This exercise is to predict how many points NBA players scored in the 2013-2014 season using K-nearest neighbors algorithm. The data is available at below location.

- https://www.dropbox.com/s/b3nv38jjo5dxcl6/nba_2013.csv?dl=0 (https://www.dropbox.com/s/b3nv38jjo5dxcl6/nba_2013.csv?dl=0)

Load Libraries

In [1]:
```
import numpy as np
import pandas as pd
import scipy.stats as stats
import matplotlib.pyplot as plt
import seaborn as sns

%matplotlib inline
```

In [2]:
```
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsRegressor
from sklearn.model_selection import cross_val_score
from sklearn import preprocessing
from sklearn.preprocessing import Imputer
from sklearn.metrics import accuracy_score
```

Load Dataset

In [3]:
```
#read from the csv file and return a Pandas DataFrame.
pd.options.display.float_format = '{:,.2f}'.format

with open("nba_2013.csv", 'r') as csvfile:
    nba = pd.read_csv(csvfile)
```

Analyze the dataset

In [4]:
```
print(" [NBA Data] Length : {} ".format(len(nba)))
print(" [NBA Data] shape : {} ".format(nba.shape))
print(" [NBA Data] : \n", str(nba))
```

```
 [NBA Data] Length : 481
 [NBA Data] shape : (481, 31)
 [NBA Data] :
                    player pos  age bref_team_id   g  gs    mp   fg   fga  \
0              Quincy Acy  SF   23          TOT  63   0   847   66   141
1            Steven Adams   C   20          OKC  81  20  1197   93   185
2             Jeff Adrien  PF   27          TOT  53  12   961  143   275
3           Arron Afflalo  SG   28          ORL  73  73  2552  464  1011
4           Alexis Ajinca   C   25          NOP  56  30   951  136   249
5            Cole Aldrich   C   25          NYK  46   2   330   33    61
6       LaMarcus Aldridge  PF   28          POR  69  69  2498  652  1423
7             Lavoy Allen  PF   24          TOT  65   2  1072  134   300
8               Ray Allen  SG   38          MIA  73   9  1936  240   543
9             Tony Allen  SG   32          MEM  55  28  1278  204   413
10        Al-Farouq Aminu  SF   23          NOP  80  65  2045  234   494
11         Louis Amundson  PF   31          TOT  19   0   185   16    32
12         Chris Andersen   C   35          MIA  72   0  1396  177   275
13          Alan Anderson  SF   31          BRK  78  26  1773  194   485
14         James Anderson  SG   24          PHI  80  62  2309  309   717
15          Ryan Anderson  PF   25          NOP  22  14   795  155   354
16  Giannis Antetokounmpo  SF   19          MIL  77  23  1897  173   418
17        Carmelo Anthony  PF   29          NYK  77  77  2982  743  1643
18           Joel Anthony   C   31          TOT  33   0   186   12    32
19             Pero Antic  PF   31          ATL  50  26   925  123   294
20           Trevor Ariza  SF   28          WAS  77  77  2723  389   853
21       Hilton Armstrong   C   29          GSW  15   1    97    9    19
22         Darrell Arthur  SF   25          DEN  68   1  1161  162   410
23              Omer Asik   C   27          HOU  48  19   968  101   190
24          D.J. Augustin  PG   26          TOT  71   9  1939  298   718
25          Gustavo Ayon   C   28          ATL  26  14   429   52   102
26            Jeff Ayres  PF   26          SAS  73  10   952  101   174
27            Chris Babb  SG   23          BOS  14   0   132    8    30
28          Luke Babbitt  PF   24          NOP  27   2   473   60   154
29        Leandro Barbosa  PG   31          PHO  20   0   368   56   131
..                    ...  ..  ...          ...  ..  ..   ...  ...   ...
451             John Wall  PG   23          WAS  82  82  2980  579  1337
452        Gerald Wallace  SF   31          BOS  58  16  1416  116   230
453           Casper Ware  PG   24          PHI   9   0   116   18    42
454           C.J. Watson  PG   29          IND  63   5  1193  146   334
455           Earl Watson  PG   34          POR  24   0   161    3    11
456          Maalik Wayns  PG   22          LAC   2   0     9    1     2
457       Martell Webster  SF   27          WAS  78  13  2157  254   587
458             David West  PF   33          IND  80  80  2472  458   939
```

459	Russell Westbrook	PG	25	OKC	46	46	1412	346	791
460	D.J. White	PF	27	CHA	2	0	10	0	1
461	Royce White	PF	22	SAC	3	0	9	0	1
462	Deron Williams	PG	29	BRK	64	58	2059	322	716
463	Derrick Williams	SF	22	TOT	78	15	1820	206	482
464	Elliot Williams	SG	24	PHI	67	2	1157	140	337
465	Louis Williams	PG	27	ATL	60	7	1445	197	493
466	Marvin Williams	PF	27	UTA	66	50	1674	231	526
467	Mo Williams	PG	31	POR	74	0	1834	280	672
468	Reggie Williams	SF	27	OKC	3	0	17	5	9
469	Shawne Williams	PF	27	LAL	36	13	751	73	192
470	Jeff Withey	C	23	NOP	58	4	684	69	129
471	Nate Wolters	PG	22	MIL	58	31	1309	170	389
472	Metta World Peace	SF	34	NYK	29	1	388	56	141
473	Brandan Wright	C	26	DAL	58	0	1077	224	331
474	Chris Wright	SF	25	MIL	8	0	126	21	35
475	Dorell Wright	SF	28	POR	68	13	984	111	297
476	Tony Wroten	SG	20	PHI	72	16	1765	345	808
477	Nick Young	SG	28	LAL	64	9	1810	387	889
478	Thaddeus Young	PF	25	PHI	79	78	2718	582	1283
479	Cody Zeller	C	21	CHA	82	3	1416	172	404
480	Tyler Zeller	C	24	CLE	70	9	1049	156	290

	fg.	...	drb	trb	ast	stl	blk	tov	pf	pts	season	\
0	0.47	...	144	216	28	23	26	30	122	171	2013-2014	
1	0.50	...	190	332	43	40	57	71	203	265	2013-2014	
2	0.52	...	204	306	38	24	36	39	108	362	2013-2014	
3	0.46	...	230	262	248	35	3	146	136	1330	2013-2014	
4	0.55	...	183	277	40	23	46	63	187	328	2013-2014	
5	0.54	...	92	129	14	8	30	18	40	92	2013-2014	
6	0.46	...	599	765	178	63	68	123	147	1603	2013-2014	
7	0.45	...	192	311	71	24	33	44	126	303	2013-2014	
8	0.44	...	182	205	143	54	8	84	115	701	2013-2014	
9	0.49	...	129	208	94	90	19	90	121	495	2013-2014	
10	0.47	...	367	496	114	82	38	88	147	572	2013-2014	
11	0.50	...	27	55	6	9	11	14	49	38	2013-2014	
12	0.64	...	250	379	19	32	97	53	162	477	2013-2014	
13	0.40	...	135	175	81	48	11	62	147	564	2013-2014	
14	0.43	...	241	300	149	74	28	106	154	810	2013-2014	
15	0.44	...	76	142	17	10	7	20	47	436	2013-2014	
16	0.41	...	261	339	150	60	61	122	173	525	2013-2014	
17	0.45	...	477	622	242	95	51	198	224	2112	2013-2014	
18	0.38	...	23	38	2	3	12	3	17	28	2013-2014	

19	0.42	...	152	209	58	19	12	55	126	352	2013-2014
20	0.46	...	376	475	191	126	20	132	179	1107	2013-2014
21	0.47	...	28	47	5	4	4	6	11	25	2013-2014
22	0.40	...	158	210	61	39	47	58	185	401	2013-2014
23	0.53	...	277	378	25	14	37	59	92	280	2013-2014
24	0.41	...	115	130	313	53	3	125	147	930	2013-2014
25	0.51	...	83	125	28	25	10	29	47	112	2013-2014
26	0.58	...	169	258	60	13	25	63	146	240	2013-2014
27	0.27	...	13	17	3	6	0	3	13	22	2013-2014
28	0.39	...	70	88	29	7	11	15	52	170	2013-2014
29	0.43	...	32	37	32	7	4	19	30	150	2013-2014
..	...	...	...	...	...	...	...	...	...	...	...
451	0.43	...	295	333	721	149	40	295	219	1583	2013-2014
452	0.50	...	176	212	143	73	14	97	79	298	2013-2014
453	0.43	...	9	9	10	8	0	5	11	48	2013-2014
454	0.44	...	82	101	107	60	8	60	66	414	2013-2014
455	0.27	...	10	15	28	5	1	17	33	12	2013-2014
456	0.50	...	2	2	2	2	0	0	4	2	2013-2014
457	0.43	...	184	222	97	41	15	58	150	759	2013-2014
458	0.49	...	422	542	223	61	74	133	186	1118	2013-2014
459	0.44	...	208	263	319	88	7	177	104	1002	2013-2014
460	0.00	...	2	2	0	1	0	0	1	0	2013-2014
461	0.00	...	0	0	0	0	0	0	2	0	2013-2014
462	0.45	...	153	168	392	93	13	143	148	915	2013-2014
463	0.43	...	252	323	56	48	20	76	114	624	2013-2014
464	0.41	...	100	130	72	35	3	68	126	404	2013-2014
465	0.40	...	114	124	210	45	4	92	65	625	2013-2014
466	0.44	...	252	334	78	54	31	53	151	603	2013-2014
467	0.42	...	111	153	321	55	10	149	197	721	2013-2014
468	0.56	...	0	0	1	1	0	2	1	11	2013-2014
469	0.38	...	142	167	30	19	30	21	93	202	2013-2014
470	0.54	...	101	150	26	15	50	20	73	190	2013-2014
471	0.44	...	116	149	187	35	15	57	67	417	2013-2014
472	0.40	...	41	59	17	24	8	19	44	139	2013-2014
473	0.68	...	142	244	31	32	55	35	94	525	2013-2014
474	0.60	...	10	20	5	7	5	5	17	48	2013-2014
475	0.37	...	162	191	64	23	16	39	62	343	2013-2014
476	0.43	...	159	228	217	78	16	204	151	939	2013-2014
477	0.43	...	137	166	95	46	12	95	156	1144	2013-2014
478	0.45	...	310	476	182	167	36	165	213	1417	2013-2014
479	0.43	...	235	353	92	40	41	87	170	490	2013-2014
480	0.54	...	179	282	36	18	38	60	137	399	2013-2014

	season_end
0	2013
1	2013
2	2013
3	2013
4	2013
5	2013
6	2013
7	2013
8	2013
9	2013
10	2013
11	2013
12	2013
13	2013
14	2013
15	2013
16	2013
17	2013
18	2013
19	2013
20	2013
21	2013
22	2013
23	2013
24	2013
25	2013
26	2013
27	2013
28	2013
29	2013
..	...
451	2013
452	2013
453	2013
454	2013
455	2013
456	2013
457	2013
458	2013
459	2013
460	2013
461	2013

```
462        2013
463        2013
464        2013
465        2013
466        2013
467        2013
468        2013
469        2013
470        2013
471        2013
472        2013
473        2013
474        2013
475        2013
476        2013
477        2013
478        2013
479        2013
480        2013

[481 rows x 31 columns]
```

In [5]:
```
print("[NBA Data] Column names \n")
print(nba.columns.values)
```

```
[NBA Data] Column names

['player' 'pos' 'age' 'bref_team_id' 'g' 'gs' 'mp' 'fg' 'fga' 'fg.' 'x3p'
 'x3pa' 'x3p.' 'x2p' 'x2pa' 'x2p.' 'efg.' 'ft' 'fta' 'ft.' 'orb' 'drb'
 'trb' 'ast' 'stl' 'blk' 'tov' 'pf' 'pts' 'season' 'season_end']
```

In [6]:
```
print(nba.head())
```

```
          player pos  age bref_team_id   g  gs    mp   fg   fga  fg.  \
0     Quincy Acy  SF   23          TOT  63   0   847   66   141 0.47
1   Steven Adams   C   20          OKC  81  20  1197   93   185 0.50
2    Jeff Adrien  PF   27          TOT  53  12   961  143   275 0.52
3  Arron Afflalo  SG   28          ORL  73  73  2552  464  1011 0.46
4  Alexis Ajinca   C   25          NOP  56  30   951  136   249 0.55

      ...      drb  trb  ast  stl  blk  tov   pf   pts     season  season_end
0     ...      144  216   28   23   26   30  122   171  2013-2014        2013
1     ...      190  332   43   40   57   71  203   265  2013-2014        2013
2     ...      204  306   38   24   36   39  108   362  2013-2014        2013
3     ...      230  262  248   35    3  146  136  1330  2013-2014        2013
4     ...      183  277   40   23   46   63  187   328  2013-2014        2013

[5 rows x 31 columns]
```

In [7]:
```
print(nba.dtypes)
```

```
player           object
pos              object
age               int64
bref_team_id     object
g                 int64
gs                int64
mp                int64
fg                int64
fga               int64
fg.             float64
x3p               int64
x3pa              int64
x3p.            float64
x2p               int64
x2pa              int64
x2p.            float64
efg.            float64
ft                int64
fta               int64
ft.             float64
orb               int64
drb               int64
trb               int64
ast               int64
stl               int64
blk               int64
tov               int64
pf                int64
pts               int64
season           object
season_end        int64
dtype: object
```

Split the data into as Features and target.

In [8]:
```
# The columns that we will be making predictions with.
X_columns = ['age', 'g', 'gs', 'mp', 'fg', 'fga', 'fg.', 'x3p', 'x3pa', 'x3p.', 'x2p', 'x2pa', 'x2p.', 'efg.'
, 'ft', 'fta', 'ft.', 'orb', 'drb', 'trb', 'ast', 'stl', 'blk', 'tov', 'pf']

# The column that we want to predict.
y_column = ["pts"]
```

In [9]:
```
X = nba[X_columns]
y = nba[y_column]
```

Explore the Input Data.

In [10]:
```
print(X.dtypes)
```

```
age       int64
g         int64
gs        int64
mp        int64
fg        int64
fga       int64
fg.     float64
x3p       int64
x3pa      int64
x3p.    float64
x2p       int64
x2pa      int64
x2p.    float64
efg.    float64
ft        int64
fta       int64
ft.     float64
orb       int64
drb       int64
trb       int64
ast       int64
stl       int64
blk       int64
tov       int64
pf        int64
dtype: object
```

In [11]:
```
print(X.describe())
```

```
              age       g      gs        mp      fg       fga     fg.     x3p    x3pa  \
count  481.00 481.00 481.00   481.00 481.00   481.00 479.00 481.00 481.00
mean    26.51  53.25  25.57 1,237.39 192.88   424.46   0.44  39.61 110.13
std      4.20  25.32  29.66   897.26 171.83   368.85   0.10  50.86 132.75
min     19.00   1.00   0.00     1.00   0.00     0.00   0.00   0.00   0.00
25%     23.00  32.00   0.00   388.00  47.00   110.00   0.40   0.00   3.00
50%     26.00  61.00  10.00 1,141.00 146.00   332.00   0.44  16.00  48.00
75%     29.00  76.00  54.00 2,016.00 307.00   672.00   0.48  68.00 193.00
max     39.00  83.00  82.00 3,122.00 849.00 1,688.00   1.00 261.00 615.00

              x3p.  ...      fta    ft.    orb    drb      trb    ast    stl    blk  \
count  414.00  ...   481.00 461.00 481.00 481.00   481.00 481.00 481.00 481.00
mean     0.29  ...   120.64   0.72  55.81 162.82   218.63 112.54  39.28  24.10
std      0.16  ...   131.24   0.16  62.10 145.35   200.36 131.02  34.78  30.88
min      0.00  ...     0.00   0.00   0.00   0.00     0.00   0.00   0.00   0.00
25%      0.23  ...    22.00   0.65  12.00  43.00    55.00  20.00   9.00   4.00
50%      0.33  ...    73.00   0.75  35.00 135.00   168.00  65.00  32.00  14.00
75%      0.38  ...   179.00   0.82  73.00 230.00   310.00 152.00  60.00  32.00
max      1.00  ...   805.00   1.00 440.00 783.00 1,114.00 721.00 191.00 219.00

               tov     pf
count  481.00 481.00
mean    71.86 105.87
std     62.70  71.21
min      0.00   0.00
25%     21.00  44.00
50%     58.00 104.00
75%    108.00 158.00
max    295.00 273.00

[8 rows x 25 columns]
```

Check the Correlation

In [12]:
```
print(X.corr())
```

	age	g	gs	mp	fg	fga	fg.	x3p	x3pa	x3p.	...	fta	\
age	1.00	-0.01	0.03	0.01	-0.01	-0.02	0.03	0.05	0.03	0.01	...	-0.06	
g	-0.01	1.00	0.61	0.86	0.74	0.75	0.32	0.52	0.54	0.10	...	0.62	
gs	0.03	0.61	1.00	0.86	0.82	0.81	0.23	0.50	0.52	0.06	...	0.72	
mp	0.01	0.86	0.86	1.00	0.93	0.94	0.27	0.65	0.67	0.14	...	0.81	
fg	-0.01	0.74	0.82	0.93	1.00	0.99	0.28	0.60	0.61	0.11	...	0.90	
fga	-0.02	0.75	0.81	0.94	0.99	1.00	0.21	0.66	0.69	0.15	...	0.88	
fg.	0.03	0.32	0.23	0.27	0.28	0.21	1.00	-0.03	-0.04	-0.04	...	0.26	
x3p	0.05	0.52	0.50	0.65	0.60	0.66	-0.03	1.00	0.99	0.46	...	0.44	
x3pa	0.03	0.54	0.52	0.67	0.61	0.69	-0.04	0.99	1.00	0.45	...	0.47	
x3p.	0.01	0.10	0.06	0.14	0.11	0.15	-0.04	0.46	0.45	1.00	...	0.02	
x2p	-0.03	0.68	0.79	0.86	0.96	0.92	0.33	0.35	0.37	-0.03	...	0.89	
x2pa	-0.04	0.69	0.78	0.87	0.96	0.94	0.28	0.38	0.41	-0.01	...	0.89	
x2p.	0.01	0.28	0.21	0.24	0.24	0.19	0.88	0.04	0.04	-0.12	...	0.21	
efg.	0.07	0.35	0.23	0.30	0.28	0.24	0.91	0.22	0.20	0.30	...	0.21	
ft	-0.05	0.60	0.71	0.81	0.89	0.89	0.22	0.50	0.53	0.06	...	0.99	
fta	-0.06	0.62	0.72	0.81	0.90	0.88	0.26	0.44	0.47	0.02	...	1.00	
ft.	0.02	0.25	0.18	0.28	0.28	0.31	-0.01	0.37	0.37	0.29	...	0.20	
orb	-0.07	0.55	0.56	0.58	0.56	0.49	0.42	-0.07	-0.06	-0.31	...	0.54	
drb	0.01	0.71	0.77	0.82	0.82	0.77	0.38	0.28	0.29	-0.09	...	0.76	
trb	-0.01	0.68	0.74	0.77	0.77	0.71	0.40	0.18	0.19	-0.17	...	0.72	
ast	0.02	0.55	0.64	0.73	0.71	0.75	0.07	0.62	0.64	0.21	...	0.67	
stl	-0.03	0.71	0.74	0.85	0.79	0.80	0.19	0.59	0.62	0.15	...	0.73	
blk	-0.02	0.48	0.51	0.51	0.48	0.41	0.40	-0.04	-0.04	-0.19	...	0.46	
tov	-0.03	0.71	0.77	0.89	0.90	0.91	0.22	0.56	0.59	0.10	...	0.88	
pf	-0.03	0.87	0.73	0.88	0.80	0.79	0.36	0.45	0.46	-0.02	...	0.70	

	ft.	orb	drb	trb	ast	stl	blk	tov	pf
age	0.02	-0.07	0.01	-0.01	0.02	-0.03	-0.02	-0.03	-0.03
g	0.25	0.55	0.71	0.68	0.55	0.71	0.48	0.71	0.87
gs	0.18	0.56	0.77	0.74	0.64	0.74	0.51	0.77	0.73
mp	0.28	0.58	0.82	0.77	0.73	0.85	0.51	0.89	0.88
fg	0.28	0.56	0.82	0.77	0.71	0.79	0.48	0.90	0.80
fga	0.31	0.49	0.77	0.71	0.75	0.80	0.41	0.91	0.79
fg.	-0.01	0.42	0.38	0.40	0.07	0.19	0.40	0.22	0.36
x3p	0.37	-0.07	0.28	0.18	0.62	0.59	-0.04	0.56	0.45
x3pa	0.37	-0.06	0.29	0.19	0.64	0.62	-0.04	0.59	0.46
x3p.	0.29	-0.31	-0.09	-0.17	0.21	0.15	-0.19	0.10	-0.02
x2p	0.19	0.68	0.86	0.83	0.61	0.71	0.58	0.86	0.78
x2pa	0.22	0.64	0.84	0.80	0.65	0.73	0.54	0.88	0.78
x2p.	0.03	0.31	0.30	0.32	0.07	0.19	0.30	0.19	0.30
efg.	0.17	0.26	0.30	0.30	0.13	0.23	0.27	0.22	0.33
ft	0.27	0.46	0.70	0.65	0.70	0.72	0.38	0.87	0.66

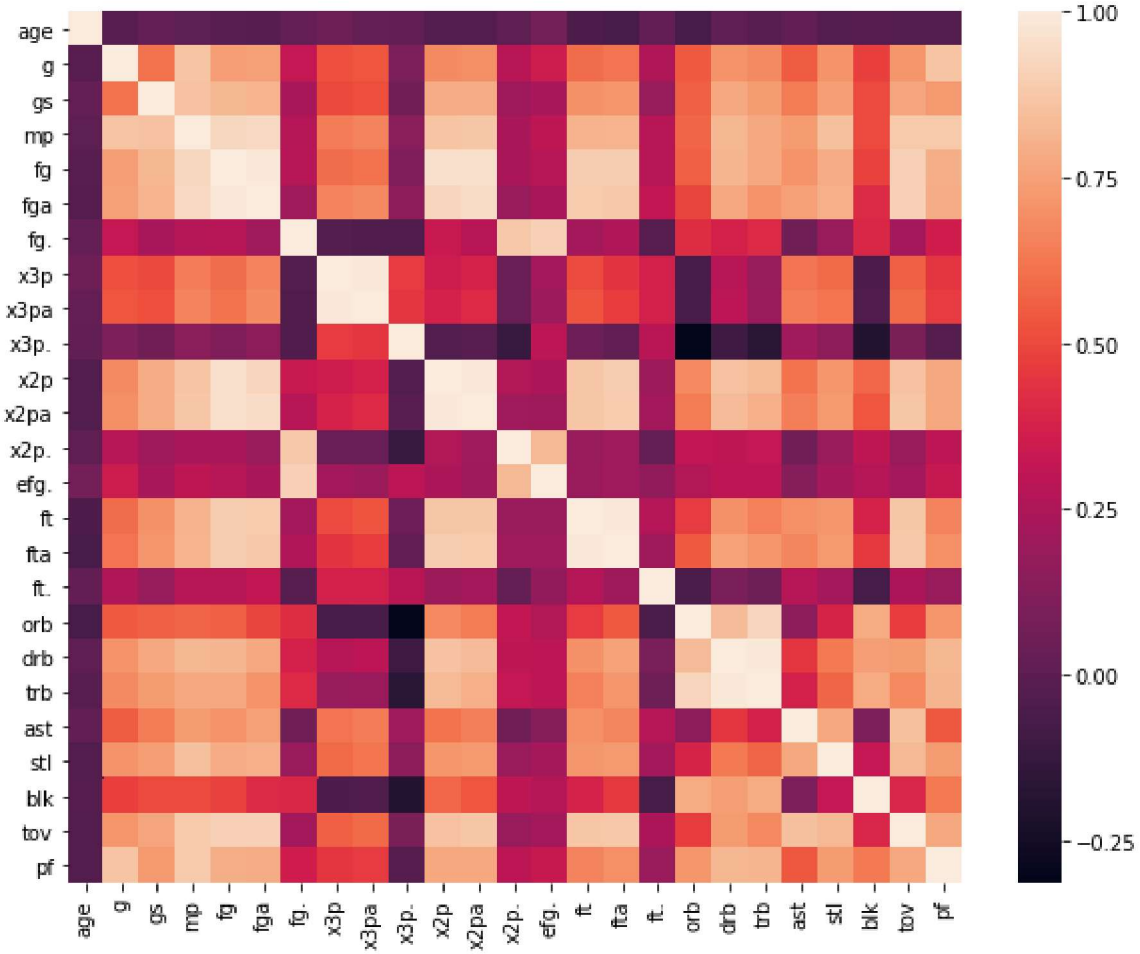
```
fta   0.20  0.54  0.76  0.72 0.67  0.73  0.46  0.88  0.70
ft.   1.00 -0.05  0.09  0.05 0.28  0.22 -0.07  0.25  0.18
orb  -0.05  1.00  0.84  0.92 0.14  0.39  0.78  0.47  0.71
drb   0.09  0.84  1.00  0.99 0.45  0.63  0.74  0.74  0.82
trb   0.05  0.92  0.99  1.00 0.37  0.58  0.78  0.68  0.82
ast   0.28  0.14  0.45  0.37 1.00  0.77  0.10  0.86  0.54
stl   0.22  0.39  0.63  0.58 0.77  1.00  0.32  0.83  0.74
blk  -0.07  0.78  0.74  0.78 0.10  0.32  1.00  0.40  0.63
tov   0.25  0.47  0.74  0.68 0.86  0.83  0.40  1.00  0.78
pf    0.18  0.71  0.82  0.82 0.54  0.74  0.63  0.78  1.00

[25 rows x 25 columns]
```

Visulize the data.

In [13]:
```
# correlation between attributes
plt.figure(figsize=(10,8))
sns.heatmap(X.corr())
```

Out[13]: <matplotlib.axes._subplots.AxesSubplot at 0x1724f0c12b0>



Normalize the Data

In [14]:
```
imp = Imputer(missing_values="NaN", strategy='median', axis=0)
X = imp.fit_transform(X)
```

Split the data into Train & Test

In [15]:
```
X_train, X_test, y_train, y_test =  train_test_split(X, y,  train_size=0.75, test_size=0.25, random_state = 1
00) #75/25 data split

y_train = y_train.as_matrix().ravel()
y_test  = y_test.as_matrix().ravel()
```

```
C:\Users\Sreekanth\Anaconda3\lib\site-packages\ipykernel_launcher.py:3: FutureWarning: Method .as_matrix will
be removed in a future version. Use .values instead.
  This is separate from the ipykernel package so we can avoid doing imports until
C:\Users\Sreekanth\Anaconda3\lib\site-packages\ipykernel_launcher.py:4: FutureWarning: Method .as_matrix will
be removed in a future version. Use .values instead.
  after removing the cwd from sys.path.
```

Model Creation

In [16]:
```
# Create the knn model.
# Look at the five closest neighbors.
knn = KNeighborsRegressor(n_neighbors=21)
# Fit the model on the training data.
knn.fit(X_train,y_train)
# Make point predictions on the test set using the fit model.
y_pred = knn.predict(X_test)
```

In [17]:
```
y_pred
```

Out[17]:
```
array([ 566.9047619 ,  448.85714286,  156.19047619,  117.23809524,
         25.04761905,  185.66666667,   90.52380952,   77.57142857,
          6.95238095,   24.        ,   57.14285714,  136.04761905,
         89.38095238,   20.14285714,  449.42857143, 1106.04761905,
        341.52380952,  637.38095238,  446.85714286,  643.9047619 ,
         65.57142857, 1358.        , 1142.        ,  832.57142857,
          6.23809524,  591.42857143, 1057.85714286,    6.23809524,
        294.57142857,  185.95238095,  740.76190476,  320.66666667,
        347.52380952, 1043.19047619,  235.66666667,  395.85714286,
        791.42857143,   32.23809524,  115.14285714,  687.14285714,
        526.66666667,  182.61904762,  626.14285714,  214.66666667,
         48.76190476,  434.0952381 ,  111.19047619, 1094.0952381 ,
         10.95238095,  575.76190476, 1164.61904762, 1560.9047619 ,
       1091.19047619,  657.95238095,  757.66666667, 1561.23809524,
        815.71428571,    6.23809524,  628.38095238,  871.61904762,
        595.61904762,   98.71428571,  668.23809524, 1112.42857143,
        296.47619048,  936.85714286, 1042.71428571,  959.61904762,
       1132.95238095,  430.76190476,   37.23809524, 1013.76190476,
        347.95238095,   40.61904762,  195.23809524, 1240.38095238,
        442.71428571,  854.0952381 ,    6.23809524,    5.76190476,
        246.47619048,  116.66666667,  199.52380952,   89.52380952,
        718.80952381,  530.80952381,  597.52380952,  543.23809524,
        265.76190476,   44.61904762,  858.57142857,  175.95238095,
       1236.57142857,  362.57142857, 1097.38095238,  300.38095238,
        220.76190476, 1653.        ,  847.66666667,    9.        ,
        450.76190476,  420.61904762,  367.71428571, 1395.95238095,
        290.28571429,  532.38095238,  799.47619048,  149.38095238,
       1256.14285714,  191.71428571, 1506.80952381,   22.42857143,
        829.76190476,  613.80952381,  364.38095238,   35.14285714,
        605.38095238,  777.42857143,    6.23809524,  329.47619048,
        329.71428571])
```

In [18]:
```
y_test
```

Out[18]:
```
array([ 511,  483,  178,  150,   38,  138,   99,   97,    6,   33,   73,
        107,   99,   26,  429, 1068,  384,  665,  408,  703,   47, 1248,
       1257,  911,    0,  618, 1134,    0,  273,  273,  758,  252,  350,
       1042,  274,  338,  715,   29,  115,  770,  499,  159,  495,  270,
         27,  401,   75, 1095,   12,  579, 1081, 1560, 1069,  677,  646,
       1583,  911,    0,  638,  921,  772,  143,  588, 1007,  280, 1144,
       1107, 1068, 1080,  435,   44,  998,  303,   66,  174, 1226,  520,
        799,    7,    0,  257,   97,  197,   78,  824,  622,  492,  529,
        159,   28,  910,  159, 1249,  339, 1118,  315,  197, 2593,  760,
          3,  378,  485,  532, 1264,  286,  558,  784,  170, 1330,  178,
       1603,   15,  879,  696,  414,   25,  625,  821,    2,  265,  343],
      dtype=int64)
```

Mean Square Error

In [19]:
```
from sklearn.metrics import mean_squared_error
print("[NBA Data] MSE : {}".format(round(mean_squared_error(y_test, y_pred), 3)))
```

```
[NBA Data] MSE : 10729.366
```

Cross Validation

In [20]:
```
scores = cross_val_score(knn, X, y, scoring='mean_squared_error', cv = 100,)
```

```
C:\Users\Sreekanth\Anaconda3\lib\site-packages\sklearn\metrics\scorer.py:100: DeprecationWarning: Scoring met
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```
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```

In [21]:
```
print(scores.mean())
```

```
-8478.98734807256
```

Scatter plot

In [22]:
```
plt.scatter(y_pred, y_test, alpha = 0.9)
plt.show()
```