		30.400000	
190	C (all)	1046.000000	0.00000		0.000000	
	RH	128.000000	0.00000		0.000000	
	RL	707.562500	20.500000		122.500000	
	RM	90.636364	0.00000		36.090909	
		OpenPorchSF	EnclosedPorch	3SsnPorch	ScreenPorch	\
MSSubClass	s MSZoning					
20	C (all)	0.000000	0.000000	0.000000	0.000000	
	FV	130.769231	0.000000	0.000000	0.000000	
	RH	14.000000	8.000000	0.000000	0.000000	
	RL	40.791339	12.446850	5.535433	16.494094	
	RM	48.300000	27.000000	0.000000	0.000000	
30	C (all)	271.500000	57.500000	0.000000	0.000000	
	RH	0.000000	286.000000	0.000000	0.000000	
	RL	14.181818	49.090909	0.000000	5.030303	
	RM	26.030303	66.545455	0.000000	3.636364	
40	RL	14.000000	0.000000	0.000000	0.000000	
	RM	0.000000	91.500000	0.000000	0.000000	
45	RH	0.000000	91.000000	0.000000	0.000000	
	RL	0.000000	28.000000	0.000000	0.000000	
	RM	16.000000	112.285714	0.000000	0.000000	
50	C (all)	11.750000	134.500000	0.000000	0.000000	
	RH	0.000000	56.000000	0.000000	0.000000	
	RL	21.670455	42.215909	6.863636	23.761364	
	RM	36.745098	57.588235	0.000000	20.196078	
60					7 000000	
	FV	106.320000	0.000000	0.000000	7.920000	
	FV RL	106.320000 78.417582	0.000000 9.128205	0.000000 3.717949	7.920000 17.820513	
70	RL	78.417582	9.128205	3.717949	17.820513	

	RH	64.00000	0 84.66	6667 0 0	00000	0.000000
	RL	24.06666				5.700000
	RM	46.76923				5.461538
75	RL	58.50000				1.000000
70	RM	174.80000				1.000000
80	RL	30.82758				5.965517
85	RL	22.10000				9.600000
90	RH	0.00000				0.000000
	RL	15.97674				0.000000
	RM	0.00000				0.000000
120	FV	132.80000				0.000000
	RH	54.00000				0.00000
	RL	43.71186				0.694915
	RM	58.619048	0.00	0000 7.2	B5714 14	1.666667
160	FV	77.45454		0000 0.00	00000	0.000000
	RL	13.090909	9 0.00	0000 0.00	00000	0.000000
	RM	15.13333	0.00	0000 0.00	00000	0.000000
180	RM	22.50000	0.00	0000 0.00	00000	0.000000
190	C (all)	0.00000	0.00	0000 0.00	00000 99	9.000000
	RH	55.00000	114.00	0000 0.00	00000	0.000000
	RL	44.50000	22.37	5000 0.00	00000	0.00000
	RM	12.90909	1 76.72	7273 0.0	00000 24	1.636364
		D 14	W: 17.3	W G 7.1	v. c	7.1
MCCubCload	MCZoning	PoolArea	MiscVal	MoSold	YrSo	old \
MSSubClass	•	0 000000	07 000000	0.00000	2008 2006	200
20	C (all) FV	0.000000	27.000000	8.000000 7.307692	2008.0000	
	r v RH	0.000000	0.000000	9.000000	2007.9230	
	RL	1.275591	56.358268	6.204724	2007.0000	
	RM	0.000000	0.000000	5.700000	2007.8700	
30	C (all)	0.000000	280.000000	9.500000	2008.5000	
30	RH	0.000000	0.000000	5.000000	2007.0000	
	RL	0.000000	25.757576	6.000000	2007.0000	
	RM	0.000000	32.424242	5.606061	2007.6363	
40	RL	0.000000	0.000000	6.500000	2009.5000	
10	RM	0.000000	300.000000	9.000000	2007.5000	
45	RH	0.000000	0.000000	10.000000	2009.0000	
10	RL	0.000000	0.000000	5.250000	2007.2500	
	RM	0.000000	0.000000	6.428571	2007.2857	
50	C (all)	0.000000	0.000000	6.000000	2008.7500	
	RH	0.000000	0.000000	7.000000	2009.0000	
	RL	0.000000	65.909091	6.113636	2007.8068	
	RM	0.000000	53.921569	6.450980	2007.8039	
60	FV	0.000000	0.000000	6.720000	2008.0400	
				6.446886	2007.6959	
	RL	5.692308	20.073260	0.440000		<i>/</i> / 1
	RL RM	5.692308 0.000000	0.000000	9.000000	2009.0000	
70						000
70	RM	0.000000	0.000000	9.000000	2009.0000	000

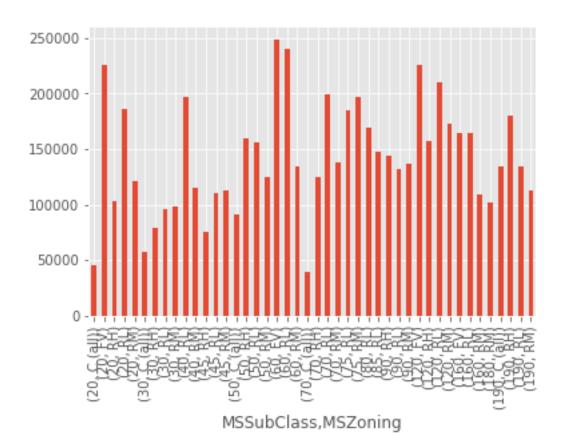
	RL	0.000000	83.333333	6.866667	2007.800000
	RM	0.000000	0.000000	7.038462	2007.769231
75	RL	85.333333	0.000000	6.000000	2007.500000
	RM	0.000000	0.000000	6.600000	2007.500000
80	RL	22.655172	20.689655	6.810345	2007.810345
85	RL	0.000000	20.000000	5.550000	2008.150000
90	RH	0.000000	0.000000	8.666667	2007.000000
	RL	0.000000	218.604651	6.604651	2007.790698
	RM	0.000000	0.000000	7.666667	2008.333333
120	FV	0.000000	0.000000	5.400000	2007.200000
	RH	0.000000	0.000000	7.000000	2007.500000
	RL	0.000000	0.000000	6.847458	2007.915254
	RM	0.000000	0.000000	5.809524	2007.714286
160	FV	0.000000	0.000000	5.363636	2007.727273
	RL	0.000000	0.000000	6.636364	2008.454545
	RM	0.000000	0.000000	5.466667	2007.633333
180	RM	0.000000	0.000000	6.800000	2007.800000
190	C (all)	0.000000	0.000000	11.000000	2007.000000
	RH	0.000000	0.000000	5.000000	2006.500000
	RL	0.000000	43.750000	5.000000	2007.625000
	RM	0.000000	318.181818	5.636364	2008.000000

SalePrice

MSSubClass	t MSZoning	
20	C (all)	45652.000000
	FV	226289.538462
	RH	102966.666667
	RL	186467.039370
	RM	121327.500000
30	C (all)	57950.000000
	RH	79000.000000
	RL	96481.212121
	RM	97983.969697
40	RL	196500.000000
	RM	115750.000000
45	RH	76000.000000
	RL	110050.000000
	RM	112414.285714
50	C (all)	91044.000000
	RH	159434.000000
	RL	156277.477273
	RM	124698.039216
60	FV	248558.600000
	RL	239544.457875
	RM	135000.000000
70	C (all)	40000.000000
	RH	124533.333333
	RL	199808.733333

```
RM
                      138403.192308
75
           RL
                      184750.000000
           RM
                      197050.000000
80
           RL
                      169736.551724
           RL
                      147810.000000
85
           RH
90
                      144666.666667
           RL
                      132379.906977
           RM
                      136300.000000
120
           F۷
                      226140.000000
           RH
                      157000.000000
           RL
                      210029.491525
           RM
                      172920.952381
160
           F۷
                      164749.318182
           RL
                      164909.090909
           RM
                      109876.666667
180
           RM
                      102300.000000
190
           C (all)
                      133900.000000
           RH
                      180000.000000
           RL
                      134662.500000
           RM
                      112718.181818
```

[44 rows x 37 columns]



In [11]: test_df.head()

Out[11]:		Id N	(ISSubC	Lass	MSZoning	g Lo	tFronta	age	Lot	Area	Stree	t A	Alley	LotSha	ре	\	
	0	1		60	R	_	65	5.0		8450	Pav	e	NaN	R	leg		
	1	2		20	R		80	0.0		9600	Pav	e	NaN	R	leg		
	2	3		60	R		68	3.0	1	1250	Pav	e	NaN	I	R1		
	3	4		70	R		60	0.0		9550	Pav	e	NaN	I	R1		
	4	5		60	R		84	4.0	1	4260	Pav	e	NaN	I	R1		
		LandCo	ontour	Uti	lities		Po	oolA	rea	PoolQ	C Fen	се	MiscF	eature	Mi	scVal	/
	0		Lvl	1	AllPub				0	Na	.N N	aN		NaN	I	0	
	1		Lvl	1	AllPub				0	Na	.N N	aN		NaN	I	0	
	2		Lvl	1	AllPub				0	Na	.N N	aN		NaN	I	0	
	3		Lvl	1	AllPub				0	Na	.N N	aN		NaN	I	0	
	4		Lvl	I	AllPub				0	Na	.N N	aN		NaN	I	0	
		Mogola	d YrSol	14 (SaleType	951	oCondit	tion	g	lePri	60						
	^				0.1	Sal			ъa								
	0	_	2 200		WD			rmal		2085							
	1	ξ	5 200)7	WD		Noi	rmal		1815	00						
	2	ç	200	80	WD		Noi	rmal		2235	00						

3	2	2006	WD	Abnorml	140000
4	12	2008	WD	Normal	250000

[5 rows x 81 columns]

In [13]: test_df.groupby(['PoolArea','PoolQC']).head(80)

Out[13]:	Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	LotShape	\
0	1	60	RL	65.0	8450	Pave	NaN	Reg	
1	2	20	RL	80.0	9600	Pave	NaN	Reg	
2	3	60	RL	68.0	11250	Pave	NaN	IR1	
3	4	70	RL	60.0	9550	Pave	NaN	IR1	
4	5	60	RL	84.0	14260	Pave	NaN	IR1	
5	6	50	RL	85.0	14115	Pave	NaN	IR1	
6	7	20	RL	75.0	10084	Pave	NaN	Reg	
7	8	60	RL	NaN	10382	Pave	NaN	IR1	
8	9	50	RM	51.0	6120	Pave	NaN	Reg	
9	10	190	RL	50.0	7420	Pave	NaN	Reg	
10	11	20	RL	70.0	11200	Pave	NaN	Reg	
11	12	60	RL	85.0	11924	Pave	NaN	IR1	
12	13	20	RL	NaN	12968	Pave	NaN	IR2	
13	14	20	RL	91.0	10652	Pave	NaN	IR1	
14	15	20	RL	NaN	10920	Pave	NaN	IR1	
15	16	45	RM	51.0	6120	Pave	NaN	Reg	
16	17	20	RL	NaN	11241	Pave	NaN	IR1	
17	18	90	RL	72.0	10791	Pave	NaN	Reg	
18	19	20	RL	66.0	13695	Pave	NaN	Reg	
19	20	20	RL	70.0	7560	Pave	NaN	Reg	
20	21	60	RL	101.0	14215	Pave	NaN	IR1	
21	22	45	RM	57.0	7449	Pave	Grvl	Reg	
22	23	20	RL	75.0	9742	Pave	NaN	Reg	
23	24	120	RM	44.0	4224	Pave	NaN	Reg	
24	25	20	RL	NaN	8246	Pave	NaN	IR1	
25	26	20	RL	110.0	14230	Pave	NaN	Reg	
26	27	20	RL	60.0	7200	Pave	NaN	Reg	
27	28	20	RL	98.0	11478	Pave	NaN	Reg	
28	29	20	RL	47.0	16321	Pave	NaN	IR1	
29	30	30	RM	60.0	6324	Pave	NaN	IR1	
• • •	• • •		• • •					• • •	
57	58	60	RL	89.0	11645	Pave	NaN	IR1	
58	59	60	RL	66.0	13682	Pave	NaN	IR2	
59	60	20	RL	60.0	7200	Pave	NaN	Reg	
60	61	20	RL	63.0	13072	Pave	NaN	Reg	
61	62	75	RM	60.0	7200	Pave	NaN	Reg	
62	63	120	RL	44.0	6442	Pave	NaN	IR1	
63	64	70	RM	50.0	10300	Pave	NaN	IR1	
64	65	60	RL	NaN	9375	Pave	NaN	Reg	
65	66	60	RL	76.0	9591	Pave	NaN	Reg	

66	67	20	RL	NaN	19900	Pave	NaN	Reg
67	68	20	RL	72.0	10665	Pave	NaN	IR1
68	69	30	RM	47.0	4608	Pave	NaN	Reg
69	70	50	RL	81.0	15593	Pave	NaN	Reg
70	71	20	RL	95.0	13651	Pave	NaN	IR1
71	72	20	RL	69.0	7599	Pave	NaN	Reg
72	73	60	RL	74.0	10141	Pave	NaN	IR1
73	74	20	RL	85.0	10200	Pave	NaN	Reg
74	75	50	RM	60.0	5790	Pave	NaN	Reg
75	76	180	RM	21.0	1596	Pave	NaN	Reg
76	77	20	RL	NaN	8475	Pave	NaN	IR1
77	78	50	RM	50.0	8635	Pave	NaN	Reg
78	79	90	RL	72.0	10778	Pave	NaN	Reg
79	80	50	RM	60.0	10440	Pave	Grvl	Reg
197	198	75	RL	174.0	25419	Pave	NaN	Reg
810	811	20	RL	78.0	10140	Pave	NaN	Reg
1170	1171	80	RL	76.0	9880	Pave	NaN	
1182	1171	60		160.0				Reg
			RL		15623	Pave	NaN N-N	IR1
1298	1299	60	RL	313.0	63887	Pave	NaN	IR3
1386	1387	60	RL	80.0	16692	Pave	NaN	IR1
1423	1424	80	RL	NaN	19690	Pave	NaN	IR1
	LandContour	Utilities		PoolArea	PoolQC	Fence	MiscFea	ature \
0	Lvl			0	NaN	NaN		NaN
1	Lvl			0	NaN	NaN		NaN
2	Lvl			0	NaN	NaN		NaN
3	Lvl			0	NaN	NaN		NaN
4	Lvl			0	NaN	NaN		NaN
5	Lvl			0	NaN	MnPrv		Shed
6	Lvl			0	NaN	NaN		NaN
7	Lvl		• • •	0	NaN	NaN		Shed
8	Lvl		• • •	0	NaN	NaN		NaN
9	Lvl		• • •	0	NaN	NaN		NaN
10	Lvl		• • •	0	NaN	NaN		NaN
11	Lvl		• • •	0	NaN	NaN		NaN
12	Lvl		• • •	0	NaN	NaN		NaN
13	Lvl		• • •	0	NaN	NaN		NaN
14	Lvl		• • •	0	NaN	GdWo		NaN
15			• • •			GdPrv		
	Lvl		• • •	0	NaN NaN			NaN
16	Lvl		• • •	0	NaN NaN	NaN NaN		Shed
17	Lvl		• • •	0	NaN NaN	NaN NaN		Shed
18	Lvl		• • •	0	NaN N-N	NaN M D		NaN NaN
19	Lvl		• • •	0	NaN	MnPrv		NaN
20	Lvl		• • •	0	NaN	NaN		NaN
21	Bnk		• • •	0	NaN	GdPrv		NaN
22	Lvl		• • •	0	NaN	NaN		NaN
23	Lvl			0	NaN	NaN		NaN
24	Lvl	AllPub		0	NaN	${ t MnPrv}$		NaN

25		Lvl	AllPub		0	NaN	NaN	NaN
26		Lvl	AllPub		0	NaN	NaN	NaN
27		Lvl	AllPub		0	NaN	NaN	NaN
28		Lvl	AllPub		0	NaN	NaN	NaN
29		Lvl	AllPub		0	NaN	NaN	NaN
57		Lvl	AllPub		0	NaN	NaN	NaN
58		HLS	AllPub		0	NaN	NaN	NaN
59		Bnk	AllPub		0	NaN	MnPrv	NaN
60		Lvl	AllPub		0	NaN	NaN	NaN
61		Lvl	AllPub		0	NaN	NaN	NaN
62		Lvl	AllPub		0	NaN	NaN	NaN
63		Bnk	AllPub		0	NaN	GdPrv	NaN
64		Lvl	AllPub		0	NaN	GdPrv	NaN
65		Lvl	AllPub		0	NaN	NaN	NaN
66		Lvl	AllPub		0	NaN	NaN	NaN
67		Lvl	AllPub		0	NaN	NaN	NaN
68		Lvl	AllPub		0	NaN	NaN	NaN
69		Lvl	AllPub		0	NaN	NaN	NaN
70		Lvl	AllPub		0	NaN	NaN	NaN
71		Lvl	AllPub	• • •	0	NaN	NaN	NaN
72		Lvl	AllPub	• • •	0	NaN	NaN	NaN
73		Lvl	AllPub	• • •	0	NaN	GdWo	NaN
74		Lvl	AllPub	• • •	0	NaN	NaN	NaN
75		Lvl	AllPub	• • •	0	NaN	GdWo	NaN
76		Lvl	AllPub	• • •	0	NaN	NaN	NaN
77		Lvl	AllPub	• • •	0	NaN	MnPrv	NaN
78		Lvl	AllPub	• • •	0	NaN	NaN	NaN
79		Lvl	AllPub	• • •	0	NaN	MnPrv	NaN
197		Lvl	AllPub	• • •	512	Ex	GdPrv	NaN
810		Lvl	AllPub	• • •	648	Fa	GdPrv	NaN
1170		Lvl	AllPub	• • •	576	Gd	GdPrv	NaN
1182		Lvl	AllPub	• • •	555	Ex		NaN
				• • •		Gd		
1298 1386		Bnk Lvl	AllPub AllPub	• • •	480 519	Fa		NaN TenC
				• • •				
1423		Lvl	AllPub	• • •	738	Gd	GdPrv	NaN
	MiscVal	MoSold	VrSold	SaleTune	SaleCondi	tion (SalaPrica	
0	niscvai 0	2		WD		rmal	208500	
1	0	5	2003	WD WD		rmal	181500	
2	0	9	2007	WD WD		rmal		
							223500	
3	0	2	2006	WD		orml	140000	
4	700	12	2008	WD		rmal	250000	
5	700	10	2009	WD		rmal	143000	
6	0	8	2007	WD		rmal	307000	
7	350	11	2009	WD		rmal	200000	
8	0	4		WD		orml	129900	
9	0	1	2008	WD	No:	rmal	118000	

10	0	2	2008	L/D	Normal	120500
10 11	0 0	7	2008 2006	WD New	Normal Partial	129500 345000
12	0	9	2008	WD	Normal	144000
13	0	8	2007	New	Partial	279500
14	0	5	2007	WD	Normal	157000
15	0	7	2007	WD	Normal	132000
16	700	3	2010	WD	Normal	149000
17	500	10	2016	WD	Normal	90000
18	0	6	2008	WD Normal		159000
19	0	5	2009	COD	Abnorml	139000
20	0	11	2006	New	Partial	325300
21	0	6	2007	WD	Normal	139400
22	0	9	2007	WD	Normal	230000
23	0	6	2007	WD	Normal	129900
24	0	5	2010	WD	Normal	154000
25	0	7	2009	WD	Normal	256300
26	0	5	2010	WD	Normal	134800
27	0	5	2010	WD	Normal	306000
28	0	12	2006	WD	Normal	207500
29	0	5	2008	WD	Normal	68500
	V	O		· · ·		00000
57	0	8	2006	WD	Normal	196500
58	0	10	2006	New	Partial	438780
59	0	1	2008	WD	Normal	124900
60	0	5	2006	New	Partial	158000
61	0	3	2007	WD	Normal	101000
62	0	10	2007	WD	Normal	202500
63	0	4	2010	WD	Normal	140000
64	0	2	2009	WD	Normal	219500
65	0	10	2007	WD	Normal	317000
66	0	7	2010	WD	Normal	180000
67	0	6	2007	WD	Normal	226000
68	0	6	2010	WD	Normal	80000
69	0	7	2006	WD	Normal	225000
70	0	2	2007	WD	Normal	244000
71	0	6	2007	WD	Normal	129500
72	0	12	2009	WD	Normal	185000
73	0	5	2010	WD	Normal	144900
74	0	5	2010	WD	Normal	107400
75	0	11	2009	WD	Normal	91000
76	0	4	2008	WD	Normal	135750
77	0	1	2008	WD	Normal	127000
78	0	4	2010	WD	Normal	136500
79	0	5	2009	WD	Normal	110000
197	0	3	2006	WD	Abnorml	235000
810	0	1	2006	WD	Normal	181000
1170	0	7	2008	WD	Normal	171000
1182	0	7	2007	WD	Abnorml	745000

1298	0	1	2008	New	Partial	160000
1386	2000	7	2006	WD	Normal	250000
1423	0	8	2006	WD	Alloca	274970

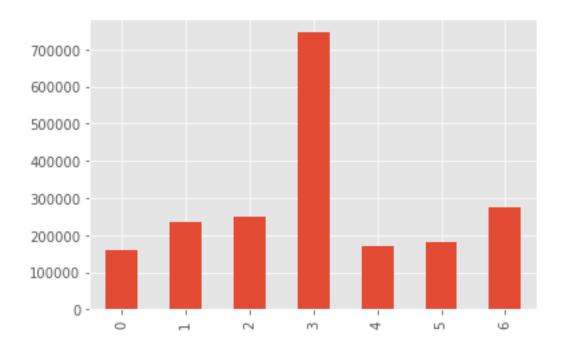
[87 rows x 81 columns]

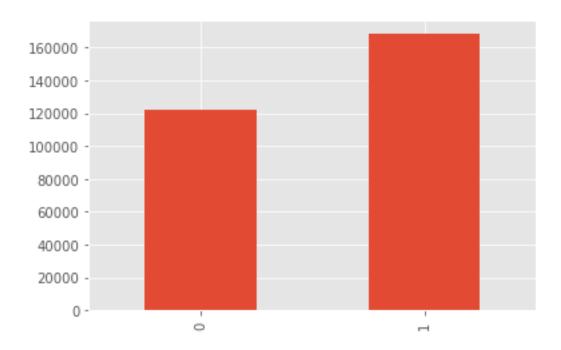
In [15]: test_df.groupby(['PoolArea', 'PoolQC']).mean()

Out[15]:			Id	MSSubCla	ass LotFr	ontage	LotArea	overall(Qual \		
	PoolArea	PoolQC				J			•		
	480	Gd	1299		60	313.0	63887	•	10		
	512	Ex	198		75	174.0	25419)	8		
	519	Fa	1387		60	80.0	16692	2	7		
	555	Ex	1183		60	160.0	15623	3	10		
	576	Gd	1171		80	76.0	9880)	6		
	648	Fa	811		20	78.0	10140)	6		
	738	Gd	1424		80	NaN	19690)	6		
			Overa	llCond Y	YearBuilt	YearRe	modAdd	MasVnrArea	a Bsmt	FinSF1	\
	PoolArea	PoolQC									
	480	Gd		5	2008		2008	796.0)	5644	
	512	Ex		4	1918		1990	0.0)	1036	
	519	Fa		5	1978		1978	184.0)	790	
	555	Ex		5	1996		1996	0.0)	2096	
	576	Gd		6	1977		1977	0.0)	522	
	648	Fa		6	1974		1999	99.0)	663	
	738	Gd		7	1966		1966	0.0)	0	
				Gai	rageArea	WoodDec	kSF Ope	nPorchSF	\		
	PoolArea	$P \cap 1 \cap C$							•		
	I COLIII CU	TOOTWO							•		
	480	Gd			1418		214	292	•		
					1418 795		214		•		
	480	Gd						292			
	480 512	Gd Ex			795		0	292 16			
	480 512 519	Gd Ex Fa			795 564		0	292 16 112			
	480 512 519 555	Gd Ex Fa Ex			795 564 813		0 0 171	292 16 112 78			
	480 512 519 555 576	Gd Ex Fa Ex Gd			795 564 813 358		0 0 171 203	292 16 112 78 0			
	480 512 519 555 576 648	Gd Ex Fa Ex Gd Fa		sedPorch	795 564 813 358 484	h Scre	0 0 171 203 265 586	292 16 112 78 0 0 236	MoSold	\	
	480 512 519 555 576 648 738	Gd Ex Fa Ex Gd Fa Gd		sedPorch	795 564 813 358 484 432	h Scre	0 0 171 203 265 586 eenPorch	292 16 112 78 0 0 236 MiscVal		\	
	480 512 519 555 576 648 738 PoolArea 480	Gd Ex Fa Ex Gd Fa Gd PoolQC Gd		0	795 564 813 358 484 432 3SsnPorc	0	0 0 171 203 265 586 eenPorch	292 16 112 78 0 0 236 MiscVal	MoSold		
	480 512 519 555 576 648 738 PoolArea 480 512	Gd Ex Fa Ex Gd Fa Gd PoolQC Gd Ex		0 552	795 564 813 358 484 432 3SsnPorc	0 0	0 0 171 203 265 586 eenPorch	292 16 112 78 0 0 236 MiscVal	MoSold 1 3		
	480 512 519 555 576 648 738 PoolArea 480 512 519	Gd Ex Fa Ex Gd Fa Gd PoolQC Gd Ex Fa		0 552 0	795 564 813 358 484 432 3SsnPorc	0	0 0 171 203 265 586 eenPorch 0 0 440	292 16 112 78 0 0 236 MiscVal	MoSold 1 3 7		
	480 512 519 555 576 648 738 PoolArea 480 512 519 555	Gd Ex Fa Ex Gd Fa Gd PoolQC Gd Ex Fa Ex		0 552	795 564 813 358 484 432 3SsnPorc	0 0 0 0	0 0 171 203 265 586 eenPorch	292 16 112 78 0 0 236 MiscVal 0 0 2000 0	MoSold 1 3 7 7		
	480 512 519 555 576 648 738 PoolArea 480 512 519 555 576	Gd Ex Fa Ex Gd Fa Gd PoolQC Gd Ex Fa Ex Gd		0 552 0	795 564 813 358 484 432 3SsnPorc	0 0 0	0 0 171 203 265 586 eenPorch 0 0 440	292 16 112 78 0 0 236 MiscVal	MoSold 1 3 7		
	480 512 519 555 576 648 738 PoolArea 480 512 519 555	Gd Ex Fa Ex Gd Fa Gd PoolQC Gd Ex Fa Ex		0 552 0	795 564 813 358 484 432 3SsnPorc	0 0 0 0	0 0 171 203 265 586 eenPorch 0 440 0	292 16 112 78 0 0 236 MiscVal 0 0 2000 0	MoSold 1 3 7 7		

YrSold SalePrice PoolArea PoolQC Gd Ex Fa Ex Gd Fa Gd

[7 rows x 37 columns]



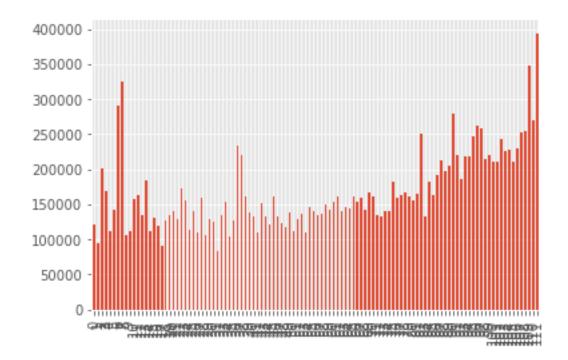


```
In [18]: pool_class = test_df.groupby('Alley',as_index=False).mean()
In [19]: test_df.groupby('Alley',as_index=False).mean()
                         Id MSSubClass LotFrontage
Out [19]:
          Alley
                                                        LotArea OverallQual \
        0 Grvl 735.900000
                              63.900000
                                          61.744681 8932.500000
                                                                    5.180000
        1 Pave 726.390244 102.804878
                                          46.666667 5953.121951
                                                                    6.414634
           OverallCond
                         YearBuilt YearRemodAdd MasVnrArea
              6.260000 1919.740000
                                    1972.520000
                                                      17.500
        1
              5.439024 1968.317073
                                     1993.780488
                                                     133.175
           WoodDeckSF
                       OpenPorchSF EnclosedPorch 3SsnPorch ScreenPorch PoolArea \
            50.520000
                         52.620000
                                       75.060000
                                                        0.0
                                                                9.600000
                                                                              0.0
        1 23.902439
                         75.853659
                                                        0.0
                                       51.341463
                                                               10.195122
                                                                              0.0
           MiscVal
                   MoSold
                                 YrSold
                                             SalePrice
              58.0 6.26000 2007.660000 122219.080000
               0.0 5.97561 2007.804878 168000.585366
        [2 rows x 39 columns]
In [20]: test_df.groupby('Alley',as_index=False).count()
Out[20]: Alley Id MSSubClass MSZoning LotFrontage LotArea Street LotShape \
        0 Grvl 50
                                      50
                                                   47
                                                                             50
                            50
                                                            50
                                                                   50
```

```
41
                                 41
                                                                 41
                                                                            41
1 Pave 41
                                               39
                                                        41
                                        PoolArea
   LandContour
                Utilities
                                                   PoolQC Fence MiscFeature
0
             50
                        50
                                               50
                                                         0
                                                               14
1
                                               41
                                                         0
                                                                4
                                                                              0
             41
                        41
   MiscVal
            MoSold
                     YrSold
                              SaleType
                                        SaleCondition
                                                        SalePrice
        50
                 50
                                    50
0
                         50
                                                    50
1
        41
                 41
                         41
                                    41
                                                    41
                                                                41
```

[2 rows x 81 columns]

In []: test_df.groupby('Alley',as_index=False).count()

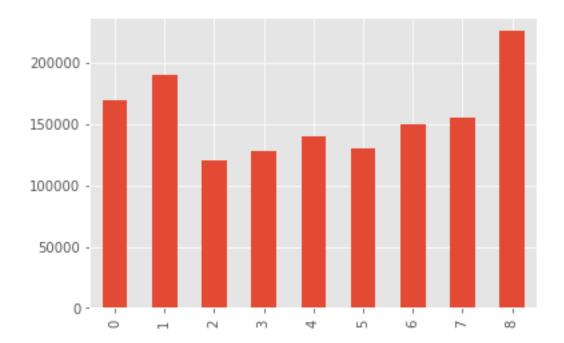


In [22]: test_df.YearBuilt.min(axis=0)

Out[22]: 1872

In [23]: test_df.YearBuilt.max(axis=0)

Out[23]: 2010



In [26]: year_class

Out[26]:	Id	MSSubClass	LotFrontage	LotArea	OverallQual	\
0	899.571429	67.857143	73.857143	11178.428571	6.571429	
1	757.500000	79.375000	74.125000	11613.750000	6.250000	
2	746.111111	98.055556	64.833333	9507.777778	5.027778	
3	747.416667	53.583333	60.926606	8879.950000	5.316667	
4	679.453488	55.174419	61.026316	8541.081395	5.418605	
5	741.195312	42.343750	69.617391	10376.312500	4.945312	
6	730.517241	39.406130	78.958763	13152.057471	5.287356	
7	751.856502	70.493274	62.018750	10000.964126	5.623318	
8	696.726619	59.532374	75.900000	11552.172662	6.769784	
	OverallCond	YearBuilt	YearRemodA	dd MasVnrArea	BsmtFinSF1	\
0	6.857143	1878.428571	1987.8571	43 0.000000	67.857143	
1	6.750000	1890.625000	1982.7500	0.000000	136.000000	
2	6.305556	1906.888889	1979.0000	0.000000	136.138889	
3	6.066667	1920.450000	1970.4583	33 0.900000	186.608333	

```
4
      6.337209 1934.674419
                              1970.279070
                                             34.941860 205.337209
5
      5.695312
               1949.093750
                                            39.859375 310.671875
                              1966.835938
6
      5.796935
                1961.555556
                              1973.356322
                                             94.588462
                                                        499.766284
7
      5.793722
                1974.596413
                              1978.878924 109.825112 547.587444
8
      5.302158
               1991.273381
                                            124.719424
                                                        661.582734
                              1992.841727
                  WoodDeckSF
                              OpenPorchSF
                                           EnclosedPorch
                                                           3SsnPorch \
       . . .
                                                            0.00000
0
                   69.000000
                                38.714286
                                               125.000000
       . . .
1
                   24.125000
                               156.625000
                                                62.625000
                                                            0.00000
2
                   98.916667
                                57.444444
                                                66.972222
                                                            0.00000
       . . .
3
                                36.025000
                                                97.675000
                                                            2.366667
                   36.833333
4
                   54.755814
                                15.453488
                                                38.616279
                                                            0.00000
5
                   43.101562
                                20.421875
                                                24.812500
                                                            2.953125
6
                   74.310345
                                36.141762
                                                19.463602
                                                            4.417625
7
                                                 7.103139
                  116.766816
                                34.278027
                                                            1.551570
       . . .
8
                  157.820144
                                56.136691
                                                20.251799
                                                           11.597122
   ScreenPorch PoolArea
                            MiscVal
                                       MoSold
                                                     YrSold
                                                                 SalePrice
0
      0.000000
               0.000000
                           0.000000
                                    7.000000
                                               2008.142857
                                                             169497.000000
1
     51.250000
               0.000000
                          56.250000
                                     8.000000
                                                2008.125000
                                                             190050.000000
     12.277778
                                     5.972222
2
                0.000000
                           0.000000
                                                2007.722222
                                                            120531.388889
3
     15.391667
                4.266667
                          34.750000
                                     6.216667
                                                2007.733333 128200.766667
4
    14.337209
                0.000000
                          85.000000
                                     6.360465
                                                2007.837209
                                                            139340.174419
5
     9.250000
               0.000000
                          51.203125
                                     6.273438
                                                2007.859375
                                                             130376.007812
6
     28.678161
                2.827586
                          96.283525
                                     6.402299
                                                2007.854406
                                                            150078.130268
7
     15.008969
                          61.883408
                                     6.044843
                                                2007.923767
                                                             155487.381166
                7.816143
     13.187050
               3.992806
                          26.474820 6.453237
                                                2007.812950
                                                             225521.007194
```

[9 rows x 38 columns]

Out[28]:	YearBuilt	Id	MSSubClass	LotFrontage	${ t LotArea}$	\
0	1872	1350.000000	70.000000	50.000000	5250.000000	
1	1875	1138.000000	50.000000	54.000000	6342.000000	
2	1880	704.250000	71.250000	73.000000	12246.500000	
3	1882	992.000000	70.000000	121.000000	17671.000000	
4	1885	762.000000	110.000000	60.000000	11070.000000	
5	1890	831.500000	60.000000	79.000000	9810.000000	
6	1892	739.500000	72.500000	75.000000	14775.000000	
7	1893	584.000000	75.000000	75.000000	13500.000000	
8	1898	810.000000	75.000000	90.000000	8100.000000	
9	1900	690.900000	126.000000	69.400000	9393.900000	
10	1904	842.000000	70.000000	60.000000	10440.000000	
11	1905	1394.000000	190.000000	60.000000	10800.000000	
12	1906	654.000000	50.000000	60.000000	10320.000000	
13	1908	517.000000	50.000000	83.500000	26519.000000	

4.4	4040	700 005004	05 004440	00 047050	0100 001110
14	1910	789.235294	85.294118	60.647059	8106.294118
15	1911	1235.000000	70.000000	55.000000	8525.000000
16	1912	458.333333	113.333333	69.000000	5803.666667
17	1913	439.000000	30.000000	40.000000	4280.000000
18	1914	927.428571	77.142857	57.285714	9210.000000
19	1915	495.200000	60.000000	68.400000	9134.900000
20	1916	854.625000	71.250000	51.800000	8121.875000
21	1917	1249.000000	75.000000	60.000000	9600.000000
22	1918	689.571429	50.714286	80.166667	17302.142857
23	1919	886.000000	56.666667	65.000000	10551.000000
24	1920	748.333333	55.000000	61.642857	8349.666667
25	1921	681.333333	46.666667	57.500000	8763.833333
26	1922	1001.500000	39.375000	59.000000	7805.500000
27	1923	727.857143	47.142857	75.428571	11360.857143
28	1924	599.000000	43.571429	54.571429	7628.714286
29	1925	709.437500	50.000000	54.071429	7446.312500
82	1981	593.000000	20.000000	75.333333	20235.200000
83	1982	604.500000	41.666667	67.800000	7517.500000
84	1983	508.750000	43.750000	75.000000	9894.750000
85	1984	684.333333	71.111111	62.333333	8885.111111
86	1985	769.800000	68.000000	77.000000	8513.800000
87	1986	671.600000	76.000000	59.666667	10461.400000
88	1987	536.000000	90.000000	52.666667	9972.333333
89	1988	517.818182	57.272727	93.250000	11843.454545
90	1989	467.000000	66.66667	62.000000	16755.000000
91	1990	784.750000	50.000000	85.55556	11576.500000
92	1991	893.200000	48.000000	95.666667	11566.600000
93	1992	790.615385	61.153846	75.714286	13347.000000
94	1993	530.470588	73.529412	67.538462	9724.176471
95	1994	852.000000	43.157895	76.937500	13492.736842
96	1995	741.777778	56.111111	78.642857	11953.888889
97	1996	668.000000	61.666667	75.769231	11584.400000
98	1997	489.857143	56.428571	74.545455	10778.714286
99			67.200000		
	1998	714.240000		62.666667	10135.040000
100	1999	774.560000	90.400000	57.190476	7747.240000
101	2000	783.916667	78.333333	69.818182	8198.833333
102	2001	709.100000	48.000000	70.000000	10407.500000
103	2002	832.608696	43.478261	79.200000	10723.260870
104	2003	674.177778	67.222222	67.842105	9658.533333
105	2004	642.796296	69.259259	68.787234	8526.259259
106	2005	791.718750	73.437500	66.562500	9304.546875
107	2006	779.179104	51.940299	76.417910	10402.432836
108	2007	692.795918	42.857143	78.224490	10456.306122
109	2008	869.956522	42.608696	92.260870	14081.956522
110	2009	592.22222	52.22222	74.882353	8862.277778
111	2010	379.000000	20.000000	88.000000	11394.000000

	OverallQual	OverallCond	YearRemodAdd	MasVnrArea	BsmtFinSF1	\
0	8.000000	5.000000	1987.000000	0.000000	259.000000	
1	5.000000	8.000000	1996.000000	0.000000	0.000000	
2	6.250000	6.500000	1986.500000	0.000000	0.000000	
3	8.000000	9.000000	1986.000000	0.000000	216.000000	
4	4.000000	6.500000	1972.500000	0.000000	0.000000	
5	6.000000	7.000000	1997.000000	0.000000	544.000000	
6	7.500000	6.500000	1979.000000	0.000000	0.000000	
7	10.000000	9.000000	2000.000000	0.000000	0.000000	
8	5.000000	5.000000	1965.000000	0.000000	0.000000	
9	4.500000	5.800000	1968.900000	0.000000	242.900000	
10	5.000000	8.000000	2002.000000	0.000000	0.000000	
11	6.000000	7.000000	2002.000000	0.000000	0.000000	
12	6.000000	7.000000	1995.000000	0.000000	0.000000	
13	5.500000	8.000000	1994.000000	0.000000	0.000000	
14	5.176471	6.352941	1983.529412	0.000000	133.058824	
15	5.000000	6.000000	1950.000000	0.000000	0.000000	
16	5.000000	5.666667	1966.66667	0.000000	70.000000	
17	5.000000	6.000000	2002.000000	0.000000	365.000000	
18	5.142857	5.428571	1974.571429	0.000000	127.142857	
19	5.100000	5.700000	1968.600000	0.000000	120.100000	
20	5.500000	6.500000	1970.750000	0.000000	45.625000	
21	6.000000	5.000000	1950.000000	0.000000	319.000000	
22	6.142857	6.571429	1977.857143	0.000000	339.142857	
23	5.666667	6.666667	1981.666667	0.000000	0.000000	
24	5.100000	5.866667	1967.300000	0.000000	211.900000	
25	5.333333	6.333333	1970.333333	0.000000	221.500000	
26	4.000000	5.375000	1962.625000	0.000000	135.625000	
27	5.428571	6.428571	1980.571429	0.000000	229.857143	
28	5.285714	6.142857	1958.000000	0.000000	345.142857	
29	5.750000	6.312500	1972.375000	0.000000	202.812500	
82	7.400000	5.800000	1982.200000	234.600000	836.000000	
83	4.833333	6.833333	1993.833333	0.000000	654.166667	
84	6.000000	6.250000	1989.500000	0.000000	706.250000	
85	6.333333	5.666667	1987.888889	8.222222	575.000000	
86	6.600000	5.000000	1985.000000	84.200000	679.800000	
87	7.000000	5.200000	1987.200000	85.400000	501.600000	
88	6.000000	6.000000	1987.333333	24.000000	891.666667	
89	6.818182	5.545455	1991.727273	115.181818	728.272727	
90	7.000000	5.333333	1989.333333	259.333333	968.000000	
91	7.000000	5.166667	1990.500000	99.166667	796.500000	
92	6.600000	5.000000	1991.600000	89.600000	292.000000	
92 93	6.692308	5.153846	1991.800000	47.153846	556.230769	
	6.764706		1993.384615	100.882353		
94 05		5.529412			592.352941	
95 06	6.684211	5.210526	1995.789474	200.842105	776.684211	
96	7.166667	5.111111	1996.222222	245.777778	575.000000	
97	6.866667	5.066667	1996.466667	139.400000	735.800000	

98	6.428571	5.071429	1997.428571	235.428571 6	28.000000	
99	6.960000	5.040000	1998.280000	210.000000 5	01.000000	
100	7.160000	5.080000	1999.600000		01.520000	
101	6.916667	5.000000	2000.083333		36.958333	
102	7.550000	5.050000	2001.500000		00.400000	
103	7.391304	5.000000	2002.173913		58.782609	
104	7.155556	5.022222	2003.377778		82.466667	
105	7.092593	5.000000	2004.462963		66.722222	
106	7.078125	5.000000	2005.531250		90.937500	
107	7.567164	5.000000	2006.313433		33.223881	
108	7.734694	5.081633	2007.306122		00.224490	
100	8.652174	5.000000	2008.304348		31.217391	
110	7.444444	5.000000	2009.222222		76.944444	
111	9.000000	2.000000	2010.000000		45.000000	
111	9.000000	2.00000	2010.000000	350.000000 14	45.000000	
	• • •	WoodDeckSF	OpenPorchSF	EnclosedPorch	3SsnPorch	\
0	• • •	0.000000	54.000000	20.000000	0.000000	•
1		0.000000	0.000000	176.000000	0.000000	
2		120.750000	12.000000	169.750000	0.000000	
3		0.000000	169.000000	0.000000	0.000000	
4		0.000000	0.000000	57.000000	0.000000	
5		24.000000	24.000000	193.500000	0.000000	
6		0.000000	273.500000	0.000000	0.000000	
7		105.000000	502.000000	0.000000	0.000000	
8		40.000000	156.000000	0.000000	0.000000	
9	• • •	77.400000	44.500000	62.700000	0.000000	
10	• • •	70.000000	78.000000	68.000000	0.000000	
11	• • •	0.000000	25.000000	212.000000	0.000000	
12	• • •	57.000000	0.000000	239.000000	0.000000	
13	• • •	295.000000	20.000000	0.000000	0.000000	
14	• • •	121.764706	42.235294	72.647059	0.000000	
15	• • •	0.000000	192.000000	0.000000	0.000000	
16	• • •	0.000000	190.000000	10.000000	0.000000	
17	• • •	0.000000	0.000000	34.000000	0.000000	
	• • •	48.428571	111.714286			
18	• • •		10.100000	63.571429 147.600000	0.000000	
19	• • •	63.400000 11.000000	21.625000	115.250000	0.000000 17.500000	
20	• • •				0.000000	
21	• • •	0.000000	0.000000	259.000000		
22	• • •	39.857143 90.666667	41.714286 0.000000	124.571429	0.000000	
23	• • •			104.000000	0.000000	
24	• • •	17.000000	56.400000	89.200000	0.000000	
25 26	• • •	64.500000	1.833333	125.333333	0.000000	
26	• • •	53.875000	36.500000	41.375000	0.000000	
27	• • •	13.714286	50.000000	74.857143	20.571429	
28	• • •	45.142857	1.142857	138.285714	0.000000	
29	• • •	66.750000	30.875000	80.500000	0.000000	
	• • •					
82	• • •	436.200000	51.200000	19.800000	0.000000	

00	• • •	40.000000	0.00000	0	.000000	.000000
84		218.250000	10.000000	39	.500000 0	.000000
85		165.888889	17.44444	0	.000000 0	.000000
86		94.200000				.000000
87		151.400000				.000000
	• • •					
88	• • •	228.666667				.000000
89	• • •	135.818182	51.272727	29	.545455 16	. 545455
90		133.333333	37.000000	0	.000000 65	.333333
91		133.833333	55.500000	18	.666667 42	.333333
92		95.000000	70.600000	44	.800000 0	.000000
93		165.923077	68.230769	26	.384615 0	.000000
94		162.411765				.705882
95		168.315789				.000000
	• • •	163.555556				.000000
96	• • •					
97	• • •	174.800000				.000000
98	• • •	125.571429				.000000
99	• • •	100.240000	82.000000			.000000
100		87.840000	51.240000	0	.000000 6	.720000
101		97.291667	63.458333	0	.000000 0	.000000
102		131.450000	80.450000	8	.500000 12	.250000
103		130.956522	77.043478	0	.000000 0	.000000
104	• • •	128.088889				.000000
105		107.222222				.666667
	• • •					
106	• • •	117.703125				.984375
107	• • •	127.626866				.000000
108	• • •	107.448980				.000000
109	• • •	104.347826	99.913043	0	.000000 19	.869565
110		82.833333	103.944444	0	.000000 0	.000000
111		113.000000	0.000000	0	.000000 0	.000000
	ScreenPorch	PoolArea	MiscVal	MoSold	YrSol	d SalePrice
0	0.000000	0.00000	0.000000 12	.000000	2008.00000	0 122000.000000
1	0.000000	0.000000		.000000	2010.00000	
2	0.000000	0.000000		.250000	2007.50000	
	0.000000	0.000000		.000000	2009.00000	
3						
4	0.000000			.000000	2008.50000	
5	0.000000	0.00000		.000000	2008.00000	
6	205.000000	0.000000		.000000	2007.50000	
7	0.000000	0.000000	0.000000 7	.000000	2008.00000	0 325000.000000
8	0.000000	0.00000	0.000000 11	.000000	2009.00000	0 106000.000000
9	0.000000	0.000000	0.000000 5	.800000	2007.80000	0 112492.600000
10	0.000000	0.00000	0.000000 6	.000000	2008.00000	0 157500.000000
11	0.000000	0.000000		.000000	2008.00000	
12	0.000000	0.000000		.000000	2008.00000	
					2007.00000	
13	87.500000	0.000000		.500000		
14	15.705882	0.000000		.000000	2007.70588	
15	0.000000	0.000000		.000000	2008.00000	
16	0.000000	0.000000	0.000000 4	. 333333	2007.66666	7 119466.666667

0.000000

0.000000

0.000000

48.000000

83

```
17
        0.000000
                    0.000000
                                0.000000
                                            3.000000
                                                      2007.000000
                                                                     90350.000000
18
        0.00000
                    0.00000
                                0.00000
                                            6.285714
                                                      2007.428571
                                                                    126055.285714
19
       25.900000
                    0.000000
                              120.000000
                                            5.100000
                                                      2008.300000
                                                                    134387.500000
20
                                            6.750000
        5.000000
                    0.000000
                                0.00000
                                                      2007.625000
                                                                    139800.000000
21
        0.00000
                    0.000000
                                0.00000
                                            4.000000
                                                      2008.000000
                                                                    129500.000000
22
       20.571429
                   73.142857
                                0.000000
                                            6.714286
                                                      2007.000000
                                                                    172421.428571
23
       38.666667
                    0.000000
                                0.000000
                                            6.000000
                                                      2008.000000
                                                                    154833.333333
24
       20.200000
                    0.000000
                               78.333333
                                            6.566667
                                                      2007.866667
                                                                    112903.333333
                                0.00000
                                            7.000000
25
        0.000000
                    0.000000
                                                      2008.000000
                                                                    140813.333333
                                                      2007.750000
                                                                    109237.500000
26
        0.00000
                    0.000000
                                0.00000
                                            5.625000
27
       39.000000
                    0.00000
                                0.00000
                                            6.000000
                                                      2007.142857
                                                                    159428.571429
        0.00000
28
                    0.00000
                                0.000000
                                            5.285714
                                                      2008.000000
                                                                    105985.714286
29
       16.500000
                    0.00000
                               38.750000
                                            6.375000
                                                      2007.750000
                                                                    129190.625000
. .
                                                 . . .
82
        0.000000
                    0.00000
                                0.00000
                                            5.800000
                                                      2007.200000
                                                                    249880.000000
                                0.00000
83
        0.00000
                    0.00000
                                            6.500000
                                                      2008.000000
                                                                    132400.000000
84
        0.00000
                    0.00000
                                0.00000
                                            8.250000
                                                      2007.250000
                                                                    181400.000000
85
       26.333333
                    0.00000
                               44.44444
                                            5.444444
                                                      2007.888889
                                                                    164111.111111
       28.000000
                    0.00000
                                0.00000
                                            6.400000
                                                      2008.200000
86
                                                                    191400.000000
87
       36.800000
                    0.00000
                                0.000000
                                           10.400000
                                                      2007.200000
                                                                    212000.000000
88
        0.00000
                    0.000000
                                0.00000
                                            5.333333
                                                      2007.000000
                                                                    198000.000000
89
       31.454545
                    0.000000
                               45.454545
                                            6.363636
                                                      2007.818182
                                                                    204636.363636
90
      132.000000
                    0.000000
                                0.000000
                                            4.333333
                                                      2007.333333
                                                                    279500.000000
91
        7.500000
                    0.000000
                                0.00000
                                            5.333333
                                                      2007.666667
                                                                    220881.666667
92
        0.00000
                    0.000000
                                0.00000
                                            7.000000
                                                      2007.000000
                                                                    186140.000000
93
        0.00000
                    0.00000
                               30.769231
                                            6.076923
                                                      2007.769231
                                                                    218384.615385
94
        0.00000
                    0.00000
                               69.411765
                                            6.705882
                                                      2008.176471
                                                                    218058.823529
95
        0.00000
                    0.00000
                               26.315789
                                            6.052632
                                                      2008.052632
                                                                    247900.000000
96
       12.000000
                    0.000000
                               38.888889
                                            6.500000
                                                      2007.611111
                                                                    262194.44444
97
       14.933333
                   37.000000
                                0.000000
                                            7.200000
                                                      2008.200000
                                                                    259162.666667
98
                    0.00000
                               28.571429
                                            6.642857
                                                      2007.285714
       14.142857
                                                                    214925.000000
99
       26.600000
                    0.00000
                                0.00000
                                            6.200000
                                                      2007.760000
                                                                    220450.000000
100
        7.200000
                    0.00000
                                0.00000
                                            6.040000
                                                      2008.320000
                                                                    210614.720000
101
        0.00000
                    0.00000
                                0.00000
                                                      2007.791667
                                            6.833333
                                                                    210766.666667
       20.650000
                    0.000000
                              100.000000
                                            6.200000
                                                      2008.450000
                                                                    242630.000000
102
103
        0.00000
                    0.000000
                                0.000000
                                            6.434783
                                                      2007.739130
                                                                    226869.565217
104
        9.066667
                    0.000000
                                0.000000
                                            6.600000
                                                      2007.955556
                                                                    227408.577778
       12.018519
                    0.000000
                                0.000000
                                            5.925926
                                                      2007.740741
                                                                    210347.722222
105
106
        1.875000
                    0.00000
                                0.00000
                                            5.484375
                                                      2007.062500
                                                                    229680.953125
                                                                    251775.447761
107
        4.402985
                    0.000000
                                0.000000
                                            7.000000
                                                      2006.970149
                                0.00000
                                            7.040816
108
       14.163265
                    0.00000
                                                      2007.836735
                                                                    255362.734694
                                0.00000
109
       25.478261
                   20.869565
                                            6.304348
                                                      2008.826087
                                                                    348849.130435
        0.00000
                                0.00000
                                            6.777778
                                                      2009.444444
                                                                    269220.000000
110
                    0.000000
111
        0.000000
                    0.000000
                                0.00000
                                            6.000000
                                                      2010.000000
                                                                    394432.000000
```

[112 rows x 38 columns]

```
In [29]: year_group = pd.cut(test_df.YearBuilt, np.arange(1870, 2010, 14))
```

test_df.groupby(test_df.YearBuilt,as_index=False).mean()

Out [29]:	YearBuilt	Id	MSSubClass	LotFrontage	${ t LotArea}$	\
0	1872	1350.000000	70.000000	50.000000	5250.000000	
1	1875	1138.000000	50.000000	54.000000	6342.000000	
2	1880	704.250000	71.250000	73.000000	12246.500000	
3	1882	992.000000	70.000000	121.000000	17671.000000	
4	1885	762.000000	110.000000	60.000000	11070.000000	
5	1890	831.500000	60.000000	79.000000	9810.000000	
6	1892	739.500000	72.500000	75.000000	14775.000000	
7	1893	584.000000	75.000000	75.000000	13500.000000	
8	1898	810.000000	75.000000	90.000000	8100.000000	
9	1900	690.900000	126.000000	69.400000	9393.900000	
10	1904	842.000000	70.000000	60.000000	10440.000000	
11	1905	1394.000000	190.000000	60.000000	10800.000000	
12	1906	654.000000	50.000000	60.000000	10320.000000	
13	1908	517.000000	50.000000	83.500000	26519.000000	
14	1910	789.235294	85.294118	60.647059	8106.294118	
15	1911	1235.000000	70.000000	55.000000	8525.000000	
16	1912	458.333333	113.333333	69.000000	5803.666667	
17	1913	439.000000	30.000000	40.000000	4280.000000	
18	1914	927.428571	77.142857	57.285714	9210.000000	
19	1915	495.200000	60.000000	68.400000	9134.900000	
20	1916	854.625000	71.250000	51.800000	8121.875000	
21	1917	1249.000000	75.000000	60.000000	9600.000000	
22	1918	689.571429	50.714286	80.166667	17302.142857	
23	1919	886.000000	56.666667	65.000000	10551.000000	
24	1920	748.333333	55.000000	61.642857	8349.666667	
25	1921	681.333333	46.666667	57.500000	8763.833333	
26	1922	1001.500000	39.375000	59.000000	7805.500000	
27	1923	727.857143	47.142857	75.428571	11360.857143	
28	1924	599.000000	43.571429	54.571429	7628.714286	
29	1925	709.437500	50.000000	54.071429	7446.312500	
82	1981	593.000000	20.000000	75.333333	20235.200000	
83	1982	604.500000	41.666667	67.800000	7517.500000	
84	1983	508.750000	43.750000	75.000000	9894.750000	
85	1984	684.333333	71.111111	62.333333	8885.111111	
86	1985	769.800000	68.000000	77.000000	8513.800000	
87	1986	671.600000	76.000000	59.666667	10461.400000	
88	1987	536.000000	90.000000	52.666667	9972.333333	
89	1988	517.818182	57.272727	93.250000	11843.454545	
90	1989	467.000000	66.666667	62.000000	16755.000000	
91	1990	784.750000	50.000000	85.555556	11576.500000	
92	1991	893.200000	48.000000	95.666667	11566.600000	
93	1992	790.615385	61.153846	75.714286	13347.000000	
94	1993	530.470588	73.529412	67.538462	9724.176471	
95	1994	852.000000	43.157895	76.937500	13492.736842	
	1001	552.500000				

96	1995	741.777778	56.111111	78.642857	11953.888889	
97	1996	668.000000	61.666667	75.769231	11584.400000	
98	1997	489.857143	56.428571	74.545455	10778.714286	
99	1998	714.240000	67.200000	62.666667	10135.040000	
100	1999	774.560000	90.400000	57.190476	7747.240000	
101	2000	783.916667	78.333333	69.818182	8198.833333	
102	2001	709.100000	48.000000	70.000000	10407.500000	
103	2002	832.608696	43.478261	79.200000	10723.260870	
104	2003	674.177778	67.22222	67.842105	9658.533333	
105	2004	642.796296	69.259259	68.787234	8526.259259	
106	2005	791.718750	73.437500	66.562500	9304.546875	
107	2006	779.179104	51.940299	76.417910	10402.432836	
108	2007	692.795918	42.857143	78.224490	10456.306122	
109	2008	869.956522	42.608696	92.260870	14081.956522	
110	2009	592.222222	52.22222	74.882353	8862.277778	
111	2010	379.000000	20.000000	88.000000	11394.000000	
	OverallQual	OverallCond	YearRemodAdo	d MasVnrAr	ea BsmtFinSF1	\
0	8.000000	5.000000	1987.000000			•
1	5.000000	8.000000	1996.000000			
2	6.250000	6.500000	1986.500000			
3	8.000000	9.000000	1986.000000			
4	4.000000	6.500000	1972.500000			
5	6.000000	7.000000	1997.000000			
6	7.500000	6.500000	1979.000000			
7	10.000000	9.000000	2000.000000			
8	5.000000	5.000000	1965.000000			
9	4.500000	5.800000	1968.900000			
10	5.000000	8.000000	2002.000000			
11	6.000000	7.000000	2000.000000			
12	6.000000	7.000000	1995.000000			
13	5.500000	8.000000	1994.000000			
14	5.176471	6.352941	1983.529412			
15	5.000000	6.000000	1950.000000			
16	5.000000	5.666667	1966.666667			
17	5.000000	6.000000	2002.000000			
18	5.142857	5.428571	1974.571429			
19	5.100000	5.700000	1968.600000			
20	5.500000	6.500000	1970.750000			
21	6.000000	5.000000	1950.000000			
22	6.142857	6.571429	1977.857143			
23	5.666667	6.666667	1981.666667			
24	5.100000	5.866667	1967.300000			
25	5.333333	6.333333	1970.333333			
26	4.000000	5.375000	1962.625000			
27	5.428571	6.428571	1980.571429			
28	5.285714	6.142857	1958.000000			
29	5.750000	6.312500	1972.375000			
20	3.10000	0.012000	1312.010000	3.0000	202.012000	

	• • •	• • •	• • •	• • •	• • •	
82	7.400000	5.800000	1982.200000	234.600000	336.000000	
83	4.833333	6.833333	1993.833333	0.000000	554.166667	
84	6.000000	6.250000	1989.500000	0.000000	706.250000	
85	6.333333	5.666667	1987.888889	8.222222	575.000000	
86	6.600000	5.000000	1985.000000	84.200000	679.800000	
87	7.000000	5.200000	1987.200000		501.600000	
88	6.000000	6.000000	1987.333333		391.666667	
89	6.818182	5.545455	1991.727273		728.272727	
90	7.000000	5.333333	1989.333333		968.000000	
91	7.000000	5.166667	1990.500000		796.500000	
92	6.600000	5.000000	1991.600000		292.000000	
93	6.692308	5.153846	1993.384615		556.230769	
94	6.764706	5.529412	1994.058824		592.352941	
95	6.684211	5.210526	1995.789474		776.684211	
96	7.166667	5.111111	1996.222222		575.000000	
97	6.866667	5.066667	1996.466667		735.800000	
98	6.428571	5.071429	1997.428571		528.000000	
99	6.960000	5.040000	1998.280000		501.000000	
100	7.160000	5.080000	1999.600000		501.520000	
101	6.916667	5.000000	2000.083333		136.958333	
101	7.550000	5.050000	2001.500000		500.400000	
102	7.391304	5.000000	2001.300000		558.782609	
103	7.155556	5.022222	2002.173913		182.466667	
104	7.133330	5.000000	2004.462963		166.722222	
106	7.092595	5.000000	2004.402903		390.937500	
100	7.567164	5.000000	2006.313433		333.223881	
107	7.734694	5.081633	2006.313433		500.224490	
100	8.652174	5.000000	2007.306122		331.217391	
					576.94444	
110	7.44444	5.000000	2009.222222 2010.000000			
111	9.000000	2.000000	2010.000000	350.000000 14	145.000000	
		${\tt WoodDeckSF}$	OpenPorchSF	EnclosedPorch		\
0	• • •			20.000000		
1	• • •	0.000000	0.000000	176.000000	0.000000	
2	• • •	120.750000	12.000000	169.750000	0.000000	
3	• • •	0.000000	169.000000	0.000000	0.000000	
4		0.000000	0.000000	57.000000	0.000000	
5		24.000000	24.000000	193.500000	0.000000	
6		0.000000	273.500000	0.000000	0.000000	
7		105.000000	502.000000	0.000000	0.000000	
8		40.000000	156.000000	0.000000	0.000000	
9		77.400000	44.500000	62.700000	0.000000	
10		70.000000	78.000000	68.000000	0.000000	
11		0.000000	25.000000	212.000000	0.00000	
12		57.000000	0.000000	239.000000	0.00000	
13		295.000000	20.000000	0.000000	0.00000	
14		121.764706	42.235294	72.647059	0.00000	

15		0.000000	192.000000	0.000000	0.00000
16		0.000000	190.000000	10.000000	0.000000
17		0.000000	0.000000	34.000000	0.000000
18		48.428571	111.714286	63.571429	0.000000
19		63.400000	10.100000	147.600000	0.000000
20		11.000000	21.625000	115.250000	17.500000
21		0.000000	0.000000	259.000000	0.000000
22		39.857143	41.714286	124.571429	0.000000
23		90.666667	0.000000	104.000000	0.000000
24		17.000000	56.400000	89.200000	0.000000
25		64.500000	1.833333	125.333333	0.000000
26		53.875000	36.500000	41.375000	0.000000
27		13.714286	50.000000	74.857143	20.571429
28		45.142857	1.142857	138.285714	0.000000
29		66.750000	30.875000	80.500000	0.000000
82		436.200000	51.200000	19.800000	0.000000
83		48.000000	0.000000	0.000000	0.000000
84		218.250000	10.000000	39.500000	0.000000
85		165.888889	17.444444	0.000000	0.000000
86		94.200000	30.800000	46.800000	0.000000
87		151.400000	62.600000	27.400000	0.000000
88		228.666667	11.666667	0.000000	0.000000
89		135.818182	51.272727	29.545455	16.545455
90		133.333333	37.000000	0.000000	65.333333
91		133.833333	55.500000	18.666667	42.333333
92		95.000000	70.600000	44.800000	0.000000
93		165.923077	68.230769	26.384615	0.000000
94		162.411765	70.411765	36.588235	42.705882
95		168.315789	67.473684	10.105263	0.000000
96		163.555556	69.722222	11.222222	0.000000
97		174.800000	52.600000	10.266667	0.00000
98		125.571429	55.785714	13.214286	0.00000
99		100.240000	82.000000	0.000000	0.00000
100		87.840000	51.240000	0.000000	6.720000
101		97.291667	63.458333	0.000000	0.00000
102		131.450000	80.450000	8.500000	12.250000
103		130.956522	77.043478	0.000000	0.000000
104		128.088889	60.422222	3.933333	0.00000
105		107.222222	58.185185	0.000000	2.666667
106		117.703125	58.968750	0.000000	2.984375
107		127.626866	67.701493	0.552239	0.000000
108		107.448980	82.244898	0.000000	0.000000
109		104.347826	99.913043	0.000000	19.869565
110		82.833333	103.944444	0.000000	0.000000
111	•••	113.000000	0.000000	0.000000	0.000000
		110.00000	0.00000	0.00000	0.00000

ScreenPorch PoolArea MiscVal MoSold YrSold SalePrice

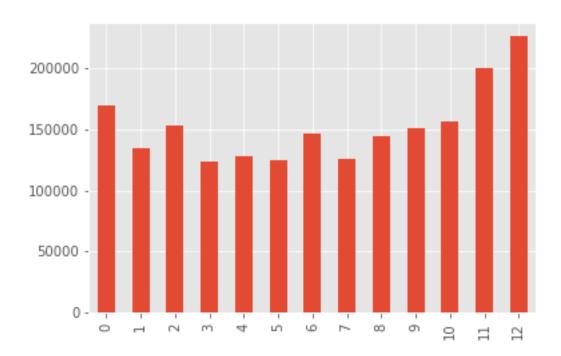
^	0 000000	0 000000	0 000000	40 000000	0000 00000	400000 000000
0	0.000000	0.000000	0.000000	12.000000	2008.000000	122000.000000
1	0.000000	0.00000	0.000000	5.000000	2010.000000	94000.000000
2	0.000000	0.000000	0.000000	5.250000	2007.500000	200619.750000
3	0.000000	0.000000	0.000000	11.000000	2009.000000	168000.000000
4	0.000000	0.000000	225.000000	6.000000	2008.500000	111250.000000
5	0.000000	0.000000	0.000000	8.000000	2008.000000	142200.000000
6	205.000000	0.000000	0.000000	9.000000	2007.500000	291250.000000
7	0.000000	0.000000	0.000000	7.000000	2008.000000	325000.000000
8	0.000000	0.000000	0.000000	11.000000	2009.000000	106000.000000
9	0.000000	0.000000	0.000000	5.800000	2007.800000	112492.600000
10	0.000000	0.000000	0.000000	6.000000	2008.000000	157500.000000
11	0.000000	0.000000	0.000000	4.000000	2008.000000	163000.000000
12	0.000000	0.000000	0.00000	6.000000	2008.000000	135000.000000
13	87.500000	0.000000	0.000000	7.500000	2007.000000	183500.000000
14	15.705882	0.000000	0.000000	6.000000	2007.705882	111959.058824
15	0.000000	0.000000	0.000000	11.000000	2008.000000	130000.000000
16	0.000000	0.000000	0.000000	4.333333	2007.666667	119466.666667
17	0.000000	0.000000	0.000000	3.000000	2007.0000007	90350.000000
18	0.000000	0.000000	0.000000	6.285714	2007.428571	126055.285714
19	25.900000	0.000000	120.000000	5.100000	2008.300000	134387.500000
		0.000000	0.000000		2007.625000	
20	5.000000			6.750000		139800.000000
21	0.000000	0.000000	0.000000	4.000000	2008.000000	129500.000000
22	20.571429	73.142857	0.000000	6.714286	2007.000000	172421.428571
23	38.666667	0.000000	0.000000	6.000000	2008.000000	154833.333333
24	20.200000	0.00000	78.333333	6.566667	2007.866667	112903.333333
25	0.000000	0.000000	0.000000	7.000000	2008.000000	140813.333333
26	0.000000	0.000000	0.000000	5.625000	2007.750000	109237.500000
27	39.000000	0.000000	0.000000	6.000000	2007.142857	159428.571429
28	0.000000	0.000000	0.000000	5.285714	2008.000000	105985.714286
29	16.500000	0.000000	38.750000	6.375000	2007.750000	129190.625000
• •						
82	0.000000	0.000000	0.00000	5.800000	2007.200000	249880.000000
83	0.000000	0.000000	0.000000	6.500000	2008.000000	132400.000000
84	0.000000	0.000000	0.000000	8.250000	2007.250000	181400.000000
85	26.333333	0.000000	44.44444	5.44444	2007.888889	164111.111111
86	28.000000	0.000000	0.000000	6.400000	2008.200000	191400.000000
87	36.800000	0.000000	0.000000	10.400000	2007.200000	212000.000000
88	0.000000	0.000000	0.000000	5.333333	2007.000000	198000.000000
89	31.454545	0.000000	45.454545	6.363636	2007.818182	204636.363636
90	132.000000	0.000000	0.000000	4.333333	2007.333333	279500.000000
91	7.500000	0.000000	0.000000	5.333333	2007.666667	220881.666667
92	0.000000	0.000000	0.000000	7.000000	2007.000000	186140.000000
93	0.000000	0.000000	30.769231	6.076923	2007.769231	218384.615385
94	0.000000	0.000000	69.411765	6.705882	2008.176471	218058.823529
95	0.000000	0.000000	26.315789	6.052632	2008.052632	247900.000000
96	12.000000	0.000000	38.888889	6.500000	2007.611111	262194.444444
97	14.933333	37.000000	0.000000	7.200000	2008.200000	259162.666667
98	14.142857	0.00000	28.571429	6.642857	2007.285714	214925.000000

```
99
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                                            6.200000
                                                      2007.760000
                                                                    220450.000000
100
        7.200000
                    0.00000
                                0.000000
                                            6.040000
                                                      2008.320000
                                                                    210614.720000
101
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                   0.000000
                                0.00000
                                            6.833333
                                                      2007.791667
                                                                    210766.666667
102
       20.650000
                   0.000000
                              100.000000
                                            6.200000
                                                      2008.450000
                                                                    242630.000000
        0.00000
                    0.00000
                                0.000000
                                            6.434783
103
                                                      2007.739130
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        9.066667
                    0.00000
                                0.00000
                                            6.600000
                                                      2007.955556
                                                                    227408.577778
104
105
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                    0.000000
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                                            5.925926
                                                      2007.740741
                                                                    210347.722222
106
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                                0.000000
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                                                      2007.062500
                                                                    229680.953125
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                                0.000000
                                            7.000000
                                                      2006.970149
                                                                    251775.447761
107
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108
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                                                      2007.836735
                                                                    255362.734694
       25.478261
                   20.869565
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109
                                            6.304348
                                                      2008.826087
                                                                    348849.130435
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                   0.000000
                                0.000000
                                            6.777778
                                                      2009.444444
                                                                    269220.000000
110
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                                0.000000
                                                      2010.000000
                    0.00000
                                            6.000000
                                                                    394432.000000
111
```

[112 rows x 38 columns]

```
Out[30]: 0
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          2
                             NaN
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                   (1910, 1920]
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          27
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          28
                   (1950, 1960]
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29
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         1453
                           NaN
         1454
                           NaN
                  (1990, 2000]
         1455
                  (1970, 1980]
         1456
         1457
                  (1940, 1950]
                  (1940, 1950]
         1458
         1459
                  (1960, 1970]
         Name: YearBuilt, Length: 1460, dtype: category
         Categories (13, interval[int64]): [(1870, 1880] < (1880, 1890] < (1890, 1900] < (1900,
In [31]: year_group = pd.cut(test_df.YearBuilt, np.arange(1870, 2010, 10))
         year_class = test_df.groupby(year_group,as_index=False).mean()
         year_class['SalePrice'].plot.bar()
         plt.show()
```



test_df = pd.read_csv('train.csv') test_df.head() Out [32]: MSSubClass MSZoning LotFrontage LotArea Street Alley LotShape \ 1 60 RL65.0 8450 0 Pave NaN Reg 2 80.0 1 20 RL 9600 Pave NaN Reg 2 3 60 RL 68.0 11250 Pave NaN IR1 3 4 70 RL 60.0 9550 Pave NaN IR1 4 5 60 RL84.0 14260 Pave NaN IR1 LandContour Utilities PoolArea PoolQC Fence MiscFeature MiscVal 0 Lvl AllPub 0 NaN NaN NaN 0 1 0 NaN NaN 0 Lvl **AllPub** . . . NaN 2 AllPub 0 NaN NaN NaN 0 Lvl 3 Lvl **AllPub** 0 NaNNaNNaN 0 . . . 4 Lvl AllPub 0 NaN NaN NaN 0 MoSold YrSold SaleType SaleCondition SalePrice 2 2008 Normal 208500 0 WD 1 5 2007 WD Normal 181500 2 9 Normal 2008 WD 223500 3 2 2006 Abnorml 140000

[5 rows x 81 columns]

2008

12

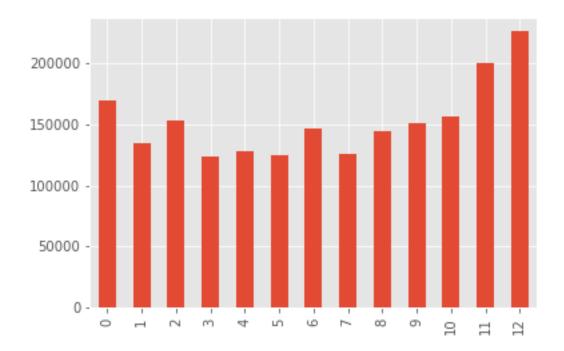
In [32]: import pandas as pd

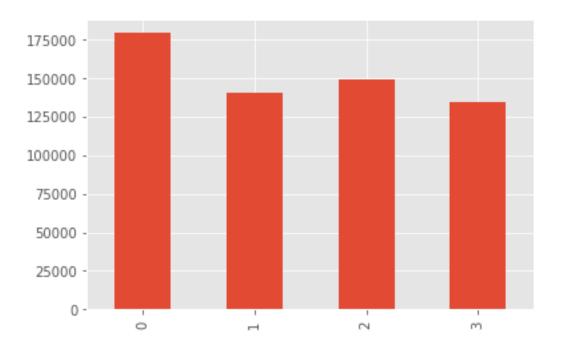
Normal

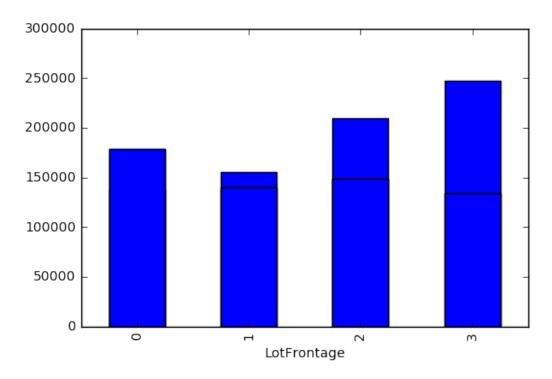
250000

WD

WD







```
In [8]: import pandas as pd
        test_df = pd.read_csv('train.csv')
        fence_class = test_df.groupby(test_df['Fence'],as_index=False).mean()
        fence_class
Out[8]:
           Fence
                           Id MSSubClass
                                            LotFrontage
                                                               LotArea
                                                                        OverallQual
        0
           GdPrv
                  752.372881
                                57.118644
                                                         10520.288136
                                                                           6.305085
                                              73.687500
                  750.203704
                                40.000000
        1
            GdWo
                                              73.666667
                                                           9634.018519
                                                                           5.166667
           MnPrv
                  704.286624
                                47.611465
                                              70.562500
                                                           9204.458599
                                                                           5.445860
        3
            MnWw
                 743.454545
                                41.363636
                                              69.400000
                                                           9250.909091
                                                                           5.181818
           OverallCond
                           YearBuilt
                                     YearRemodAdd MasVnrArea
        0
                                       1984.169492
              6.084746
                        1961.152542
                                                      88.576271
        1
              5.666667
                         1957.925926
                                        1972.981481
                                                      89.314815
        2
              5.980892 1955.942675
                                       1977.203822
                                                      49.579618
                                                                      . . .
              6.545455 1949.909091
                                        1979.181818
                                                      48.454545
                                                                      . . .
                       OpenPorchSF EnclosedPorch 3SsnPorch ScreenPorch
           WoodDeckSF
                                                                               PoolArea
        0
          137.457627
                          52.118644
                                          34.593220
                                                      2.847458
                                                                   16.508475 41.932203
        1
            87.222222
                          30.537037
                                          30.888889
                                                      0.000000
                                                                   13.666667
                                                                                0.000000
        2
            96.038217
                          34.942675
                                          29.082803
                                                      4.687898
                                                                   16.929936
                                                                                6.840764
        3
          107.454545
                          54.727273
                                          32.363636 16.363636
                                                                   11.090909
                                                                                0.00000
             MiscVal
                         MoSold
                                      YrSold
                                                   SalePrice
        0
          79.661017
                       6.305085
                                 2007.898305
                                               178927.457627
          37.962963
        1
                       6.962963
                                 2007.759259
                                               140379.314815
                                 2008.038217
           82.929936
                       6.140127
                                               148751.089172
           43.636364
                                 2007.272727
                       6.272727
                                               134286.363636
        [4 rows x 39 columns]
In [10]: s = pd.Series(list(test_df['Fence']))
         pd.get_dummies(s)
Out[10]:
               GdPrv
                       GdWo
                             MnPrv
                                    MnWw
                    0
                          0
                                        0
                    0
                                 0
                                        0
         1
                          0
         2
                    0
                          0
                                 0
                                        0
         3
                    0
                          0
                                 0
                                        0
         4
                                 0
                    0
                          0
                                       0
         5
                    0
                          0
                                 1
                                       0
         6
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                    0
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                                        0
         7
                                 0
                    0
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         9
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                                 0
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0

10

0

0

0

11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	0 0 0 0 1 0 0 0 0 0 1 0 0	0 0 1 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1 0 0 0	0 0 0 0 0 0 0 0 0 0 0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
1430 1431	0	0	0 0	0
1431	0	0	0	0
1432	0	0	0	0
1434	0	0	0	0
1435	1	0	0	0
1436	0	1	0	0
1437	0	0	0	0
1438	0	0	1	0
1439	0	0	0	0
1440	0	0	0	0
1441	0	0	0	0
1442	0	0	0	0
1443	0	0	0	0
1444	0	0	0	0
1445	0	0	0	0
1446	0	0	0	0
1447	0	0	0	0
1448	0	1	0	0
1449 1450	0	0	0	0
1450	0	0	0	0
1451	0	0	0	0
1452	0	0	0	0
1454	0	0	0	0
1455	0	0	0	0
1456	0	0	1	0
1457	1	0	0	0

```
    1458
    0
    0
    0
    0

    1459
    0
    0
    0
    0
```

[1460 rows x 4 columns]

Out[11]:	GdPrv	GdWo	MnPrv	MnWw
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	1	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	1	0	0
15	1	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	1	0
20	0	0	0	0
21	1	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	1	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
1430	0	0	0	0
1431	0	0	0	0
1432	0	0	0	0
1433	0	0	0	0
1434	0	0	0	0
1435	1	0	0	0
1436	0	1	0	0
1437	0	0	0	0

1438	0	0	1	0
1439	0	0	0	0
1440	0	0	0	0
1441	0	0	0	0
1442	0	0	0	0
1443	0	0	0	0
1444	0	0	0	0
1445	0	0	0	0
1446	0	0	0	0
1447	0	0	0	0
1448	0	1	0	0
1449	0	0	0	0
1450	0	0	0	0
1451	0	0	0	0
1452	0	0	0	0
1453	0	0	0	0
1454	0	0	0	0
1455	0	0	0	0
1456	0	0	1	0
1457	1	0	0	0
1458	0	0	0	0
1459	0	0	0	0

[1460 rows x 4 columns]

In [12]: pd.get_dummies(test_df['Fence']).rename(columns=lambda x: 'Fence_' + str(x))

Out[12]:	Fence_GdPrv	Fence_GdWo	Fence_MnPrv	Fence_MnWw
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	1	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	1	0	0
15	1	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	1	0

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20
                                                                0
                   0
                                 0
                                                 0
21
                   1
                                 0
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22
                                 0
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23
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24
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25
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27
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1436
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                                  1
1437
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1441
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1446
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1447
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1448
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                                  1
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1449
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1450
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1451
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1456
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1457
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1458
                   0
                                 0
                                                 0
                                                                0
1459
                   0
                                 0
                                                 0
                                                                0
```

[1460 rows x 4 columns]

```
In [21]: test_df = pd.read_csv('train.csv')
          dummies = pd.get_dummies(test_df['Fence']).rename(columns=lambda x: 'Fence_' + str(x))
          pd.concat([test_df, dummies], axis=1)
Out [21]:
                    Ιd
                        MSSubClass MSZoning
                                                 LotFrontage
                                                                LotArea Street Alley LotShape
          0
                     1
                                  60
                                            RL
                                                          65.0
                                                                    8450
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          1
                     2
                                  20
                                             RL
                                                          80.0
                                                                    9600
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          2
                     3
                                             RL
                                                          68.0
                                  60
                                                                   11250
                                                                                     NaN
                                                                                                IR1
                                                                             Pave
          3
                     4
                                  70
                                             RL
                                                          60.0
                                                                    9550
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          4
                     5
                                  60
                                             RL
                                                          84.0
                                                                   14260
                                                                                                IR1
                                                                             Pave
                                                                                     NaN
          5
                     6
                                  50
                                             RL
                                                          85.0
                                                                   14115
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
                     7
          6
                                  20
                                             RL
                                                          75.0
                                                                   10084
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          7
                     8
                                  60
                                             RL
                                                           NaN
                                                                   10382
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          8
                     9
                                  50
                                             RM
                                                          51.0
                                                                    6120
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          9
                                 190
                                             RL
                                                          50.0
                                                                    7420
                    10
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          10
                                  20
                                             RL
                                                          70.0
                                                                   11200
                    11
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
                                                          85.0
                                                                   11924
          11
                    12
                                  60
                                             RL
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          12
                    13
                                  20
                                             RL
                                                                   12968
                                                                                                IR2
                                                           NaN
                                                                             Pave
                                                                                     NaN
          13
                    14
                                  20
                                             RL
                                                          91.0
                                                                   10652
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          14
                    15
                                  20
                                             RL
                                                           NaN
                                                                   10920
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          15
                    16
                                  45
                                             RM
                                                          51.0
                                                                    6120
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          16
                    17
                                  20
                                             RL
                                                                   11241
                                                                                                IR1
                                                           NaN
                                                                             Pave
                                                                                     NaN
          17
                                             RL
                                                                   10791
                    18
                                  90
                                                          72.0
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          18
                    19
                                  20
                                             RL
                                                          66.0
                                                                   13695
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          19
                    20
                                  20
                                             RL
                                                          70.0
                                                                    7560
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          20
                    21
                                  60
                                             RL
                                                         101.0
                                                                   14215
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          21
                    22
                                  45
                                             RM
                                                          57.0
                                                                    7449
                                                                             Pave
                                                                                    Grvl
                                                                                                Reg
          22
                    23
                                  20
                                             RL
                                                          75.0
                                                                    9742
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          23
                    24
                                 120
                                             RM
                                                          44.0
                                                                    4224
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          24
                    25
                                  20
                                             RL
                                                                    8246
                                                           NaN
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          25
                    26
                                  20
                                             RL
                                                         110.0
                                                                   14230
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          26
                    27
                                  20
                                             RL
                                                          60.0
                                                                    7200
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          27
                    28
                                  20
                                             RL
                                                          98.0
                                                                   11478
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          28
                    29
                                  20
                                             RL
                                                          47.0
                                                                   16321
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          29
                    30
                                  30
                                             RM
                                                          60.0
                                                                    6324
                                                                             Pave
                                                                                                IR1
                                                                                     NaN
          . . .
                   . . .
                                 . . .
                                            . . .
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          1430
                 1431
                                  60
                                            RL
                                                          60.0
                                                                   21930
                                                                            Pave
                                                                                                IR3
                                                                                     NaN
          1431
                 1432
                                 120
                                                                    4928
                                            RL
                                                           NaN
                                                                                                IR1
                                                                             Pave
                                                                                     NaN
          1432
                 1433
                                  30
                                             RL
                                                                   10800
                                                          60.0
                                                                             Pave
                                                                                    Grvl
                                                                                                Reg
          1433
                 1434
                                  60
                                             RL
                                                          93.0
                                                                   10261
                                                                             Pave
                                                                                     NaN
                                                                                                IR1
          1434
                 1435
                                  20
                                             RL
                                                          80.0
                                                                   17400
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          1435
                 1436
                                  20
                                             RL
                                                          80.0
                                                                    8400
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          1436
                 1437
                                  20
                                             RL
                                                          60.0
                                                                    9000
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          1437
                 1438
                                  20
                                             RL
                                                          96.0
                                                                   12444
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          1438
                 1439
                                  20
                                             RM
                                                          90.0
                                                                    7407
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          1439
                                  60
                 1440
                                             RL
                                                          80.0
                                                                   11584
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
          1440
                 1441
                                  70
                                                          79.0
                                             RL
                                                                   11526
                                                                                                IR1
                                                                             Pave
                                                                                     NaN
          1441
                 1442
                                 120
                                             RM
                                                                    4426
                                                           NaN
                                                                             Pave
                                                                                     NaN
                                                                                                Reg
```

1442	1443	60	FV	85.0	11003	Pave	NaN	Reg
1443	1444	30	RL	NaN	8854	Pave	NaN	Reg
1444	1445	20	RL	63.0	8500	Pave	NaN	Reg
1445	1446	85	RL	70.0	8400	Pave	NaN	Reg
1446	1447	20	RL	NaN	26142	Pave	NaN	IR1
1447	1448	60	RL	80.0	10000	Pave	NaN	Reg
1448	1449	50	RL	70.0	11767	Pave	NaN	Reg
1449	1450	180	RM	21.0	1533	Pave	NaN	Reg
1450	1451	90	RL	60.0	9000	Pave	NaN	Reg
1451	1452	20	RL	78.0	9262	Pave	NaN	Reg
1452	1453	180	RM	35.0	3675	Pave	NaN	Reg
1453	1454	20	RL	90.0	17217	Pave	NaN	Reg
1454	1455	20	FV	62.0	7500	Pave	Pave	Reg
1455	1456	60	RL	62.0	7917	Pave	NaN	Reg
1456	1457	20	RL	85.0	13175	Pave	NaN	Reg
1457	1458	70	RL	66.0	9042	Pave	NaN	Reg
1458	1459	20	RL	68.0	9717	Pave	NaN	_
								Reg
1459	1460	20	RL	75.0	9937	Pave	NaN	Reg
	LandContour	Utilities		MiscVal	MoSold	YrSold	SaleType	\
0	Lvl	AllPub		0	2	2008	WD	•
1	Lvl	AllPub		0	5	2007	WD	
2	Lvl	AllPub		0	9	2008	WD	
3	Lvl	AllPub		0	2	2006	WD	
4	Lvl	AllPub	• • •	0	12	2008	WD	
5	Lvl	AllPub	• • •	700	10	2009	WD	
6	Lvl	AllPub	• • •	0	8	2007	WD	
7	Lvl	AllPub	• • •	350	11	2007	WD	
8	Lvl	AllPub	• • •	0	4	2008	WD	
9	Lvl	AllPub	• • •	0	1	2008	WD	
10	Lvl	AllPub	• • •	0	2	2008	WD	
11		AllPub	• • •	0	7	2006		
	Lvl		• • •				New	
12	Lvl	AllPub	• • •	0	9	2008	WD	
13	Lvl	AllPub	• • •	0	8	2007	New	
14	Lvl	AllPub	• • •	0	5	2008	WD	
15	Lvl	AllPub	• • •	0	7	2007	WD	
16	Lvl	AllPub	• • •	700	3	2010	WD	
17	Lvl	AllPub	• • •	500	10	2006	WD	
18	Lvl	AllPub	• • •	0	6	2008	WD	
19	Lvl	AllPub		0	5	2009	COD	
20	Lvl	AllPub	• • •	0	11	2006	New	
21	Bnk	AllPub		0	6	2007	WD	
22	Lvl	AllPub		0	9	2008	WD	
23	Lvl	AllPub		0	6	2007	WD	
24	Lvl	AllPub		0	5	2010	WD	
25	Lvl	AllPub		0	7	2009	WD	
26	Lvl	AllPub		0	5	2010	WD	
27	Lvl	AllPub		0	5	2010	WD	

28	Lvl	AllPub		0	12	2006	WD	
29	Lvl	AllPub		0	5	2008	WD	
1430	Lvl	AllPub		0	7	2006	WD	
1431	Lvl	AllPub		0	10	2009	WD	
1432	Lvl	AllPub		0	8	2007	WD	
1433	Lvl	AllPub		0	5	2008	WD	
1434	Low	AllPub		0	5	2006	WD	
1435	Lvl	AllPub		0	7	2008	COD	
1436	Lvl	AllPub		0	5	2007	WD	
1437	Lvl	AllPub		0	11	2008	New	
1438	Lvl	AllPub		0	4	2010	WD	
1439	Lvl	AllPub	•••	0	11	2007	WD	
1440	Bnk	AllPub	• • •	0	9	2008	WD	
1441	Lvl	AllPub	• • •	0	5	2008	WD	
1442	Lvl	AllPub	•••	0	4	2009	WD	
1443	Lvl	AllPub	•••	0	5	2009	WD	
1444	Lvl	AllPub	• • •	0	11	2009	WD	
1445	Lvl	AllPub	• • •	0	5	2007	WD	
1445		AllPub	• • •		4		WD WD	
1440	Lvl		• • •	0		2010	WD WD	
	Lvl	AllPub	• • •	0	12	2007		
1448	Lvl	AllPub	• • •	0	5	2007	WD	
1449	Lvl	AllPub		0	8	2006	WD	
1450	Lvl	AllPub	• • •	0	9	2009	WD	
1451	Lvl	AllPub	• • •	0	5	2009	New	
1452	Lvl	AllPub	• • •	0	5	2006	WD	
1453	Lvl	AllPub	• • •	0	7	2006	WD	
1454	Lvl	AllPub		0	10	2009	WD	
1455	Lvl	AllPub		0	8	2007	WD	
1456	Lvl	AllPub		0	2	2010	WD	
1457	Lvl	AllPub	• • •	2500	5	2010	WD	
1458	Lvl	AllPub	• • •	0	4	2010	WD	
1459	Lvl	AllPub		0	6	2008	WD	
	SaleCondition	CaloPrico	Fonco CdDry	Fonco	CdWo	Fence_MnPrv	Fonc	e_MnWw
0	Normal	208500	rence_dariv	rence_	Gawo O	rence_mrrv		0
	Normal	181500	0		0	0		0
1 2	Normal	223500	0		0	0		0
3			_					
	Abnorml Normal	140000	0		0	0		0
4		250000	0		0	0		0
5	Normal	143000	0		0	1		0
6	Normal	307000	0		0	0		0
7	Normal	200000	0		0	0		0
8	Abnorml	129900	0		0	0		0
9	Normal	118000	0		0	0		0
10	Normal	129500	0		0	0		0
11	Partial	345000	0		0	0		0
12	Normal	144000	0		0	0		0

13	Partial	279500	0	0	0	0
14	Normal	157000	0	1	0	0
15	Normal	132000	1	0	0	0
16	Normal	149000	0	0	0	0
17	Normal	90000	0	0	0	0
18	Normal	159000	0	0	0	0
19	Abnorml	139000	0	0	1	0
20	Partial	325300	0	0	0	0
21	Normal	139400	1	0	0	0
22	Normal	230000	0	0	0	0
23	Normal	129900	0	0	0	0
24	Normal	154000	0	0	1	0
25	Normal	256300	0	0	0	0
26	Normal	134800	0	0	0	0
27	Normal	306000	0	0	0	0
28	Normal	207500	0	0	0	0
				_		
29	Normal	68500	0	0	0	0
1430	Normal	192140	0	0	0	0
1431	Normal	143750	0	0	0	0
1432	Normal	64500	0	0	0	0
1433	Normal	186500	0	0	0	0
1434	Normal	160000	0	0	0	0
1435	Abnorml	174000	1	0	0	0
1436	Normal	120500	0	1	0	0
1437				0		
	Partial	394617	0		0	0
1438	Normal	149700	0	0	1	0
1439	Normal	197000	0	0	0	0
1440	Normal	191000	0	0	0	0
1441	Normal	149300	0	0	0	0
1442	Normal	310000	0	0	0	0
1443	Normal	121000	0	0	0	0
1444	Normal	179600	0	0	0	0
1445	Normal	129000	0	0	0	0
1446	Normal	157900	0	0	0	0
1447	Normal	240000	0	0	0	0
1448	Normal	112000	0	1	0	0
1449	Abnorml	92000	0	0	0	0
1450	Normal	136000	0	0	0	0
1451	Partial	287090	0	0	0	0
1452	Normal	145000	0	0	0	0
1453	Abnorml	84500	0	0	0	0
1454	Normal	185000	0	0	0	0
1455	Normal	175000	0	0	0	0
1456	Normal	210000	0	0	1	0
1457	Normal	266500	1	0	0	0
1458	Normal	142125	0	0	0	0
1459	Normal	147500	0	0	0	0

[1460 rows x 85 columns]

```
In [22]: test_df = pd.read_csv('train.csv')
          dummies = pd.get_dummies(test_df['Fence']).rename(columns=lambda x: 'Fence_' + str(x))
          pd.concat([test_df, dummies], axis=1)
          test_df.drop(['Fence'], axis=1)
Out [22]:
                        MSSubClass MSZoning
                                                 LotFrontage
                                                                LotArea Street Alley LotShape
                    Ιd
          0
                     1
                                  60
                                            RL
                                                          65.0
                                                                    8450
                                                                            Pave
                                                                                     NaN
                                                                                               Reg
          1
                     2
                                  20
                                                                    9600
                                            RL
                                                          80.0
                                                                            Pave
                                                                                     NaN
                                                                                               Reg
          2
                     3
                                  60
                                            RL
                                                          68.0
                                                                   11250
                                                                                               IR1
                                                                            Pave
                                                                                     NaN
          3
                     4
                                            RL
                                  70
                                                          60.0
                                                                    9550
                                                                            Pave
                                                                                     NaN
                                                                                               IR1
          4
                     5
                                            RL
                                  60
                                                          84.0
                                                                   14260
                                                                                               IR1
                                                                            Pave
                                                                                     NaN
          5
                     6
                                  50
                                            RL
                                                          85.0
                                                                   14115
                                                                            Pave
                                                                                     NaN
                                                                                               IR1
          6
                     7
                                  20
                                            RL
                                                          75.0
                                                                   10084
                                                                            Pave
                                                                                     NaN
                                                                                               Reg
          7
                     8
                                  60
                                            RL
                                                          NaN
                                                                   10382
                                                                            Pave
                                                                                     NaN
                                                                                               IR1
          8
                     9
                                  50
                                            RM
                                                         51.0
                                                                    6120
                                                                            Pave
                                                                                     NaN
                                                                                               Reg
          9
                    10
                                 190
                                            RL
                                                          50.0
                                                                    7420
                                                                            Pave
                                                                                     NaN
                                                                                               Reg
          10
                                            RL
                                                                   11200
                    11
                                  20
                                                         70.0
                                                                            Pave
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                                                                                               Reg
                    12
                                  60
                                            RL
                                                          85.0
                                                                   11924
          11
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                                                                                               IR1
          12
                    13
                                  20
                                            RL
                                                          NaN
                                                                   12968
                                                                            Pave
                                                                                     NaN
                                                                                               IR2
          13
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                                  20
                                            RL
                                                          91.0
                                                                   10652
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          14
                                  20
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                                                                   10920
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                    15
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                                            RM
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                                                          51.0
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          16
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                                  20
                                            RL
                                                          NaN
                                                                   11241
                                                                            Pave
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          17
                                  90
                                            RL
                                                         72.0
                                                                   10791
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                                                                            Pave
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          18
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          19
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                                            RL
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                                                                    7560
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          20
                                                        101.0
                                                                   14215
                    21
                                  60
                                            RL
                                                                            Pave
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          21
                    22
                                  45
                                            RM
                                                          57.0
                                                                    7449
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                                                                                   Grvl
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          22
                    23
                                  20
                                            RL
                                                         75.0
                                                                    9742
                                                                            Pave
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                                                                                               Reg
          23
                    24
                                 120
                                            RM
                                                         44.0
                                                                    4224
                                                                            Pave
                                                                                     NaN
                                                                                               Reg
          24
                    25
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                                            RL
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                                                                    8246
                                                                                               IR1
                                                                            Pave
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          25
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                                                                   14230
                    26
                                            RL
                                                        110.0
                                                                            Pave
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          26
                    27
                                  20
                                            RL
                                                          60.0
                                                                    7200
                                                                            Pave
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                                                                                               Reg
          27
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                    28
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                                                          98.0
                                                                            Pave
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          28
                    29
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                                            RL
                                                          47.0
                                                                   16321
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          1431
                 1432
                                 120
                                            RL
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          1432
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          1433
                 1434
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                                                                   10261
                                                                            Pave
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          1434
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                                            RL
                                                          80.0
                                                                   17400
                                                                            Pave
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          1435
                 1436
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                                                                    8400
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          1436
                 1437
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          1437
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                 1438
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                                            RL
                                                          96.0
                                                                            Pave
                                                                                     NaN
                                                                                               Reg
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1438	1439	20	RM	90.0	7407	Pave	NaN	Reg
1439	1440	60	RL	80.0	11584	Pave	NaN	Reg
1440	1441	70	RL	79.0	11526	Pave	NaN	IR1
1441	1442	120	RM	NaN	4426	Pave	NaN	Reg
1442	1443	60	FV	85.0	11003	Pave	NaN	Reg
1443	1444	30	RL	NaN	8854	Pave	NaN	Reg
1444	1445	20	RL	63.0	8500	Pave	NaN	Reg
1445	1446	85	RL	70.0	8400	Pave	NaN	Reg
1446	1447	20	RL	NaN	26142	Pave	NaN	IR1
1447	1448	60	RL	80.0	10000	Pave	NaN	Reg
1448	1449	50	RL	70.0	11767	Pave	NaN	Reg
1449	1450	180	RM	21.0	1533	Pave	NaN	Reg
1450	1451	90	RL	60.0	9000	Pave	NaN	Reg
1451	1452	20	RL	78.0	9262	Pave	NaN	Reg
1452	1453	180	RM	35.0	3675	Pave	NaN	Reg
1453	1454	20	RL	90.0	17217	Pave	NaN	Reg
1454	1455	20	FV	62.0	7500	Pave	Pave	Reg
1455	1456	60	RL	62.0	7917	Pave	NaN	Reg
1456	1457	20	RL	85.0	13175	Pave	NaN	Reg
1457	1458	70	RL	66.0	9042	Pave	NaN	Reg
1458	1459	20	RL	68.0	9717	Pave	NaN	Reg
1459	1460	20	RL	75.0	9937	Pave	NaN	Reg
								_
	LandConto	our Utilities		ScreenPo	rch Pool	Area Po	olQC M:	iscFeature \
0	I	.vl AllPub			0	0	NaN	NaN
1	I	.vl AllPub			0	0	NaN	NaN
2	I	.vl AllPub			0	0	NaN	NaN
3	I	.vl AllPub			0	0	NaN	NaN
4	I	vl AllPub			0	0	NaN	NaN
5	I	.vl AllPub			0	0	NaN	Shed
6	I	.vl AllPub			0	0	NaN	NaN
7	I	.vl AllPub			0	0	NaN	Shed
8	I	.vl AllPub			0	0	NaN	NaN
9	I	vl AllPub			0	0	NaN	NaN
10	I	vl AllPub			0	0	NaN	NaN
11	I	.vl AllPub			0	0	NaN	NaN
12	I	.vl AllPub			176	0	NaN	NaN
13	I	.vl AllPub			0	0	NaN	NaN
14	I	.vl AllPub			0	0	NaN	NaN
15	I	vl AllPub			0	0	NaN	NaN
16	I	vl AllPub			0	0	NaN	Shed
17	I	.vl AllPub			0	0	NaN	Shed
18		.vl AllPub			0	0	NaN	NaN
19		.vl AllPub			0	0	NaN	NaN
20		.vl AllPub			0	0	NaN	NaN
21		nk AllPub			0	0	NaN	NaN
22		.vl AllPub			0	0	NaN	NaN
23	I	.vl AllPub			0	0	NaN	NaN

24		Lvl	AllPub		0	0	NaN	NaN
25		Lvl	AllPub		0	0	NaN	NaN
26		Lvl	AllPub		0	0	NaN	NaN
27		Lvl	AllPub		0	0	NaN	NaN
28		Lvl	AllPub		0	0	NaN	NaN
29		Lvl	AllPub		0	0	NaN	NaN
1430		Lvl	AllPub		0	0	NaN	NaN
1431		Lvl	AllPub		0	0	NaN	NaN
1432		Lvl	AllPub		0	0	NaN	NaN
1433		Lvl	AllPub		0	0	NaN	NaN
1434		Low	AllPub		0	0	NaN	NaN
1435		Lvl	AllPub		0	0	NaN	NaN
1436		Lvl	AllPub		0	0	NaN	NaN
1437		Lvl	AllPub		0	0	NaN	NaN
1438		Lvl	AllPub		0	0	NaN	NaN
1439		Lvl	AllPub		0	0	NaN	NaN
1440		Bnk	AllPub		0	0	NaN	NaN
1441		Lvl	AllPub		0	0	NaN	NaN
1442		Lvl	AllPub		0	0	NaN	NaN
1443		Lvl	AllPub		40	0	NaN	NaN
1444		Lvl	AllPub		0	0	NaN	NaN
1445		Lvl	AllPub		0	0	NaN	NaN
1446		Lvl	AllPub		0	0	NaN	NaN
1447		Lvl	AllPub		0	0	NaN	NaN
1448		Lvl	AllPub		0	0	NaN	NaN
1449		Lvl	AllPub		0	0	NaN	NaN
1450		Lvl	AllPub		0	0	NaN	NaN
1451		Lvl	AllPub		0	0	NaN	NaN
1452		Lvl	AllPub		0	0	NaN	NaN
1453		Lvl	AllPub		0	0	NaN	NaN
1454		Lvl	AllPub		0	0	NaN	NaN
1455		Lvl	AllPub		0	0	NaN	NaN
1456		Lvl	AllPub		0	0	NaN	NaN
1457		Lvl	AllPub		0	0	NaN	Shed
1458		Lvl	AllPub		0	0	NaN	NaN
1459		Lvl	AllPub		0	0	NaN	NaN
	MiscVal	MoSold	YrSold	SaleType	SaleCondition	SalePri	ce	
0	0	2	2008	WD	Normal	2085	00	
1	0	5	2007	WD	Normal	1815		
2	0	9	2008	WD	Normal	2235		
3	0	2	2006	WD	Abnorml	1400		
4	0	12	2008	WD	Normal	2500		
5	700	10	2009	WD	Normal	1430		
6	0	8	2007	WD	Normal	3070		
7	350	11	2009	WD	Normal	2000		
8	0	4	2008	WD	Abnorml	1299		

9	0	1	2008	WD	Normal	118000
10	0	2	2008	WD WD	Normal	129500
11	0	7	2006	New	Partial	345000
12	0	9	2008	WD	Normal	144000
13	0	8	2008	wD New	Partial	279500
13 14	0	5	2007	WD	Normal	157000
	0	5 7				
15 16		3	2007	WD	Normal	132000
16	700		2010	WD	Normal	149000
17	500	10	2006	WD	Normal	90000
18	0	6	2008	WD	Normal	159000
19	0	5	2009	COD	Abnorml	139000
20	0	11	2006	New	Partial	325300
21	0	6	2007	WD	Normal	139400
22	0	9	2008	WD	Normal	230000
23	0	6	2007	WD	Normal	129900
24	0	5	2010	WD	Normal	154000
25	0	7	2009	WD	Normal	256300
26	0	5	2010	WD	Normal	134800
27	0	5	2010	WD	Normal	306000
28	0	12	2006	WD	Normal	207500
29	0	5	2008	WD	Normal	68500
	• • •					
1430	0	7	2006	WD	Normal	192140
1431	0	10	2009	WD	Normal	143750
1432	0	8	2007	WD	Normal	64500
1433	0	5	2008	WD	Normal	186500
1434	0	5	2006	WD	Normal	160000
1435	0	7	2008	COD	Abnorml	174000
1436	0	5	2007	WD	Normal	120500
1437	0	11	2008	New	Partial	394617
1438	0	4	2010	WD	Normal	149700
1439	0	11	2007	WD	Normal	197000
1440	0	9	2008	WD	Normal	191000
1441	0	5	2008	WD	Normal	149300
1442	0	4	2009	WD	Normal	310000
1443	0	5	2009	WD	Normal	121000
1444	0	11	2007	WD	Normal	179600
1445	0	5	2007	WD	Normal	129000
1446	0	4	2010	WD	Normal	157900
1447	0	12	2007	WD	Normal	240000
1448	0	5	2007	WD	Normal	112000
1449	0	8	2006	WD	Abnorml	92000
1450	0	9	2009	WD	Normal	136000
1451	0	5	2009	New	Partial	287090
1452	0	5	2006	WD	Normal	145000
1453	0	7	2006	WD	Abnorml	84500
1454	0	10	2009	WD	Normal	185000
1455	0	8	2007	WD	Normal	175000

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1456
                       0
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                                   2010
                                                 WD
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                   2500
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                               4
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                       0
                                   2010
                                                 WD
                                                              Normal
                                                                           142125
                       0
                               6
                                   2008
                                                 WD
                                                              Normal
          1459
                                                                           147500
          [1460 rows x 80 columns]
In [23]: test_df = pd.read_csv('train.csv')
          dummies = pd.get_dummies(test_df['Fence']).rename(columns=lambda x: 'Fence_' + str(x))
          test_df = pd.concat([test_df, dummies], axis=1)
          test_df =test_df.drop(['Fence'], axis=1)
In [24]: test_df
Out [24]:
                        MSSubClass MSZoning LotFrontage LotArea Street Alley LotShape
                   Ιd
          0
                    1
                                 60
                                           RL
                                                        65.0
                                                                  8450
                                                                           Pave
                                                                                   NaN
                                                                                             Reg
                    2
                                 20
                                           RL
                                                                   9600
          1
                                                        80.0
                                                                           Pave
                                                                                   NaN
                                                                                             Reg
          2
                    3
                                           RL
                                                        68.0
                                 60
                                                                 11250
                                                                                             IR1
                                                                           Pave
                                                                                   NaN
          3
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                                                        60.0
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                                                                           Pave
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                    5
          4
                                 60
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                                                        84.0
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                                           RL
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                                                                 14115
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                                                                                             IR1
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                    7
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          7
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                                 60
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21930

4928

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Pave

Pave

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IR3

IR1

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RL

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1431

1432

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120

1432	1433		30	RL	60.0	10800	Pave	Grvl	Reg
1433	1434		60	RL	93.0	10261	Pave	NaN	IR1
1434	1435		20	RL	80.0	17400	Pave	NaN	Reg
1435	1436		20	RL	80.0	8400	Pave	NaN	Reg
1436	1437		20	RL	60.0	9000	Pave	NaN	Reg
1437	1438		20	RL	96.0	12444	Pave	NaN	Reg
1438	1439		20	RM	90.0	7407	Pave	NaN	Reg
1439	1440		60	RL	80.0	11584	Pave	NaN	Reg
1440	1441		70	RL	79.0	11526	Pave	NaN	IR1
1441	1442		120	RM	NaN	4426	Pave	NaN	Reg
1442	1443		60	FV	85.0	11003	Pave	NaN	Reg
1443	1444		30	RL	NaN	8854	Pave	NaN	Reg
1444	1445		20	RL	63.0	8500	Pave	NaN	Reg
1445	1446		85	RL	70.0	8400	Pave	NaN	Reg
1446	1447		20	RL	NaN	26142	Pave	NaN	IR1
1447	1448		60	RL	80.0	10000	Pave	NaN	Reg
1448	1449		50	RL	70.0	11767	Pave	NaN	Reg
1449	1450		180	RM	21.0	1533	Pave	NaN	Reg
1450	1451		90	RL	60.0	9000	Pave	NaN	Reg
1451	1452		20	RL	78.0	9262	Pave	NaN	Reg
1452	1453		180	RM	35.0	3675	Pave	NaN	Reg
1453	1454		20	RL	90.0	17217	Pave	NaN	Reg
1454	1455		20	FV	62.0	7500	Pave	Pave	Reg
1455	1456		60	RL	62.0	7917	Pave	NaN	Reg
1456	1457		20	RL	85.0	13175	Pave	NaN	Reg
1457	1458		70	RL	66.0	9042	Pave	NaN	Reg
1458	1459		20	RL	68.0	9717	Pave	NaN	Reg
1459	1460		20	RL	75.0	9937	Pave	NaN	Reg
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1		Lvl	AllPub		0	5	2007	WD	
2		Lvl	AllPub		0	9	2008	WD	
3		Lvl	AllPub		0	2	2006	WD	
4		Lvl	AllPub		0	12	2008	WD	
5		Lvl	AllPub		700	10	2009	WD	
6		Lvl	AllPub		0	8	2007	WD	
7		Lvl	AllPub		350	11	2009	WD	
8		Lvl	AllPub		0	4	2008	WD	
9		Lvl	AllPub		0	1	2008	WD	
10		Lvl	AllPub		0	2	2008	WD	
11		Lvl	AllPub		0	7	2006	New	
12		Lvl	AllPub		0	9	2008	WD	
13		Lvl	AllPub		0	8	2007	New	
14		Lvl	AllPub		0	5	2008	WD	
15		Lvl	AllPub		0	7	2007	WD	
16		Lvl	AllPub		700	3	2010	WD	
17		Lvl	AllPub		500	10	2006	WD	

18	Lvl	AllPub		0	6	2008	WD
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20	Lvl	AllPub		0	11	2006	New
21	Bnk	AllPub		0	6	2007	WD
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24	Lvl	AllPub		0	5	2010	WD
25	Lvl	AllPub		0	7	2009	WD
26	Lvl	AllPub		0	5	2010	WD
27	Lvl	AllPub		0	5	2010	WD
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29	Lvl	AllPub		0	5	2008	WD
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1430	Lvl	AllPub		0	7	2006	WD
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1433	Lvl	AllPub	•••	0	5	2008	WD
1434	Low	AllPub	•••	0	5	2006	WD
1435	Lvl	AllPub	• • •	0	7	2008	COD
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1439	Lvl	AllPub	• • •	0	11	2007	
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1454	Lvl	AllPub	• • •	0	10	2009	WD
1455	Lvl	AllPub		0	8	2007	WD
1456	Lvl	AllPub		0	2	2010	WD
1457	Lvl	AllPub		2500	5	2010	WD
1458	Lvl	AllPub		0	4	2010	WD
1459	Lvl	AllPub		0	6	2008	WD
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1	Normal	181500	0		0	0	0
2	Normal	223500	0		0	0	0

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6	4	Normal	250000	0	0	0	0
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8	6	Normal	307000	0	0	0	0
9	7	Normal	200000	0	0	0	0
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10				0	0	0	0
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1447 Normal 240000 0 0 0 0 1448 Normal 112000 0 1 0 0	1445	Normal	129000	0	0	0	0
1448 Normal 112000 0 1 0	1446	Normal	157900	0	0	0	0
	1447	Normal	240000	0	0	0	0
1449 Abnorml 92000 0 0 0	1448	Normal	112000	0	1	0	0
	1449	Abnorml	92000	0	0	0	0

1450	Normal	136000	0	0	0	0
1451	Partial	287090	0	0	0	0
1452	Normal	145000	0	0	0	0
1453	Abnorml	84500	0	0	0	0
1454	Normal	185000	0	0	0	0
1455	Normal	175000	0	0	0	0
1456	Normal	210000	0	0	1	0
1457	Normal	266500	1	0	0	0
1458	Normal	142125	0	0	0	0
1459	Normal	147500	0	0	0	0

[1460 rows x 84 columns]

```
In [25]: df =test_df['MSZoning']
```

In [26]: df

```
Out[26]: 0
                    RL
          1
                    RL
                    RL
          3
                    RL
          4
                    RL
          5
                    RL
          6
                    RL
          7
                    RL
          8
                    RM
          9
                    RL
          10
                    RL
          11
                    RL
          12
                    RL
          13
                    RL
          14
                    RL
          15
                    RM
          16
                    RL
          17
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          18
                    RL
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                    RL
          20
                    RL
          21
                    {\tt RM}
          22
                    RL
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                    RM
          24
                    RL
          25
                    RL
          26
                    RL
          27
                    RL
          28
                    RL
          29
                    RM
```

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1431
                 RL
         1432
                 RL
         1433
                 RL
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                 RL
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                 RL
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                 RL
         1438
                 RM
         1439
                 RL
         1440
                 RL
         1441
                 RM
         1442
                 FV
         1443
                 RL
         1444
                 RL
         1445
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         1446
                 RL
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                 RL
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                 RM
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                 RL
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                 RM
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                 RL
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                 F۷
         1455
                 RL
         1456
                 RL
         1457
                 RL
         1458
                 RL
         1459
                 RL
         Name: MSZoning, dtype: object
In [29]: df.name
Out[29]: 'MSZoning'
In [31]: df.unique()
Out[31]: array(['RL', 'RM', 'C (all)', 'FV', 'RH'], dtype=object)
In [34]: df.dtypes
Out[34]: dtype('0')
In [1]: import pandas as pd
        test_df = pd.read_csv('train.csv')
        test_df.head()
Out[1]:
           Id MSSubClass MSZoning LotFrontage LotArea Street Alley LotShape \
        0
            1
                        60
                                 RL
                                             65.0
                                                      8450
                                                              Pave
                                                                     NaN
                                                                              Reg
```

1430

RL

	1	2	2	0 RL		80.0		9600	Pave	NaN	Re	g	
	2	3	6	O RL		68.0	1	1250	Pave	NaN	IR	1	
	3	4	7	0 RL		60.0		9550	Pave	NaN	IR	1	
	4	5	6	O RL		84.0	1	4260	Pave	NaN	IR	1	
		LandCor	ntour Ut	ilities		Pool Ar	·ea	Poolnc	Fence	MiscF	eature l	MiscVal	\
	0	Landon	Lvl	AllPub		TOOTAL	0	NaN	NaN	HIBCI	NaN	0	`
	1		Lvl	AllPub			0	NaN	NaN		NaN	0	
	2		Lvl	AllPub			0	NaN	NaN		NaN	0	
	3		Lvl	AllPub			0	NaN	NaN		NaN	0	
	4		Lvl	AllPub			0	NaN	NaN		NaN	0	
	_						Ū					·	
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	0	2	2008	WD		Normal		208500)				
	1	5	2007	WD		Normal		181500					
	2	9	2008	WD		Normal		223500					
	3	2	2006	WD		Abnorml		140000)				
	4	12	2008	WD		Normal		250000)				
	[5	rows 2	k 81 col	umns]									
In [2]:	<pre>import numpy as np from scipy.stats import norm import matplotlib.pyplot as plt</pre>												
In [3]:	te	est_df.h	nead()										
Out[3]:		Id MS	SSubClas	s MSZoning	LotF	rontage	Lot	Area St	reet	Alley	LotShap	e \	
	0	1		_		0				NaN	_		
	1		Ö	0 RL		65.0		8450	Pave	Ivaiv	Re	g	
		2		0 RL 0 RL					Pave		Re _z Re _z	_	
	2	2 3	2			80.0		9600	Pave	NaN	Re	g	
	2		2 6	0 RL			1					g 1	
		3	2 6 7	0 RL 0 RL		80.0 68.0	1	9600 1250	Pave Pave	NaN NaN	Reg IR	g 1 1	
	3	3 4 5	2 6 7 6	0 RL 0 RL 0 RL 0 RL		80.0 68.0 60.0 84.0	1	9600 1250 9550 4260	Pave Pave Pave Pave	NaN NaN NaN NaN	Re; IR IR IR	g 1 1 1	\
	3 4	3 4 5	2 6 7 6 ntour Ut	0 RL 0 RL 0 RL 0 RL ilities		80.0 68.0 60.0 84.0	1 1	9600 1250 9550 4260 PoolQC	Pave Pave Pave Pave Fence	NaN NaN NaN NaN	Re IR IR IR	g 1 1 1 1 MiscVal	\
	3 4 0	3 4 5	2 6 7 6 ntour Ut Lv1	0 RL 0 RL 0 RL 0 RL ilities AllPub		80.0 68.0 60.0 84.0	1 1 ea 0	9600 1250 9550 4260 PoolQC NaN	Pave Pave Pave Pave NaN	NaN NaN NaN NaN	Re IR IR IR eature 1	g 1 1 1 1 MiscVal 0	\
	3 4 0 1	3 4 5	2 6 7 6 ntour Ut Lvl Lvl	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub		80.0 68.0 60.0 84.0	1 1 rea 0 0	9600 1250 9550 4260 PoolQC NaN NaN	Pave Pave Pave Pave NaN	NaN NaN NaN NaN	Re IR IR IR eature l NaN NaN	g 1 1 1 1 MiscVal 0	\
	3 4 0 1 2	3 4 5	2 6 7 6 ntour Ut Lvl Lvl Lvl	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub		80.0 68.0 60.0 84.0	1 1 0 0 0	9600 1250 9550 4260 PoolQC NaN NaN	Pave Pave Pave Pave NaN NaN	NaN NaN NaN NaN	Re IR IR IR eature 1 NaN NaN	g 1 1 1 1 MiscVal 0 0	\
	3 4 0 1 2 3	3 4 5	2 6 7 6 ntour Ut Lvl Lvl Lvl Lvl	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub AllPub		80.0 68.0 60.0 84.0	1 1 rea 0 0	9600 1250 9550 4260 PoolQC NaN NaN NaN	Pave Pave Pave Pave Kence NaN NaN NaN	NaN NaN NaN NaN	Reg IR IR Geature 1 NaN NaN NaN	g 1 1 1 1 MiscVal 0	\
	3 4 0 1 2	3 4 5 LandCor	2 6 7 6 ntour Ut Lvl Lvl Lvl Lvl Lvl	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub		80.0 68.0 60.0 84.0	1 1 cea 0 0 0 0 0	9600 1250 9550 4260 PoolQC NaN NaN	Pave Pave Pave Pave NaN NaN	NaN NaN NaN NaN	Re IR IR IR eature 1 NaN NaN	g 1 1 1 1 MiscVal 0 0 0	\
	3 4 0 1 2 3	3 4 5 LandCor	2 6 7 6 ntour Ut Lvl Lvl Lvl Lvl	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub AllPub		80.0 68.0 60.0 84.0	1 1 0 0 0 0	9600 1250 9550 4260 PoolQC NaN NaN NaN	Pave Pave Pave Pave Fence NaN NaN NaN NaN	NaN NaN NaN NaN	Reg IR IR Geature 1 NaN NaN NaN	g 1 1 1 1 MiscVal 0 0 0	\
	3 4 0 1 2 3	3 4 5 LandCor	2 6 7 6 ntour Ut Lvl Lvl Lvl Lvl Lvl	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub AllPub AllPub AllPub		80.0 68.0 60.0 84.0 PoolAr	1 1 0 0 0 0	9600 1250 9550 4260 PoolQC NaN NaN NaN NaN	Pave Pave Pave Pave Kence NaN NaN NaN NaN NaN	NaN NaN NaN NaN	Reg IR IR Geature 1 NaN NaN NaN	g 1 1 1 1 MiscVal 0 0 0	\
	3 4 0 1 2 3 4	3 4 5 LandCor	2 6 7 6 ntour Ut Lvl Lvl Lvl Lvl Lvl Lvl	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub AllPub AllPub AllPub SaleType		80.0 68.0 60.0 84.0 PoolAr	1 1 0 0 0 0	9600 1250 9550 4260 PoolQC NaN NaN NaN NaN	Pave Pave Pave Pave Fence NaN NaN NaN NaN	NaN NaN NaN NaN	Reg IR IR Geature 1 NaN NaN NaN	g 1 1 1 1 MiscVal 0 0 0	\
	3 4 0 1 2 3 4	3 4 5 LandCor MoSold 2	2 6 7 6 ntour Ut Lvl Lvl Lvl Lvl Lvl YrSold 2008	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub AllPub AllPub AllPub SaleType WD		80.0 68.0 60.0 84.0 PoolAr	1 1 0 0 0 0	9600 1250 9550 4260 PoolQC NaN NaN NaN NaN	Pave Pave Pave Pave Fence NaN NaN NaN NaN NaN	NaN NaN NaN NaN	Reg IR IR Geature 1 NaN NaN NaN	g 1 1 1 1 MiscVal 0 0 0	\
	3 4 0 1 2 3 4	3 4 5 LandCor MoSold 2 5	2 6 7 6 ntour Ut Lvl Lvl Lvl Lvl Lvl 4 2008 2007	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub AllPub AllPub AllPub SaleType WD WD		80.0 68.0 60.0 84.0 PoolAr ondition Normal	1 1 0 0 0 0	9600 1250 9550 4260 PoolQC NaN NaN NaN NaN NaN	Pave Pave Pave Pave NaN NaN NaN NaN NaN NaN	NaN NaN NaN NaN	Reg IR IR Geature 1 NaN NaN NaN	g 1 1 1 1 MiscVal 0 0 0	
	3 4 0 1 2 3 4 0 1 2	3 4 5 LandCor MoSold 2 5 9	2 6 7 6 ntour Ut Lvl Lvl Lvl Lvl VrSold 2008 2007 2008	0 RL 0 RL 0 RL 0 RL ilities AllPub AllPub AllPub AllPub AllPub SaleType WD WD WD		80.0 68.0 60.0 84.0 PoolAr ondition Normal Normal	1 1 0 0 0 0	9600 1250 9550 4260 PoolQC NaN NaN NaN NaN OaN 1ePrice 208500 181500	Pave Pave Pave Pave NaN NaN NaN NaN NaN O O	NaN NaN NaN NaN	Reg IR IR Geature 1 NaN NaN NaN	g 1 1 1 1 MiscVal 0 0 0	

In [4]: test_val = test_df.values

In [5]: np.shape(test_val)

Out[5]: (1460, 81)

In [7]: test_df.convert_objects(convert_numeric=True)

/home/bhumihar/anaconda3/lib/python3.5/site-packages/ipykernel/__main__.py:1: FutureWarning: con
if __name__ == '__main__':

Out[7]:	Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	LotShape	\
0	1	60	RL	65.0	8450	Pave	NaN	Reg	
1	2	20	RL	80.0	9600	Pave	NaN	Reg	
2	3	60	RL	68.0	11250	Pave	NaN	IR1	
3	4	70	RL	60.0	9550	Pave	NaN	IR1	
4	5	60	RL	84.0	14260	Pave	NaN	IR1	
5	6	50	RL	85.0	14115	Pave	NaN	IR1	
6	7	20	RL	75.0	10084	Pave	NaN	Reg	
7	8	60	RL	NaN	10382	Pave	NaN	IR1	
8	9	50	RM	51.0	6120	Pave	NaN	Reg	
9	10	190	RL	50.0	7420	Pave	NaN	Reg	
10	11	20	RL	70.0	11200	Pave	NaN	Reg	
11	12	60	RL	85.0	11924	Pave	NaN	IR1	
12	13	20	RL	NaN	12968	Pave	NaN	IR2	
13	14	20	RL	91.0	10652	Pave	NaN	IR1	
14	15	20	RL	NaN	10920	Pave	NaN	IR1	
15	16	45	RM	51.0	6120	Pave	NaN	Reg	
16	17	20	RL	NaN	11241	Pave	NaN	IR1	
17	18	90	RL	72.0	10791	Pave	NaN	Reg	
18	19	20	RL	66.0	13695	Pave	NaN	Reg	
19	20	20	RL	70.0	7560	Pave	NaN	Reg	
20	21	60	RL	101.0	14215	Pave	NaN	IR1	
21	22	45	RM	57.0	7449	Pave	Grvl	Reg	
22	23	20	RL	75.0	9742	Pave	NaN	Reg	
23	24	120	RM	44.0	4224	Pave	NaN	Reg	
24	25	20	RL	NaN	8246	Pave	NaN	IR1	
25	26	20	RL	110.0	14230	Pave	NaN	Reg	
26	27	20	RL	60.0	7200	Pave	NaN	Reg	
27	28	20	RL	98.0	11478	Pave	NaN	Reg	
28	29	20	RL	47.0	16321	Pave	NaN	IR1	
29	30	30	RM	60.0	6324	Pave	NaN	IR1	
1430	1431	60	RL	60.0	21930	Pave	NaN	IR3	
1431	1432	120	RL	NaN	4928	Pave	NaN	IR1	
1432	1433	30	RL	60.0	10800	Pave	Grvl	Reg	
1433	1434	60	RL	93.0	10261	Pave	NaN	IR1	
1434	1435	20	RL	80.0	17400	Pave	NaN	Reg	

1435	1436	20	RL	80.0	8400	Pave	NaN	Reg
1436	1437	20	RL	60.0	9000	Pave	${\tt NaN}$	Reg
1437	1438	20	RL	96.0	12444	Pave	${\tt NaN}$	Reg
1438	1439	20	RM	90.0	7407	Pave	NaN	Reg
1439	1440	60	RL	80.0	11584	Pave	NaN	Reg
1440	1441	70	RL	79.0	11526	Pave	NaN	IR1
1441	1442	120	RM	NaN	4426	Pave	NaN	Reg
1442	1443	60	FV	85.0	11003	Pave	NaN	Reg
1443	1444	30	RL	NaN	8854	Pave	NaN	Reg
1444	1445	20	RL	63.0	8500	Pave	NaN	Reg
1445	1446	85	RL	70.0	8400	Pave	NaN	Reg
1446	1447	20	RL	NaN	26142	Pave	NaN	IR1
1447	1448	60	RL	80.0	10000	Pave	NaN	Reg
1448	1449	50	RL	70.0	11767	Pave	NaN	Reg
1449	1450	180	RM	21.0	1533	Pave	NaN	Reg
1450	1451	90	RL	60.0	9000	Pave	NaN	Reg
1451	1451	20	RL	78.0	9262	Pave	NaN	Reg
1452	1453	180	RM	35.0	3675	Pave	NaN	_
1453	1454	20	RL	90.0			NaN	Reg
					17217	Pave		Reg
1454	1455	20	FV	62.0	7500 7017	Pave	Pave	Reg
1455	1456	60	RL	62.0	7917	Pave	NaN N-N	Reg
1456	1457	20	RL	85.0	13175	Pave	NaN	Reg
1457	1458	70	RL	66.0	9042	Pave	NaN	Reg
1458	1459	20	RL	68.0	9717	Pave	NaN	Reg
1459	1460	20	RL	75.0	9937	Pave	NaN	Reg
	LandContour	IItilities		PoolArea	Poolnc	Fence	MiscFe	ature \
0	Lvl		• • •	0	NaN	NaN	III BCI C	NaN
1	Lvl		• • •	0	NaN	NaN		NaN
2	Lvl		• • •	0	NaN	NaN		NaN
3	Lvl		• • •	0				NaN
4	Lvl			U		1/1 🔾 1/1		
	レ۷エ	411Diih			NaN NaN	NaN NaN		
h			• • •	0	NaN	NaN		NaN
5	Lvl	AllPub		0	NaN NaN	NaN MnPrv		NaN Shed
6	Lvl Lvl	AllPub AllPub		0 0 0	NaN NaN NaN	NaN MnPrv NaN		NaN Shed NaN
6 7	Lvl Lvl Lvl	AllPub AllPub AllPub		0 0 0	NaN NaN NaN NaN	NaN MnPrv NaN NaN		NaN Shed NaN Shed
6 7 8	Lvl Lvl Lvl Lvl	AllPub AllPub AllPub AllPub		0 0 0 0	NaN NaN NaN NaN	NaN MnPrv NaN NaN NaN		NaN Shed NaN Shed NaN
6 7 8 9	Lvl Lvl Lvl Lvl	AllPub AllPub AllPub AllPub AllPub		0 0 0 0 0	NaN NaN NaN NaN NaN	NaN MnPrv NaN NaN NaN NaN		NaN Shed NaN Shed NaN NaN
6 7 8 9 10	Lvl Lvl Lvl Lvl Lvl	AllPub AllPub AllPub AllPub AllPub AllPub		0 0 0 0 0 0	NaN NaN NaN NaN NaN NaN	NaN MnPrv NaN NaN NaN NaN		NaN Shed NaN Shed NaN NaN
6 7 8 9 10 11	Lvl Lvl Lvl Lvl Lvl Lvl	AllPub AllPub AllPub AllPub AllPub AllPub AllPub		0 0 0 0 0 0	NaN NaN NaN NaN NaN NaN NaN	NaN MnPrv NaN NaN NaN NaN NaN		NaN Shed NaN Shed NaN NaN NaN
6 7 8 9 10 11	Lvl Lvl Lvl Lvl Lvl Lvl Lvl	AllPub AllPub AllPub AllPub AllPub AllPub AllPub AllPub AllPub		0 0 0 0 0 0 0	NaN NaN NaN NaN NaN NaN NaN	NaN MnPrv NaN NaN NaN NaN NaN NaN NaN NaN		NaN Shed NaN Shed NaN NaN NaN NaN NaN NaN
6 7 8 9 10 11 12 13	Lvl Lvl Lvl Lvl Lvl Lvl Lvl	AllPub		0 0 0 0 0 0 0	NaN	NaN MnPrv NaN NaN NaN NaN NaN NaN NaN NaN NaN		NaN Shed NaN Shed NaN NaN NaN NaN NaN NaN NaN
6 7 8 9 10 11 12 13 14	Lvl Lvl Lvl Lvl Lvl Lvl Lvl Lvl	AllPub		0 0 0 0 0 0 0 0	NaN	NaN MnPrv NaN NaN NaN NaN NaN NaN NaN NaN NaN Na		NaN Shed NaN Shed NaN NaN NaN NaN NaN NaN NaN NaN NaN
6 7 8 9 10 11 12 13 14 15	Lvl Lvl Lvl Lvl Lvl Lvl Lvl Lvl Lvl	AllPub		0 0 0 0 0 0 0 0	NaN	NaN MnPrv NaN NaN NaN NaN NaN NaN NaN CaN NaN CadWo GdPrv		NaN Shed NaN Shed NaN NaN NaN NaN NaN NaN NaN NaN NaN Na
6 7 8 9 10 11 12 13 14 15 16	Lvl Lvl Lvl Lvl Lvl Lvl Lvl Lvl Lvl Lvl	AllPub		0 0 0 0 0 0 0 0	NaN	NaN MnPrv NaN NaN NaN NaN NaN NaN NaN CdWo GdPrv NaN		NaN Shed NaN Shed NaN NaN NaN NaN NaN NaN NaN NaN NaN Na
6 7 8 9 10 11 12 13 14 15 16 17	Lvl	AllPub		0 0 0 0 0 0 0 0 0	NaN	NaN MnPrv NaN NaN NaN NaN NaN NaN NaN GdWo GdPrv NaN NaN		NaN Shed NaN Shed NaN NaN NaN NaN NaN NaN NaN NaN NaN Shed Shed
6 7 8 9 10 11 12 13 14 15 16 17 18	Lvl	AllPub		0 0 0 0 0 0 0 0 0 0	NaN	NaN MnPrv NaN NaN NaN NaN NaN NaN CdWo GdPrv NaN NaN NaN		NaN Shed NaN Shed NaN NaN NaN NaN NaN NaN NaN Shed Shed NaN
6 7 8 9 10 11 12 13 14 15 16 17	Lvl	AllPub		0 0 0 0 0 0 0 0 0	NaN	NaN MnPrv NaN NaN NaN NaN NaN NaN NaN GdWo GdPrv NaN NaN		NaN Shed NaN Shed NaN NaN NaN NaN NaN NaN NaN NaN NaN Shed Shed

21		Bnk	AllPub		0	NaN	GdPrv	NaN
22		Lvl	AllPub		0	NaN	NaN	NaN
23		Lvl	AllPub		0	NaN	NaN	NaN
24		Lvl	AllPub		0	NaN	${ t MnPrv}$	NaN
25		Lvl	AllPub		0	NaN	NaN	NaN
26		Lvl	AllPub		0	NaN	NaN	NaN
27		Lvl	AllPub		0	NaN	NaN	NaN
28		Lvl	AllPub		0	NaN	NaN	NaN
29		Lvl	AllPub		0	NaN	NaN	NaN
1430)	Lvl	AllPub		0	NaN	NaN	NaN
1431		Lvl	AllPub		0	NaN	NaN	NaN
1432		Lvl	AllPub		0	NaN	NaN	NaN
1433		Lvl	AllPub		0	NaN	NaN	NaN
1434		Low	AllPub		0	NaN	NaN	NaN
1435		Lvl	AllPub		0	NaN	GdPrv	NaN
1436		Lvl	AllPub		0	NaN	GdWo	NaN
1437		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1438		Lvl	AllPub	• • •	0	NaN	MnPrv	NaN
1439		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1440		Bnk	AllPub	• • •	0	NaN	NaN	NaN
1441		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1442		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1442				• • •				
		Lvl	AllPub	• • •	0	NaN	NaN	NaN NaN
1444		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1445		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1446		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1447		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1448		Lvl	AllPub		0	NaN	GdWo	NaN
1449		Lvl	AllPub		0	NaN	NaN	NaN
1450		Lvl	AllPub		0	NaN	NaN	NaN
1451		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1452		Lvl	AllPub	• • •	0	NaN	NaN	NaN
1453	}	Lvl	AllPub		0	NaN	NaN	NaN
1454	:	Lvl	AllPub		0	NaN	NaN	NaN
1455	i	Lvl	AllPub		0	NaN	NaN	NaN
1456	;	Lvl	AllPub		0	NaN	${ t MnPrv}$	NaN
1457	•	Lvl	AllPub		0	NaN	${\tt GdPrv}$	Shed
1458	}	Lvl	AllPub		0	NaN	NaN	NaN
1459)	Lvl	AllPub		0	NaN	NaN	NaN
	MiscVal	Mogold	Vrgald	SaleType	SaleCondit	ion (SalePrice	
0	MISCVAI 0	2		WD		rmal	208500	
		5						
1 2	0	9	2007	WD		rmal	181500	
3	0	9	2008	WD		rmal	223500	
	0		2006	WD	Abno		140000	
4	700	12	2008	WD		rmal	250000	
5	700	10	2009	WD	Nor	rmal	143000	

	•		0007	110	., .	007000
6	0	8	2007	WD	Normal	307000
7	350	11	2009	WD	Normal	200000
8	0	4	2008	WD	Abnorml	129900
9	0	1	2008	WD	Normal	118000
10	0	2	2008	WD	Normal	129500
11	0	7	2006	New	Partial	345000
12	0	9	2008	WD	Normal	144000
13	0	8	2007	New	Partial	279500
14	0	5	2008	WD	Normal	157000
15	0	7	2007	WD	Normal	132000
16	700	3	2010	WD	Normal	149000
17	500	10	2006	WD	Normal	90000
18	0	6	2008	WD	Normal	159000
19	0	5	2009	COD	Abnorml	139000
20	0	11	2006	New	Partial	325300
21	0	6	2007	WD	Normal	139400
22	0	9	2008	WD	Normal	230000
23	0	6	2007	WD	Normal	129900
24	0	5	2010	WD	Normal	154000
25	0	7	2009	WD	Normal	256300
26	0	5	2010	WD	Normal	134800
27	0	5	2010	WD	Normal	306000
28	0	12	2006	WD	Normal	207500
29	0	5	2008	WD	Normal	68500
1430	0	7	2006	WD	Normal	192140
1431	0	10	2009	WD	Normal	143750
1432	0	8	2007	WD	Normal	64500
1433	0	5	2008	WD	Normal	186500
1434	0	5	2006	WD	Normal	160000
1435	0	7	2008	COD	Abnorml	174000
1436	0	5	2007	WD	Normal	120500
1437	0	11	2008	New	Partial	394617
1438	0	4	2010	WD	Normal	149700
1439	0	11	2010	WD	Normal	197000
1440	0	9	2007	WD	Normal	191000
1441	0	5	2008	WD	Normal	149300
1442	0	4	2009	WD	Normal	310000
1443	0	5	2009	WD	Normal	121000
1444	0	11	2007	WD	Normal	179600
1445	0	5	2007	WD	Normal	129000
1446	0	4	2010	WD	Normal	157900
1447	0	12	2007	WD	Normal	240000
1448	0	5	2007	WD	Normal	112000
1449	0	8	2006	WD	Abnorml	92000
1450	0	9	2009	WD	Normal	136000
1451	0	5	2009	New	Partial	287090
1452	0	5	2006	WD	Normal	145000

```
1453
            0
                    7
                         2006
                                       WD
                                                  Abnorml
                                                                 84500
1454
            0
                   10
                         2009
                                       WD
                                                   Normal
                                                                185000
1455
                         2007
            0
                    8
                                       WD
                                                   Normal
                                                                175000
1456
                    2
                         2010
                                       \mathtt{WD}
                                                   Normal
                                                                210000
         2500
                    5
                                                   Normal
1457
                         2010
                                       WD
                                                                266500
1458
                    4
                         2010
                                       WD
                                                   Normal
                                                                142125
1459
                         2008
                                       WD
                                                   Normal
                                                                147500
```

[1460 rows x 81 columns]

In [8]: train_df = pd.read_csv('train.csv')

In [9]: train_df.head()

Out[9]:	Ιd	MSSubClass	MSZoning	${ t LotFrontage}$	${ t LotArea}$	Street	Alley	LotShape	/
0	1	60	RL	65.0	8450	Pave	NaN	Reg	
1	2	20	RL	80.0	9600	Pave	NaN	Reg	
2	3	60	RL	68.0	11250	Pave	NaN	IR1	
3	4	70	RL	60.0	9550	Pave	NaN	IR1	
4	5	60	RL	84.0	14260	Pave	NaN	IR1	

	LandContour	Utilities	 PoolArea	PoolQC	Fence	MiscFeature	${ t MiscVal}$	\
0	Lvl	AllPub	 0	NaN	NaN	NaN	0	
1	Lvl	AllPub	 0	NaN	NaN	NaN	0	
2	Lvl	AllPub	 0	NaN	NaN	NaN	0	
3	Lvl	AllPub	 0	NaN	NaN	NaN	0	
4	Lvl	AllPub	 0	NaN	NaN	NaN	0	

	MoSold	YrSold	SaleType	SaleCondition	SalePrice
0	2	2008	WD	Normal	208500
1	5	2007	WD	Normal	181500
2	9	2008	WD	Normal	223500
3	2	2006	WD	Abnorml	140000
4	12	2008	WD	Normal	250000

[5 rows x 81 columns]

In [10]: train_df.convert_objects(convert_numeric=True)

/home/bhumihar/anaconda3/lib/python3.5/site-packages/ipykernel/__main__.py:1: FutureWarning: con
if __name__ == '__main__':

Out[10]:	Id	MSSubClass	MSZoning	LotFrontage	${\tt LotArea}$	Street	Alley	LotShape	\
0	1	60	RL	65.0	8450	Pave	NaN	Reg	
1	2	20	RL	80.0	9600	Pave	NaN	Reg	
2	3	60	RL	68.0	11250	Pave	NaN	IR1	
3	4	70	RL	60.0	9550	Pave	NaN	IR1	
4	5	60	R.I.	84.0	14260	Pave	NaN	TR.1	

5	6	50	RL	85.0	14115	Pave	NaN	IR1
6	7	20	RL	75.0	10084	Pave	NaN	Reg
7	8	60	RL	NaN	10382	Pave	NaN	IR1
8	9	50	RM	51.0	6120	Pave	NaN	Reg
9	10	190	RL	50.0	7420	Pave	NaN	Reg
10	11	20	RL	70.0	11200	Pave	NaN	Reg
11	12	60	RL	85.0	11924	Pave	NaN	IR1
12	13	20	RL	NaN	12968	Pave	NaN	IR2
13	14	20	RL	91.0	10652	Pave	NaN	IR1
14	15	20	RL	NaN	10920	Pave	NaN	IR1
15	16	45	RM	51.0	6120	Pave	NaN	Reg
16	17	20	RL	NaN	11241	Pave	NaN	IR1
17	18	90	RL	72.0	10791	Pave	NaN	Reg
18	19	20	RL	66.0	13695	Pave	NaN	
19	20	20	RL	70.0	7560	Pave	NaN	Reg
20		60						Reg
	21		RL	101.0	14215	Pave	NaN	IR1
21	22	45	RM	57.0	7449	Pave	Grvl	Reg
22	23	20	RL	75.0	9742	Pave	NaN	Reg
23	24	120	RM	44.0	4224	Pave	NaN	Reg
24	25	20	RL	NaN	8246	Pave	NaN	IR1
25	26	20	RL	110.0	14230	Pave	NaN	Reg
26	27	20	RL	60.0	7200	Pave	NaN	Reg
27	28	20	RL	98.0	11478	Pave	NaN	Reg
28	29	20	RL	47.0	16321	Pave	NaN	IR1
29	30	30	RM	60.0	6324	Pave	NaN	IR1
• • •		• • •	• • •			• • •		• • •
1430	1431	60	RL	60.0	21930	Pave	NaN	IR3
1431	1432	120	RL	NaN	4928	Pave	NaN	IR1
1432	1433	30	RL	60.0	10800	Pave	Grvl	Reg
1433	1434	60	RL	93.0	10261	Pave	NaN	IR1
1434	1435	20	RL	80.0	17400	Pave	NaN	Reg
1435	1436	20	RL	80.0	8400	Pave	NaN	Reg
1436	1437	20	RL	60.0	9000	Pave	NaN	Reg
1437	1438	20	RL	96.0	12444	Pave	NaN	Reg
1438	1439	20	RM	90.0	7407	Pave	NaN	Reg
1439	1440	60	RL	80.0	11584	Pave	NaN	Reg
1440	1441	70	RL	79.0	11526	Pave	NaN	IR1
1441	1442	120	RM	NaN	4426	Pave	NaN	Reg
1442	1443	60	FV	85.0	11003	Pave	NaN	Reg
1443	1444	30	RL	NaN	8854	Pave	NaN	Reg
1444	1445	20	RL	63.0	8500	Pave	NaN	Reg
1445	1446	85	RL	70.0	8400	Pave	NaN	Reg
1446	1447	20	RL	NaN	26142	Pave	NaN	IR1
1447	1448	60	RL	80.0	10000	Pave	NaN	Reg
1448	1449	50	RL	70.0	11767	Pave	NaN	Reg
1449	1450	180	RM	21.0	1533	Pave	NaN	Reg
1450	1451	90	RL	60.0	9000	Pave	NaN	Reg
1451	1452	20	RL	78.0	9262	Pave	NaN	Reg
-	- '		· -			· · · -		0

1452	1453	180	RM	35.0	3675	Pave	NaN	Reg
1453	1454	20	RL	90.0	17217	Pave	NaN	Reg
1454	1455	20	FV	62.0	7500	Pave	Pave	Reg
1455	1456	60	RL	62.0	7917	Pave	NaN	Reg
1456	1457	20	RL	85.0	13175	Pave	NaN	Reg
1457	1458	70	RL	66.0	9042	Pave	NaN	Reg
1458	1459	20	RL	68.0	9717	Pave	NaN	Reg
1459	1460	20	RL	75.0	9937	Pave	NaN	Reg
	LandContour	Utilities		PoolArea	PoolQC	Fence	MiscFea	ture \
0	Lvl	AllPub		0	NaN	NaN		NaN
1	Lvl	AllPub		0	NaN	NaN		NaN
2	Lvl	AllPub		0	NaN	NaN		NaN
3	Lvl	AllPub		0	NaN	NaN		NaN
4	Lvl	AllPub		0	NaN	NaN		NaN
5	Lvl	AllPub		0	NaN	MnPrv		Shed
6	Lvl	AllPub		0	NaN	NaN		NaN
7	Lvl	AllPub		0	NaN	NaN		Shed
8	Lvl	AllPub		0	NaN	NaN		NaN
9	Lvl	AllPub		0	NaN	NaN		NaN
10	Lvl	AllPub		0	NaN	NaN		NaN
11	Lvl	AllPub		0	NaN	NaN		NaN
12	Lvl	AllPub		0	NaN	NaN		NaN
13	Lvl	AllPub		0	NaN	NaN		NaN
14	Lvl	AllPub		0	NaN	GdWo		NaN
15	Lvl	AllPub	• • •	0	NaN	GdPrv		NaN
16	Lvl	AllPub	• • •	0	NaN	NaN		Shed
17	Lvl	AllPub	• • •	0	NaN	NaN		Shed
18	Lvl	AllPub	• • •	0	NaN	NaN		NaN
19	Lvl	AllPub	• • •	0	NaN NaN	MnPrv		NaN
20	Lvl	AllPub	• • •	0	NaN NaN	NaN		NaN
21	Evi Bnk		• • •	0	NaN NaN	GdPrv		NaN
22			• • •					
	Lvl	AllPub	• • •	0	NaN NaN	NaN NaN		NaN NaN
23	Lvl	AllPub	• • •	0	NaN N-N	NaN M D		NaN N-N
24	Lvl	AllPub	• • •	0	NaN N-N	MnPrv		NaN N-N
25	Lvl	AllPub	• • •	0	NaN N-N	NaN N-N		NaN N-N
26	Lvl	AllPub	• • •	0	NaN N-N	NaN N-N		NaN N-N
27	Lvl	AllPub	• • •	0	NaN	NaN		NaN
28	Lvl	AllPub	• • •	0	NaN	NaN		NaN
29	Lvl	AllPub	• • •	0	NaN	NaN		NaN
			• • •					
1430	Lvl	AllPub	• • •	0	NaN	NaN		NaN
1431	Lvl	AllPub	• • •	0	NaN	NaN		NaN
1432	Lvl	AllPub		0	NaN	NaN		NaN
1433	Lvl	AllPub		0	NaN	NaN		NaN
1434	Low	AllPub		0	NaN	NaN		NaN
1435	Lvl	AllPub	• • •	0	NaN	GdPrv		NaN
1436	Lvl	AllPub		0	NaN	GdWo		NaN

1437		Lvl	AllPub		O Na	aN NaN	NaN
1438		Lvl	AllPub		O Na	aN MnPrv	NaN
1439		Lvl	AllPub		O Na	aN NaN	NaN
1440		Bnk	AllPub		O Na	aN NaN	NaN
1441		Lvl	AllPub		O Na	aN NaN	NaN
1442		Lvl	AllPub			aN NaN	NaN
1443		Lvl	AllPub			aN NaN	NaN
1444		Lvl	AllPub			aN NaN	NaN
1445		Lvl	AllPub			aN NaN	NaN
1446		Lvl	AllPub			aN NaN	NaN
1447		Lvl	AllPub			aN NaN	NaN
1448		Lvl	AllPub	• • •		aN GdWo	NaN
1449		Lvl	AllPub	• • •		aN NaN	NaN
1450		Lvl	AllPub	• • •		an Nan	NaN
1451		Lvl	AllPub	• • •		an Nan	NaN
1452		Lvl	AllPub	• • •		an Nan	NaN
1453		Lvl	AllPub	• • •		an Nan	NaN
1454			AllPub	• • •		an nan an Nan	NaN
		Lvl		• • •			
1455		Lvl	AllPub	• • •		aN NaN	NaN N-N
1456		Lvl	AllPub	• • •		aN MnPrv	NaN
1457		Lvl	AllPub			aN GdPrv	Shed
1458		Lvl	AllPub	• • •		aN NaN	NaN
1459		Lvl	AllPub	• • •	O Na	aN NaN	NaN
	M W- 7	M-C-la	VC - 1 -	C = 1 = T	CalaCanditian	CalaDaiaa	
	MiscVal			SaleType	SaleCondition		
0	0	2	2008	WD	Normal	208500	
1	0	5	2007	WD	Normal	181500	
2	0	9	2008	WD	Normal	223500	
3	0	2	2006	WD	Abnorml	140000	
4	0	12	2008	WD	Normal	250000	
5	700	10	2009	WD	Normal	143000	
6	0	8	2007	WD	Normal	307000	
7	350	11	2009	WD	Normal	200000	
8	0	4	2008	WD	Abnorml	129900	
9	0	1	2008	WD	Normal	118000	
10	0	2	2008	WD	Normal	129500	
11	0	7	2006	New	Partial	345000	
12	0	9	2008	WD	Normal	144000	
13	0	8	2007	New	Partial	279500	
14	0	5	2008	WD	Normal	157000	
15	0	7	2007	WD	Normal	132000	
16	700	3	2010	WD	Normal	149000	
17	500	10	2006	WD	Normal	90000	
18	0	6	2008	WD	Normal	159000	
19	0	5	2009	COD	Abnorml	139000	
20	0	11	2006	New	Partial	325300	
21	0	6	2007	WD	Normal	139400	
21 22	0	6 9	2007 2008		Normal Normal		

23	0	6	2007	WD	Normal	129900
24	0	5	2010	WD	Normal	154000
25	0	7	2009	WD	Normal	256300
26	0	5	2010	WD	Normal	134800
27	0	5	2010	WD	Normal	306000
28	0	12	2006	WD	Normal	207500
29	0	5	2008	WD	Normal	68500
1430	0	7	2006	WD	Normal	192140
1431	0	10	2009	WD	Normal	143750
1432	0	8	2007	WD	Normal	64500
1433	0	5	2008	WD	Normal	186500
1434	0	5	2006	WD	Normal	160000
1435	0	7	2008	COD	Abnorml	174000
1436	0	5	2007	WD	Normal	120500
1437	0	11	2008	New	Partial	394617
1438	0	4	2010	WD	Normal	149700
1439	0	11	2007	WD	Normal	197000
1440	0	9	2008	WD	Normal	191000
1441	0	5	2008	WD	Normal	149300
1442	0	4	2009	WD	Normal	310000
1443	0	5	2009	WD	Normal	121000
1444	0	11	2007	WD	Normal	179600
1445	0	5	2007	WD	Normal	129000
1446	0	4	2010	WD	Normal	157900
1447	0	12	2007	WD	Normal	240000
1448	0	5	2007	WD	Normal	112000
1449	0	8	2006	WD	Abnorml	92000
1450	0	9	2009	WD	Normal	136000
1451	0	5	2009	New	Partial	287090
1452	0	5	2006	WD	Normal	145000
1453	0	7	2006	WD	Abnorml	84500
1454	0	10	2009	WD	Normal	185000
1455	0	8	2007	WD	Normal	175000
1456	0	2	2010	WD	Normal	210000
1457	2500	5	2010	WD	Normal	266500
1458	0	4	2010	WD	Normal	142125
1459	0	6	2008	WD	Normal	147500

[1460 rows x 81 columns]

In [11]: train_df.dtypes

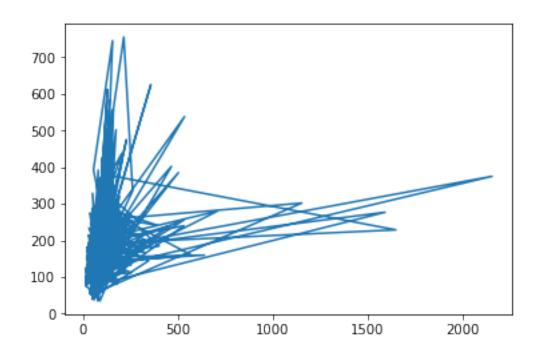
Out[11]:	Id	int64
	MSSubClass	int64
	MSZoning	object
	LotFrontage	float64
	LotArea	int64

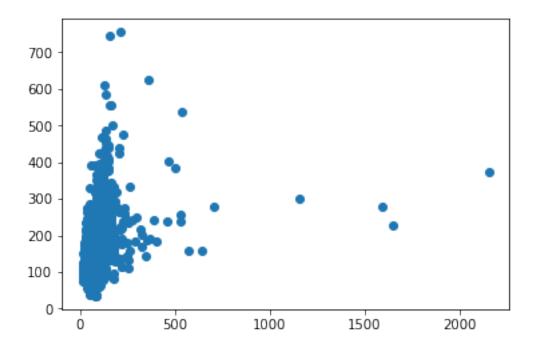
Street	object
Alley	object
LotShape	object
LandContour	object
Utilities	object
LotConfig	object
LandSlope	object
Neighborhood	object
Condition1	object
Condition2	object
BldgType	object
HouseStyle	object
OverallQual	int64
OverallCond	int64
YearBuilt	int64
YearRemodAdd	int64
RoofStyle	object
RoofMatl	object
Exterior1st	object
Exterior2nd	object
${ t MasVnrType}$	object
MasVnrArea	float64
ExterQual	object
ExterCond	object
The same of the same of the same	obioc+
Foundation	object
Foundation	object
BedroomAbvGr	int64
BedroomAbvGr KitchenAbvGr	int64
BedroomAbvGr KitchenAbvGr KitchenQual	int64 int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd	int64 int64 object int64
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional	int64 int64 object int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces	int64 int64 object int64 object int64
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu	int64 int64 object int64 object int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType	int64 int64 object int64 object int64 object object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt	int64 int64 object int64 object int64 object object object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish	int64 int64 object int64 object int64 object object object float64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars	int64 int64 object int64 object int64 object object float64 object int64
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea	int64 int64 object int64 object int64 object object float64 object int64
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual	int64 int64 object int64 object int64 object object float64 object int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond	int64 int64 object int64 object object object float64 object int64 object int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond PavedDrive	int64 int64 object int64 object int64 object object float64 object int64 object object int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond PavedDrive WoodDeckSF	int64 int64 object int64 object int64 object object float64 object int64 object int64 object int64 int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond PavedDrive WoodDeckSF OpenPorchSF	int64 int64 object int64 object int64 object object float64 object int64 int64 int64 int64 int64
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond PavedDrive WoodDeckSF OpenPorchSF EnclosedPorch	int64 int64 object int64 object int64 object object float64 object int64 int64 int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond PavedDrive WoodDeckSF OpenPorchSF	int64 int64 object int64 object int64 object object float64 object int64 int64 int64 int64 int64
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond PavedDrive WoodDeckSF OpenPorchSF EnclosedPorch	int64 int64 object int64 object int64 object object float64 object int64 int64 int64 object
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond PavedDrive WoodDeckSF OpenPorchSF EnclosedPorch 3SsnPorch	int64 int64 object int64 object int64 object object float64 object int64 int64 int64 int64 int64 int64 int64
BedroomAbvGr KitchenAbvGr KitchenQual TotRmsAbvGrd Functional Fireplaces FireplaceQu GarageType GarageYrBlt GarageFinish GarageCars GarageArea GarageQual GarageCond PavedDrive WoodDeckSF OpenPorchSF EnclosedPorch 3SsnPorch ScreenPorch	int64 int64 object int64 object int64 object object float64 object int64 int64 int64 int64 int64 int64 int64

```
object
         MiscFeature
                           object
         MiscVal
                            int64
         MoSold
                            int64
         YrSold
                            int64
         SaleType
                           object
         SaleCondition
                           object
         SalePrice
                            int64
         Length: 81, dtype: object
In [16]: train_val[:,80]
Out[16]: array([208500, 181500, 223500, ..., 266500, 142125, 147500], dtype=object)
In [17]: y = train_val[:,80]/1000
In [18]: y
Out[18]: array([208.5, 181.5, 223.5, ..., 266.5, 142.125, 147.5], dtype=object)
In [19]: x1 = train_val[:,4]/100
In [20]: x1
Out[20]: array([84.5, 96.0, 112.5, ..., 90.42, 97.17, 99.37], dtype=object)
In [21]: plt.plot(x1,y)
```

Fence

plt.show()



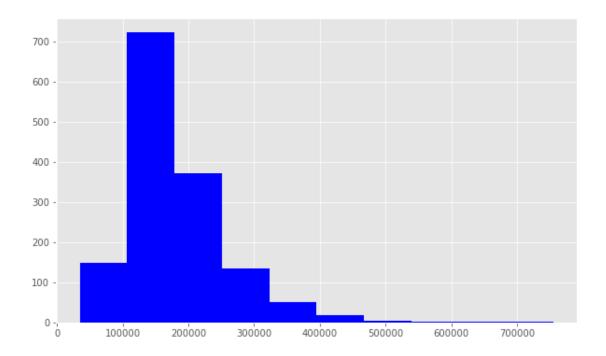


```
In [1]: import pandas as pd
        import numpy as np
In [2]: train = pd.read_csv('train.csv')
        test = pd.read_csv('test.csv')
In [3]: print ("Train data shape:", train.shape)
        print ("Test data shape:", test.shape)
Train data shape: (1460, 81)
Test data shape: (1459, 80)
In [4]: train.head()
                MSSubClass MSZoning LotFrontage
Out [4]:
            Ιd
                                                    LotArea Street Alley LotShape \
        0
             1
                         60
                                  RL
                                              65.0
                                                        8450
                                                               Pave
                                                                       NaN
                                                                                 Reg
            2
                         20
                                  RL
                                              80.0
                                                        9600
                                                               Pave
        1
                                                                       {\tt NaN}
                                                                                 Reg
        2
             3
                         60
                                  RL
                                              68.0
                                                       11250
                                                               Pave
                                                                       NaN
                                                                                 IR1
        3
             4
                         70
                                  RL
                                              60.0
                                                        9550
                                                               Pave
                                                                       {\tt NaN}
                                                                                 IR1
             5
                                  RL
                         60
                                              84.0
                                                       14260
                                                                       NaN
                                                                                 IR1
                                                               Pave
```

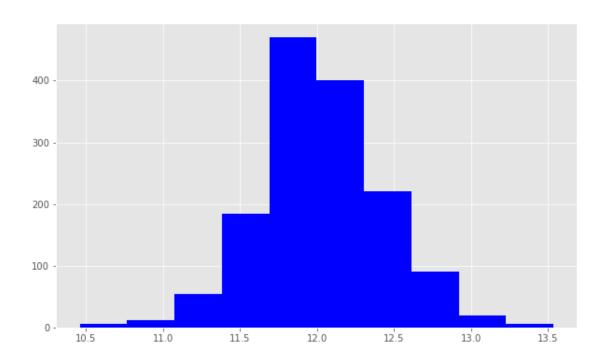
PoolArea PoolQC Fence MiscFeature MiscVal \

LandContour Utilities

```
0
                   Lvl
                          AllPub
                                                     0
                                                          NaN
                                                                NaN
                                                                             NaN
                                                                                        0
        1
                  Lvl
                          AllPub
                                                     0
                                                          NaN
                                                                NaN
                                                                             NaN
                                                                                        0
        2
                          AllPub
                                                     0
                                                                             NaN
                  Lvl
                                                          NaN
                                                                NaN
                                                                                        0
        3
                  Lvl
                          AllPub
                                                     0
                                                          NaN
                                                                NaN
                                                                             NaN
                                                                                        0
        4
                  Lvl
                          AllPub
                                                     0
                                                          NaN
                                                                             NaN
                                                                                        0
                                                                NaN
          MoSold YrSold
                          SaleType
                                    SaleCondition SalePrice
               2
                                WD
                                            Normal
        0
                    2008
                                                        208500
        1
               5
                    2007
                                WD
                                            Normal
                                                        181500
        2
               9
                    2008
                                WD
                                            Normal
                                                        223500
        3
               2
                    2006
                                WD
                                           Abnorml
                                                        140000
        4
              12
                    2008
                                WD
                                            Normal
                                                        250000
        [5 rows x 81 columns]
In [5]: import matplotlib.pyplot as plt
        plt.style.use(style='ggplot')
        plt.rcParams['figure.figsize'] = (10, 6)
In [6]: train.SalePrice.describe()
Out[6]: count
                    1460.000000
        mean
                  180921.195890
        std
                   79442.502883
                   34900.000000
        min
        25%
                  129975.000000
        50%
                  163000.000000
        75%
                 214000.000000
                  755000.000000
        max
        Name: SalePrice, dtype: float64
In [7]: print ("Skew is:", train.SalePrice.skew())
        plt.hist(train.SalePrice, color='blue')
        plt.show()
Skew is: 1.88287575977
```



Skew is: 0.121335062205



```
In [9]: numeric_features = train.select_dtypes(include=[np.number])
        numeric_features.dtypes
Out [9]: Id
                            int64
                            int64
        MSSubClass
                          float64
        LotFrontage
        LotArea
                            int64
        OverallQual
                            int64
        OverallCond
                            int64
        YearBuilt
                            int64
        YearRemodAdd
                            int64
        MasVnrArea
                          float64
        BsmtFinSF1
                            int64
        BsmtFinSF2
                            int64
        BsmtUnfSF
                            int64
        TotalBsmtSF
                            int64
        1stFlrSF
                            int64
        2ndFlrSF
                            int64
                            int64
        LowQualFinSF
        GrLivArea
                            int64
        BsmtFullBath
                            int64
        BsmtHalfBath
                            int64
        FullBath
                            int64
        HalfBath
                            int64
        BedroomAbvGr
                            int64
        KitchenAbvGr
                            int64
        TotRmsAbvGrd
                            int64
        Fireplaces
                            int64
        GarageYrBlt
                          float64
        GarageCars
                            int64
        GarageArea
                            int64
        {\tt WoodDeckSF}
                            int64
        OpenPorchSF
                            int64
        EnclosedPorch
                            int64
        3SsnPorch
                            int64
        ScreenPorch
                            int64
        PoolArea
                            int64
        MiscVal
                            int64
        MoSold
                            int64
        YrSold
                            int64
        SalePrice
                            int64
        dtype: object
```

In []: