

PROJE AMACI: Kaggle’da yer alan 4 tane NBA veri setini incelemek, ilgili durumları açıklamak, grafiğe dökerek anlaşılmasını kolaylaştırmak ve tek dosyada birleştirmek.

Kategorilerin Anlamları

- *Min: * Minutes Played= Oynadığı Dakika
- *FTM-A: * Free Throws made-Attempted= Serbest Atış
- *REB: * Rebounds= Ribaund
- *BS: * Blocked Shots= Bloklanan Şut
- *FGM-A: * Field Goals Made-Attempted=Toplam Denenen Atış
- *FT%: * Free Throw Percentage= Serbest Atış Yüzdesi
- *AST: * Assists= Asist
- *BA: * Block Against=Block
- *FG%: * Field Goal Percentage = Denenen Atış Yüzdesi
- *+/- : * Plus Minus= Oynadığı Süredeki Başarı
- *PF= * Personel
- *Fouls= * Kişisel Faul
- *PTS: * Points= Sayı
- *3PM-A: * Three Point Field Goals Made-Attempted= 3lük Denemesi
- *OREB: *Offensive Rebounds=Hücum Ribaundu
- *STL: * Steals= Top Çalma
- *3P%: *3Point field Goals Percentage=3'lük Yüzdesi
- *2P%: *2Point field Goals Percentage=2'lik Yüzdesi
- *DREB: * Defensive Rebounds=Defansif Ribaund
- *TO: * Turnovers: Top Kaybı

İlk olarak gerekli kütüphaneler import edildi.

```
In [62]: import csv
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import statsmodels.api as sm
import statsmodels.formula.api as smf
from warnings import filterwarnings
from subprocess import check_output
from pandas.api.types import CategoricalDtype
```

Satır ve sütun ayarları yapıldı

```
In [64]: pd.set_option('display.max_rows', 50)
pd.set_option('display.max_columns', 50)
pd.set_option('display.width', 1000)
```

Mvpc.csv dataseti yüklendi ve veriler için sınırlayıcı belirtildi.

```
mvps = pd.read_csv("C:/Users//NORA JDK/Desktop//Proje//archive//mvps.csv", encoding="latin-1", delimiter=';', dtype={'Rank': int, 'Player': str, 'Age': int, 'Tm': str, 'First': int, 'Pts Won': int, 'Pts Max': int, 'Share': float, 'G': int, 'MP': float, 'PTS': float, 'TRB': int, 'AST': float, 'STL': float, 'BLK': float, 'FG%': float, '3P%': float, 'FT%': float, 'WS': float, 'V': float})
mvps
```

	Rank	Player	Age	Tm	First	Pts Won	Pts Max	Share	G	MP	PTS	TRB	AST	STL	BLK	FG%	3P%	FT%	WS	V
0	1	Michael Jordan	27	CHI	77	891	960	0.928	82	37.0	31.5	6.0	5.5	2.7	1.0	0.539	0.312	0.851	20.3	1
1	2	Magic Johnson	31	LAL	10	497	960	0.518	79	37.1	19.4	7.0	12.5	1.3	0.2	0.477	0.320	0.906	15.4	1
2	3	David Robinson	25	SAS	6	476	960	0.496	82	37.7	25.6	13.0	2.5	1.5	3.9	0.552	0.143	0.762	17.0	1
3	4	Charles Barkley	27	PHI	2	222	960	0.231	67	37.3	27.6	10.1	4.2	1.6	0.5	0.570	0.284	0.722	13.4	1
4	5	Karl Malone	27	UTA	0	142	960	0.148	82	40.3	29.0	11.8	3.3	1.1	1.0	0.527	0.286	0.770	15.5	1
...
469	11	Russell Westbrook	32	WAS	0	5	1010	0.005	65	36.4	22.2	11.5	11.7	1.4	0.4	0.439	0.315	0.656	3.7	1
470	12	Ben Simmons	24	PHI	0	3	1010	0.003	58	32.4	14.3	7.2	6.9	1.6	0.6	0.557	0.300	0.613	6.0	1
471	13T	James Harden	31	TOT	0	1	1010	0.001	44	36.6	24.6	7.9	10.8	1.2	0.8	0.466	0.362	0.861	7.0	1
472	13T	LeBron James	36	LAL	0	1	1010	0.001	45	33.4	25.0	7.7	7.8	1.1	0.6	0.513	0.365	0.698	5.6	1
473	13T	Kawhi Leonard	29	LAC	0	1	1010	0.001	52	34.1	24.8	6.5	5.2	1.6	0.4	0.512	0.398	0.885	8.8	1

474 rows × 21 columns

Verilerin belirlenen sütunları görüntülendi.

```
In [66]: mvps = mvps[["Player", "Year", "Pts Won", "Pts Max", "Share"]]  
mvps.head()
```

Out[66]:

	Player	Year	Pts Won	Pts Max	Share
0	Michael Jordan	1991	891	960	0.928
1	Magic Johnson	1991	497	960	0.518
2	David Robinson	1991	476	960	0.496
3	Charles Barkley	1991	222	960	0.231
4	Karl Malone	1991	142	960	0.148

Players.csv veri seti yüklendi.

```
In [67]: players = pd.read_csv("C:/Users//NORA JDK/Desktop//Proje//archive//players.csv", encoding="latin-1",  
players
```

Out[67]:

	Rk	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA
0	1	Alaa Abdelnaby	PF	22	POR	43	0	6.7	1.3	2.7	0.474	0	0	0	1.3	2.7	0.474	0.474	0.6	1
1	2	Mahmoud Abdul-Rauf	PG	21	DEN	67	19	22.5	6.2	15.1	0.413	0.4	1.5	0.24	5.9	13.6	0.432	0.425	1.3	1.5
2	3	Mark Acres	C	28	ORL	68	0	19.3	1.6	3.1	0.509	0	0	0.333	1.6	3.1	0.512	0.512	1	1.5
3	4	Michael Adams	PG	28	DEN	66	66	35.5	8.5	21.5	0.394	2.5	8.5	0.296	6	13	0.459	0.453	7	8
4	5	Mark Aguirre	SF	31	DET	78	13	25.7	5.4	11.7	0.462	0.3	1	0.308	5.1	10.7	0.477	0.475	3.1	4.1
...
18039	536	Delon Wright	PG	28	SAC	27	8	25.8	3.9	8.3	0.462	1.2	3.1	0.398	2.6	5.3	0.5	0.536	1.1	1.3
18040	537	Thaddeus Young	PF	32	CHI	68	23	24.3	5.4	9.7	0.559	0.2	0.7	0.267	5.3	9.1	0.58	0.568	1	1.7
18041	538	Trae Young	PG	22	ATL	63	63	33.7	7.7	17.7	0.438	2.2	6.3	0.343	5.6	11.3	0.491	0.499	7.7	8.7
18042	539	Cody Zeller	C	28	CHO	48	21	20.9	3.8	6.8	0.559	0.1	0.6	0.143	3.7	6.2	0.598	0.565	1.8	2.5
18043	540	Ivica Zubac	C	23	LAC	72	33	22.3	3.6	5.5	0.652	0	0.1	0.25	3.6	5.4	0.656	0.654	1.9	2.4

18044 rows × 31 columns

Gereksiz sütunlar silindi, bazı oyunculara yer alan yıldız işaretleri kaldırıldı.
Sondan 10 oyuncu gösterildi.

```
In [68]: del players["Rk"]
```

```
In [69]: players["Player"] = players["Player"].str.replace("*", "", regex=False)
```

```
In [122]: players.tail(10)
```

ut[122]:

	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%	ORE	
	14082	Óscar Torres	SG	25	HOU	65	13	16.5	2.1	5.2	0.396	0.6	1.9	0.294	1.5	3.3	0.456	0.45	1.3	1.6	0.781	0.0
	14083	Óscar Torres	SG	26	GSW	17	0	6.4	0.9	2.1	0.444	0.4	0.8	0.538	0.5	1.4	0.391	0.542	0.8	1.2	0.7	0.0
	14084	Ömer Apyk	C	24	CHI	82	0	12.1	1	1.7	0.553	0	0	0	1	1.7	0.553	0.553	0.9	1.8	0.503	1.0
	14085	Ömer Apyk	C	25	CHI	66	2	14.7	1.2	2.4	0.506	0	0	0	1.2	2.4	0.506	0.506	0.7	1.6	0.456	1.0
	14086	Ömer Apyk	C	26	HOU	82	82	30	4	7.5	0.541	0	0	0	4	7.5	0.542	0.541	2	3.6	0.562	3.0
	14087	Ömer Apyk	C	27	HOU	48	19	20.2	2.1	4	0.532	0	0	0	2.1	4	0.532	0.532	1.6	2.6	0.619	2.0
	14088	Ömer Apyk	C	28	NOP	76	76	26.1	2.8	5.4	0.517	0	0	0	2.8	5.4	0.517	0.517	1.7	3	0.582	3.0
	14089	Ömer Apyk	C	29	NOP	68	64	17.3	1.5	2.9	0.533	0	0	0	1.5	2.9	0.533	0.533	0.9	1.6	0.545	1.0
	14090	Ömer Apyk	C	30	NOP	31	19	15.5	1	2.1	0.477	0	0	0	1	2.1	0.477	0.477	0.7	1.3	0.59	1.0
	14091	Ömer Apyk	C	31	CHI	18	0	10.1	0.5	1.2	0.409	0	0	0	0.5	1.2	0.409	0.409	0.2	0.7	0.308	0.0

Delon Wright oyuncusuna ait veriler getirildi.

```
players[players["Player"] == "Delon Wright"]
```

	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%
14590	Delon Wright	PG	23	TOR	27	1	8.5	1.3	3	0.45	0.2	0.5	0.385	1.1	2.5	0.463	0.481	1	1.3	0.743
15205	Delon Wright	PG	24	TOR	27	0	16.5	1.8	4.3	0.422	0.4	1.1	0.333	1.4	3.2	0.453	0.466	1.6	2	0.764
15892	Delon Wright	PG	25	TOR	69	4	20.8	2.9	6.3	0.465	0.8	2.2	0.366	2.1	4	0.52	0.53	1.4	1.7	0.829
16623	Delon Wright	PG	26	TOT	75	13	22.7	3.2	7.4	0.434	0.7	2.2	0.298	2.6	5.2	0.492	0.478	1.6	2	0.793
16624	Delon Wright	PG	26	TOR	49	2	18.3	2.6	6	0.433	0.6	1.8	0.333	2	4.1	0.478	0.485	1.1	1.2	0.869
16625	Delon Wright	PG	26	MEM	26	11	30.8	4.4	10.2	0.434	0.8	3	0.256	3.7	7.2	0.508	0.472	2.5	3.4	0.742
17306	Delon Wright	PG	27	DAL	73	5	21.5	2.6	5.6	0.462	0.6	1.7	0.37	2	3.9	0.504	0.519	1.1	1.4	0.77
18037	Delon Wright	SG-PG	28	TOT	63	39	27.7	3.8	8.2	0.463	1	2.7	0.372	2.8	5.5	0.509	0.525	1.6	2	0.802
18038	Delon Wright	SG	28	DET	36	31	29.2	3.8	8.1	0.464	0.9	2.5	0.348	2.9	5.7	0.515	0.517	2	2.5	0.789
18039	Delon Wright	PG	28	SAC	27	8	25.8	3.9	8.3	0.462	1.2	3.1	0.398	2.6	5.3	0.5	0.536	1.1	1.3	0.833

Aynı oyuncuya ait veriler birbiri arkasına sıralandı. Bu sayede incelemesi daha kolay oldu.

```
: def single_team(df):
    if df.shape[0]==1:
        return df
    else:
        row = df[df["Tm"]=="TOT"]
        row["Tm"] = df.iloc[-1,:]["Tm"]
        return row

players = players.groupby(["Player", "Year"]).apply(single_team)
```

Oyuncular ve MVP verileri birleştirildi.

```
: combined = players.merge(mvps, how="outer", on=["Player", "Year"])
```

```
: combined[combined["Pts Won"] > 0]
combined
```

	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS	Year	Pts Won
	HOU	37	0	4.9	0.6	1.4	0.453	0	0	0	0.6	1.4	0.462	0.453	0.7	1.2	0.614	0.6	0.9	1.5	0.1	0.1	0.2	0.5	1	2	1995	NaN
	TOR	67	18	19.9	3.4	6.2	0.543	0	0	0	3.4	6.2	0.545	0.543	1	1.7	0.561	1.7	3	4.8	0.9	0.4	0.5	1.5	3	7.7	1996	NaN
	TOR	13	4	16.8	2.5	5.5	0.451	0	0	0	2.5	5.5	0.451	0.451	1.5	2.2	0.69	1.5	2.2	3.8	1.1	0.5	0.8	1.6	2.7	6.5	1997	NaN
	BOS	57	34	17.3	2.5	5.3	0.467	0	0	0	2.5	5.3	0.469	0.467	0.4	1.1	0.377	1.5	2.2	3.7	0.8	0.4	0.7	1.1	2.9	5.4	1998	NaN
	IND	18	0	6.3	0.9	1.9	0.471	0	0	0	0.9	1.9	0.471	0.471	0.3	0.4	0.625	0.9	0.9	1.8	0.2	0.2	0.5	0.6	0.7	2.1	2000	NaN
...
	HOU	48	19	20.2	2.1	4	0.532	0	0	0	2.1	4	0.532	0.532	1.6	2.6	0.619	2.1	5.8	7.9	0.5	0.3	0.8	1.2	1.9	5.8	2014	NaN
	NOP	76	76	26.1	2.8	5.4	0.517	0	0	0	2.8	5.4	0.517	0.517	1.7	3	0.582	3.2	6.6	9.8	0.9	0.4	0.7	1.3	1.9	7.3	2015	NaN
	NOP	68	64	17.3	1.5	2.9	0.533	0	0	0	1.5	2.9	0.533	0.533	0.9	1.6	0.545	1.8	4.3	6.1	0.4	0.3	0.3	0.9	1.8	4	2016	NaN
	NOP	31	19	15.5	1	2.1	0.477	0	0	0	1	2.1	0.477	0.477	0.7	1.3	0.59	1.5	3.7	5.3	0.5	0.2	0.3	0.5	1.6	2.7	2017	NaN
	CHI	18	0	10.1	0.5	1.2	0.409	0	0	0	0.5	1.2	0.409	0.409	0.2	0.7	0.308	0.5	2.1	2.6	0.2	0.1	0.2	0.5	1.1	1.2	2018	NaN

Boş değerler(NaN olanlar) 0 yapıldı.

```
combined[["Pts Won", "Pts Max", "Share"]] = combined[["Pts Won", "Pts Max", "Share"]].fillna(0)  
combined
```

G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS	Year	Pts Won	Pts Max
37	0	4.9	0.6	1.4	0.453	0	0	0	0.6	1.4	0.462	0.453	0.7	1.2	0.614	0.6	0.9	1.5	0.1	0.1	0.2	0.5	1	2	1995	0.0	0.0
67	18	19.9	3.4	6.2	0.543	0	0	0	3.4	6.2	0.545	0.543	1	1.7	0.561	1.7	3	4.8	0.9	0.4	0.5	1.5	3	7.7	1996	0.0	0.0
13	4	16.8	2.5	5.5	0.451	0	0	0	2.5	5.5	0.451	0.451	1.5	2.2	0.69	1.5	2.2	3.8	1.1	0.5	0.8	1.6	2.7	6.5	1997	0.0	0.0
57	34	17.3	2.5	5.3	0.467	0	0	0	2.5	5.3	0.469	0.467	0.4	1.1	0.377	1.5	2.2	3.7	0.8	0.4	0.7	1.1	2.9	5.4	1998	0.0	0.0
18	0	6.3	0.9	1.9	0.471	0	0	0	0.9	1.9	0.471	0.471	0.3	0.4	0.625	0.9	0.9	1.8	0.2	0.2	0.5	0.6	0.7	2.1	2000	0.0	0.0
...
48	19	20.2	2.1	4	0.532	0	0	0	2.1	4	0.532	0.532	1.6	2.6	0.619	2.1	5.8	7.9	0.5	0.3	0.8	1.2	1.9	5.8	2014	0.0	0.0
76	76	26.1	2.8	5.4	0.517	0	0	0	2.8	5.4	0.517	0.517	1.7	3	0.582	3.2	6.6	9.8	0.9	0.4	0.7	1.3	1.9	7.3	2015	0.0	0.0
68	64	17.3	1.5	2.9	0.533	0	0	0	1.5	2.9	0.533	0.533	0.9	1.6	0.545	1.8	4.3	6.1	0.4	0.3	0.3	0.9	1.8	4	2016	0.0	0.0
31	19	15.5	1	2.1	0.477	0	0	0	1	2.1	0.477	0.477	0.7	1.3	0.59	1.5	3.7	5.3	0.5	0.2	0.3	0.5	1.6	2.7	2017	0.0	0.0
18	0	10.1	0.5	1.2	0.409	0	0	0	0.5	1.2	0.409	0.409	0.2	0.7	0.308	0.5	2.1	2.6	0.2	0.1	0.2	0.5	1.1	1.2	2018	0.0	0.0

Takım verileri yüklendi

```
teams = pd.read_csv("C:/Users//NORA JDK/Desktop//Proje//archive//teams.csv", encoding="latin-1", delin  
teams.head(15)
```

	W	L	W/L%	GB	PS/G	PA/G	SRS	Year	Team
0	56	26	0.683	□	111.5	105.7	5.22	1991	Boston Celtics*
1	44	38	0.537	12	105.4	105.6	-0.39	1991	Philadelphia 76ers*
2	39	43	0.476	17	103.1	103.3	-0.43	1991	New York Knicks*
3	30	52	0.366	26	101.4	106.4	-4.84	1991	Washington Bullets
4	26	56	0.317	30	102.9	107.5	-4.53	1991	New Jersey Nets
5	24	58	0.293	32	101.8	107.8	-5.91	1991	Miami Heat
6	Central Division	Central Division	Central Division	Central Division	Central Division	Central Division	Central Division	1991	Central Division
7	61	21	0.744	□	110	101	8.57	1991	Chicago Bulls*
8	50	32	0.61	11	100.1	96.8	3.08	1991	Detroit Pistons*
9	48	34	0.585	13	106.4	104	2.33	1991	Milwaukee Bucks*
10	43	39	0.524	18	109.8	109	0.72	1991	Atlanta Hawks*
11	41	41	0.5	20	111.7	112.1	-0.37	1991	Indiana Pacers*
12	33	49	0.402	28	101.7	104.2	-2.33	1991	Cleveland Cavaliers
13	26	56	0.317	35	102.8	108	-4.95	1991	Charlotte Hornets
14	Midwest Division	Midwest Division	Midwest Division	Midwest Division	Midwest Division	Midwest Division	Midwest Division	1991	Midwest Division

Bölüm satırları kaldırıldı, yıldız işaretleri kaldırıldı ve takımlar sıralandı.

```
teams = teams[~teams["W"].str.contains("Division")].copy()
```

```
teams["Team"] = teams["Team"].str.replace("*", "", regex=False)
```

```
sorted(teams["Team"].unique())
```

```
['Atlanta Hawks',  
'Boston Celtics',  
'Brooklyn Nets',  
'Charlotte Bobcats',  
'Charlotte Hornets',  
'Chicago Bulls',  
'Cleveland Cavaliers',  
'Dallas Mavericks',  
'Denver Nuggets',  
'Detroit Pistons',  
'Golden State Warriors',  
'Houston Rockets',  
'Indiana Pacers',  
'Los Angeles Clippers',  
'Los Angeles Lakers',  
'Memphis Grizzlies',  
'Miami Heat',  
'Milwaukee Bucks',  
'Minnesota Timberwolves',  
'New Jersey Nets',  
'New Orleans Hornets',  
'New Orleans Pelicans',  
'New Orleans/Oklahoma City Hornets',  
'New York Knicks',  
'Oklahoma City Thunder',  
'Orlando Magic',  
'Philadelphia 76ers',  
'Phoenix Suns',  
'Portland Trail Blazers',  
'Sacramento Kings',  
'San Antonio Spurs',  
'Seattle SuperSonics',  
'Toronto Raptors',  
'Utah Jazz',  
'Vancouver Grizzlies',  
'Washington Bullets',  
'Washington Wizards']
```

Combined değişkenindeki TM sütununa ait veriler gösterildi.

```
sorted(combined["Tm"].unique())
```

```
['ATL',  
'BOS',  
'BRK',  
'CHA',  
'CHH',  
'CHI',  
'CHO',  
'CLE',  
'DAL',  
'DEN',  
'DET',  
'GSW',  
'HOU',  
'IND',  
'LAC',  
'LAL',  
'MEM',  
'MIA',  
'MIL',  
'MIN',  
'NJN',  
'NOH',  
'NOK',  
'NOP',  
'NYK',  
'OKC',  
'ORL',  
'PHI',  
'PHO',  
'POR',  
'SAC',  
'SAS',  
'SEA',  
'TOR',  
'UTA',  
'VAN',  
'WAS',  
'WSB']
```

Kısaltmalar tam takım adlarıyla değiştirildi

```
nicknames = {}  
with open("C:/Users//NORA JDK/Desktop//Proje//archive//nicknames.csv") as f:  
    lines = f.readlines()  
    for line in lines[1:]:  
        abbrev,name = line.replace("\n","").split(";")  
        nicknames[abbrev] = name
```

```
combined["Team"] = combined["Tm"].map(nicknames)  
combined.head()
```


Train değişkeni oluşturularak team, players, mvp veri setleri birleştirildi.

Out[86]:

FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS	Year	Pts Won	Pts Max	Share	Team
0.6	1.4	0.453	0	0	0	0.6	1.4	0.462	0.453	0.7	1.2	0.614	0.6	0.9	1.5	0.1	0.1	0.2	0.5	1	2	1995	0.0	0.0	0.0	Houston Rockets
3.4	6.2	0.543	0	0	0	3.4	6.2	0.545	0.543	1	1.7	0.561	1.7	3	4.8	0.9	0.4	0.5	1.5	3	7.7	1996	0.0	0.0	0.0	Toronto Raptors
2.5	5.5	0.451	0	0	0	2.5	5.5	0.451	0.451	1.5	2.2	0.69	1.5	2.2	3.8	1.1	0.5	0.8	1.6	2.7	6.5	1997	0.0	0.0	0.0	Toronto Raptors
2.5	5.3	0.467	0	0	0	2.5	5.3	0.469	0.467	0.4	1.1	0.377	1.5	2.2	3.7	0.8	0.4	0.7	1.1	2.9	5.4	1998	0.0	0.0	0.0	Boston Celtics
0.9	1.9	0.471	0	0	0	0.9	1.9	0.471	0.471	0.3	0.4	0.625	0.9	0.9	1.8	0.2	0.2	0.5	0.6	0.7	2.1	2000	0.0	0.0	0.0	Indiana Pacers

```
In [87]: train = combined.merge(teams, how="outer", on=["Team", "Year"])
train
```

Out[87]:

2P%	eFG%	FT	FTA	FT%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS	Year	Pts Won	Pts Max	Share	Team	W	L	W/L%	GB	PS/G	PA/G	SRS
0.462	0.453	0.7	1.2	0.614	0.6	0.9	1.5	0.1	0.1	0.2	0.5	1	2	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15	103.5	101.4	2.32
0.25	0.25	0.4	0.9	0.5	0.1	1.3	1.4	0	0.1	0	0.1	0.9	0.7	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15	103.5	101.4	2.32
0.526	0.523	1.2	1.9	0.624	1.6	3	4.6	0.7	0.7	0.6	1.2	2.2	6.8	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15	103.5	101.4	2.32
0.333	0.333	0.3	0.7	0.5	0.7	1.7	2.3	0	0	0.3	0	2.7	1	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15	103.5	101.4	2.32
0.608	0.606	0.9	1.5	0.613	1.6	3	4.6	0.7	0.3	0.3	0.7	2.6	6.1	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15	103.5	101.4	2.32
...
0.556	0.529	0.8	1	0.846	0.7	2.8	3.5	1.5	0.3	0.6	0.9	1.4	6.2	2017	0.0	0.0	0.0	Milwaukee Bucks	42	40	0.512	9	103.6	103.8	-0.45
1	0.357	0	0	0	0	0.4	0.4	0	0	0	0	0.1	0.6	2017	0.0	0.0	0.0	Milwaukee Bucks	42	40	0.512	9	103.6	103.8	-0.45
0.508	0.489	1.9	3.1	0.606	1.2	4.5	5.7	1.1	0.7	1	0.9	1.2	10.8	2017	0.0	0.0	0.0	Milwaukee Bucks	42	40	0.512	9	103.6	103.8	-0.45
0.514	0.536	0.6	0.9	0.653	0.7	1.3	2	0.4	0.2	0.5	0.3	1.5	4	2017	0.0	0.0	0.0	Milwaukee Bucks	42	40	0.512	9	103.6	103.8	-0.45
0.548	0.588	0.6	0.7	0.81	0.3	2.8	3.1	1.2	0.7	0.2	0.7	1.6	8.5	2017	0.0	0.0	0.0	Milwaukee Bucks	42	40	0.512	9	103.6	103.8	-0.45

GB dize olarak gözükiyordu düzeltildi.

```
train["GB"].unique()
```

```
array(['15', '51', '39', '19', '\x97', '11', '27', '28', '20', '33', '25',
      '7', '5', '14', '23', '40', '42', '18', '6', '24', '26', '37',
      '29', '21', '8', '1', '13', '17', '3', '9', '2', '35', '16', '41',
      '12', '50', '10', '30', '34', '4', '1.5', '22', '36', '43', '18.5',
      '48', '46', '10.5', '32', '38', '31', '21.5', '45', '22.5', '25.5',
      '3.5', '20.5', '11.5', '44', '52', '56', '2.5', '12.5', '47',
      '32.5', '4.5'], dtype=object)
```

```
train["GB"] = pd.to_numeric(train["GB"].str.replace(".", "0"))
train.dtypes
```

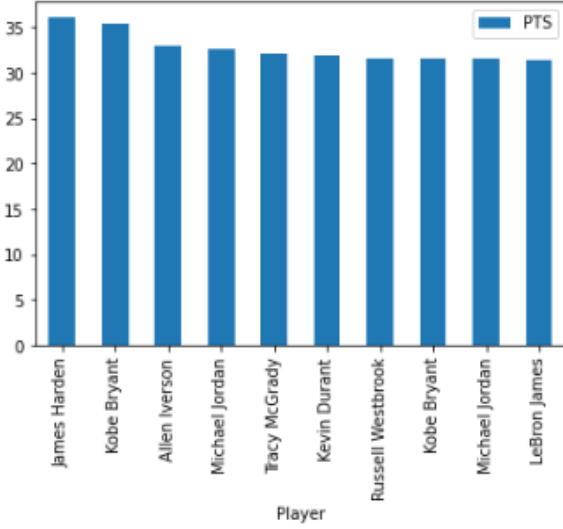
Dosya kaydedildi. 70'den fazla maça çıkan ilk 10 oyuncu grafiksel olarak gösterildi.

```
train.to_csv("player_mvp_stats.csv")
```

```
highest_scoring = train[train["G"] > 70].sort_values("PTS", ascending=False).head(10)
hs = highest_scoring
```

```
hs.plot.bar("Player", "PTS")
```

```
<AxesSubplot:xlabel='Player'>
```



Her yıl en çok sayı yapan oyuncular görüntülendi.

```
In [95]: highest_scoring_by_year = train.groupby("Year").apply(lambda x: x.sort_values("PTS", ascending=False).head(10))
hgs = highest_scoring_by_year
hgs
```

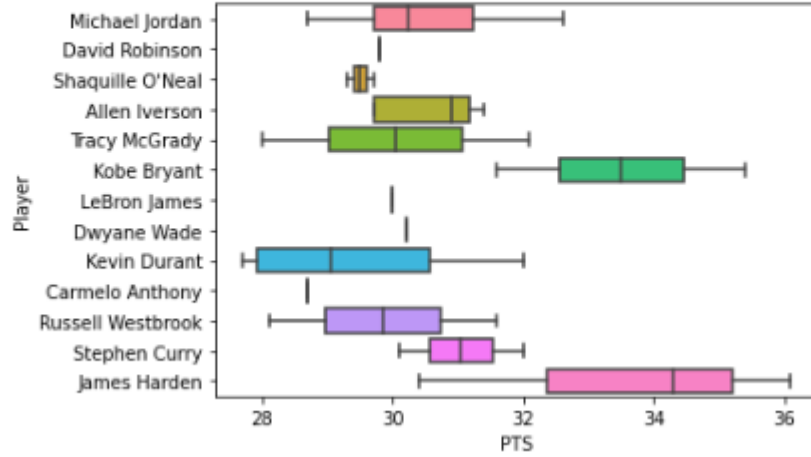
Out[95]:

		Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT
Year																			
1991	9994	Michael Jordan	SG	27	CHI	82	82	37.0	12.1	22.4	0.539	0.4	1.1	0.312	11.7	21.3	0.551	0.547	7.0
1992	10007	Michael Jordan	SG	28	CHI	80	80	38.8	11.8	22.7	0.519	0.3	1.3	0.270	11.5	21.5	0.533	0.526	6.1
1993	10020	Michael Jordan	SG	29	CHI	78	78	39.3	12.7	25.7	0.495	1.0	2.9	0.352	11.7	22.7	0.514	0.515	6.1
1994	8751	David Robinson	C	28	SAS	80	80	40.5	10.5	20.7	0.507	0.1	0.4	0.345	10.4	20.4	0.510	0.510	8.7
1995	7431	Shaquille O'Neal	C	22	ORL	79	79	37.0	11.8	20.2	0.583	0.0	0.1	0.000	11.8	20.1	0.585	0.583	5.8
1996	10527	Michael Jordan	SG	32	CHI	82	82	37.7	11.2	22.6	0.495	1.4	3.2	0.427	9.8	19.4	0.506	0.525	6.7

Grafik ıkartıldı

```
In [96]: sns.boxplot(x=hgs.iloc[:,28], y=hgs.iloc[:,0], showfliers=False, saturation=1)
```

```
Out[96]: <AxesSubplot:xlabel='PTS', ylabel='Player'>
```



Kolaylık olsun diye isimler yan yana koyuldu.

```
hgs = hgs.groupby(["Player", "Year"]).apply(single_team)
```

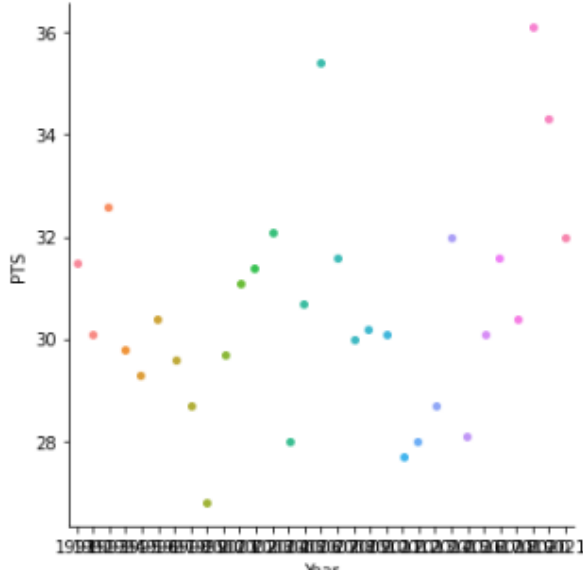
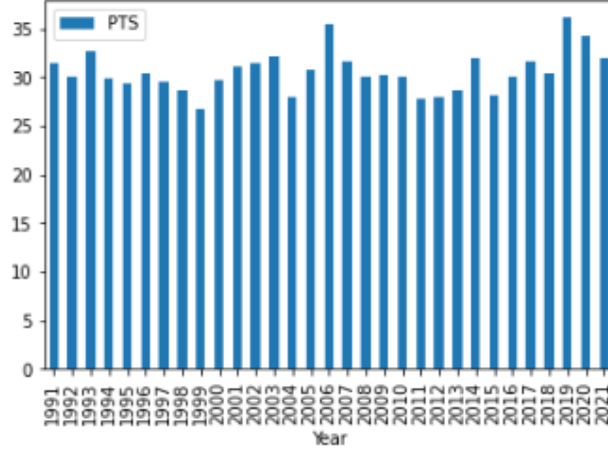
```
hgs.tail()
```

	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%
26	Russell Westbrook	PG	28	OKC	81	81	34.6	10.2	24.0	0.425	2.5	7.2	0.343	7.7	16.8	0.459	0.476	8.8	10.4	0.845
27	James Harden	SG	28	HOU	72	72	35.4	9.0	20.1	0.449	3.7	10.0	0.367	5.4	10.1	0.531	0.541	8.7	10.1	0.858
28	James Harden	PG	29	HOU	78	78	36.8	10.8	24.5	0.442	4.8	13.2	0.368	6.0	11.3	0.528	0.541	9.7	11.0	0.879
29	James Harden	SG	30	HOU	68	68	36.5	9.9	22.3	0.444	4.4	12.4	0.355	5.5	9.9	0.556	0.543	10.2	11.8	0.865
30	Stephen Curry	PG	32	GSW	63	63	34.2	10.4	21.7	0.482	5.3	12.7	0.421	5.1	9.0	0.569	0.605	5.7	6.3	0.916

Yıllara göre PTS değerleri iki farklı grafikte gösterildi.

```
In [100]: hgs.plot.bar("Year", "PTS")
sns.catplot(x = "Year", y = "PTS", data = hgs)
```

```
Out[100]: <seaborn.axisgrid.FacetGrid at 0x1656e535610>
```



LeBron James'e ait en yüksek skor verisi gösterildi (highest scoring)

```
hgs[hgs["Player"] == "LeBron James"]
```

	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%	ORB
17	LeBron James	SF	23	CLE	75	74	40.4	10.6	21.9	0.484	1.5	4.8	0.315	9.1	17.1	0.531	0.518	7.3	10.3	0.712	1.8

MVP oylarıyla ilişkili olan durumlara bakıldı. Bu sayede ilişki için analiz yapıldı. .

```
train.corr()["Share"]
```

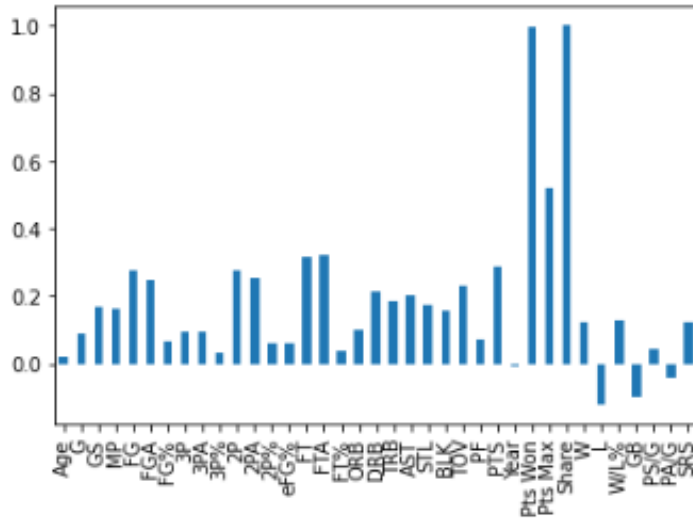
Age	0.018596
G	0.089282
GS	0.167476
MP	0.162175
FG	0.276365
FGA	0.249254
FG%	0.064901
3P	0.096225
3PA	0.096460
3P%	0.030621
2P	0.275976
2PA	0.251885
2P%	0.061986
eFG%	0.058549
FT	0.316392
FTA	0.321457
FT%	0.040052
ORB	0.101375
DRB	0.213241
TRB	0.186209
AST	0.200253
STL	0.175041
BLK	0.154713
TOV	0.233015
PF	0.071046
PTS	0.288267
Year	-0.008135
Pts Won	0.995153
Pts Max	0.521335
Share	1.000000
W	0.122718
L	-0.121866
W/L%	0.126559
GB	-0.101014
PS/G	0.045206
PA/G	-0.039617
SRS	0.122782

Name: Share, dtype: float64

Sahadi puanlar, puan ortalamalarının MVP oylarıyla güçlü bir şekilde ilişkili olduğunu anlıyoruz.

```
train.corr()["Share"].plot.bar()
```

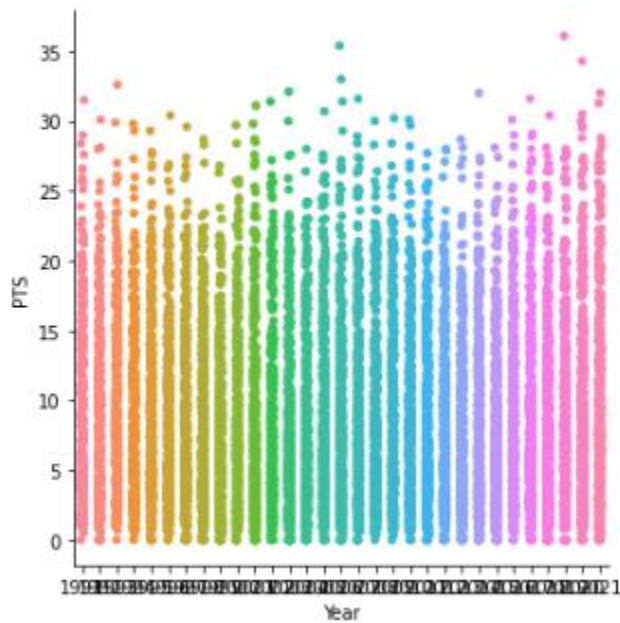
<AxesSubplot:>



Yıllara göre PTS değeri grafikte gösterildi.

```
In [106]: sns.catplot(x = "Year", y = "PTS", data = train)
```

Out[106]: <seaborn.axisgrid.FacetGrid at 0x1656e596040>



Düzenleyip kaydedilen veri seti alındı.

```
In [107]: nba = pd.read_csv("C:/Users//NORA JDK/player_mvp_stats.csv")
nba
```

FTA	FT%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS	Year	Pts Won	Pts Max	Share	Team	W	L	W/L%	GB	PS/G	PA/G	SRS
1.2	0.614	0.6	0.9	1.5	0.1	0.1	0.2	0.5	1.0	2.0	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15.0	103.5	101.4	2.32
0.9	0.500	0.1	1.3	1.4	0.0	0.1	0.0	0.1	0.9	0.7	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15.0	103.5	101.4	2.32
1.9	0.624	1.6	3.0	4.6	0.7	0.7	0.6	1.2	2.2	6.8	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15.0	103.5	101.4	2.32
0.7	0.500	0.7	1.7	2.3	0.0	0.0	0.3	0.0	2.7	1.0	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15.0	103.5	101.4	2.32
1.5	0.613	1.6	3.0	4.6	0.7	0.3	0.3	0.7	2.6	6.1	1995	0.0	0.0	0.0	Houston Rockets	47	35	0.573	15.0	103.5	101.4	2.32
...
1.0	0.846	0.7	2.8	3.5	1.5	0.3	0.6	0.9	1.4	6.2	2017	0.0	0.0	0.0	Milwaukee Bucks	42	40	0.512	9.0	103.6	103.8	-0.45

Dosyadaki sütunlar görüntülendi.

```
nba.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 14092 entries, 0 to 14091
Data columns (total 42 columns):
#   Column          Non-Null Count  Dtype
---  -
0   Unnamed: 0      14092 non-null  int64
1   Player          14092 non-null  object
2   Pos             14092 non-null  object
3   Age             14092 non-null  int64
4   Tm              14092 non-null  object
5   G               14092 non-null  int64
6   GS              14092 non-null  int64
7   MP              14092 non-null  float64
8   FG              14092 non-null  float64
9   FGA             14092 non-null  float64
10  FG%             14092 non-null  float64
11  3P              14092 non-null  float64
12  3PA             14092 non-null  float64
13  3P%             14092 non-null  float64
14  2P              14092 non-null  float64
15  2PA             14092 non-null  float64
16  2P%             14092 non-null  float64
17  eFG%           14092 non-null  float64
18  FT              14092 non-null  float64
19  FTA             14092 non-null  float64
20  FT%             14092 non-null  float64
21  ORB             14092 non-null  float64
22  DRB             14092 non-null  float64
23  TRB             14092 non-null  float64
24  AST             14092 non-null  float64
25  STL             14092 non-null  float64
26  BLK             14092 non-null  float64
27  TOV             14092 non-null  float64
28  PF              14092 non-null  float64
29  PTS             14092 non-null  float64
30  Year            14092 non-null  int64
31  Pts Won         14092 non-null  float64
32  Pts Max         14092 non-null  float64
33  Share           14092 non-null  float64
34  Team            14092 non-null  object
35  W               14092 non-null  int64
36  L               14092 non-null  int64
37  W/L%            14092 non-null  float64
38  GB              14092 non-null  float64
39  PS/G            14092 non-null  float64
40  PA/G            14092 non-null  float64
41  SRS             14092 non-null  float64
dtypes: float64(31), int64(7), object(4)
memory usage: 4.5+ MB
```



```
nba.describe().T # eksik gözlemleri göz ardı eder ayrıca kategorik ve sayısal olmayan değişkenleri görmezden gelir
```

	count	mean	std	min	25%	50%	75%	max
Unnamed: 0	14092.0	7045.500000	4068.154332	0.000	3522.750	7045.500	10568.2500	14091.00
Age	14092.0	26.750568	4.242542	18.000	23.000	26.000	30.0000	44.00
G	14092.0	52.595586	25.101975	1.000	33.000	59.000	75.0000	85.00
GS	14092.0	25.625816	29.069886	0.000	1.000	11.000	51.0000	83.00
MP	14092.0	20.379783	10.115839	0.000	12.000	19.800	28.8000	43.70
FG	14092.0	3.097005	2.204090	0.000	1.400	2.600	4.4000	12.70
FGA	14092.0	6.885531	4.638717	0.000	3.200	5.800	9.7000	27.80
FG%	14092.0	0.436985	0.096085	0.000	0.400	0.440	0.4820	1.00
3P	14092.0	0.539015	0.674970	0.000	0.000	0.300	0.9000	5.30
3PA	14092.0	1.546225	1.777399	0.000	0.100	0.900	2.6000	13.20
3P%	14092.0	0.235246	0.178770	0.000	0.000	0.294	0.3640	1.00
2P	14092.0	2.557707	1.973385	0.000	1.000	2.000	3.6000	12.10
2PA	14092.0	5.339043	3.908267	0.000	2.300	4.300	7.5000	23.40
2P%	14092.0	0.462834	0.104284	0.000	0.428	0.470	0.5100	1.00
eFG%	14092.0	0.473024	0.099484	0.000	0.441	0.483	0.5200	1.50
FT	14092.0	1.523779	1.401465	0.000	0.600	1.100	2.0000	10.20
FTA	14092.0	2.039618	1.773947	0.000	0.800	1.500	2.8000	13.10
FT%	14092.0	0.701591	0.190843	0.000	0.647	0.746	0.8140	1.00
ORB	14092.0	0.993365	0.846904	0.000	0.400	0.700	1.4000	6.80
DRB	14092.0	2.585460	1.807618	0.000	1.300	2.200	3.4000	12.30
TRB	14092.0	3.577164	2.525621	0.000	1.800	3.000	4.7250	18.70
AST	14092.0	1.848524	1.832202	0.000	0.600	1.200	2.5000	14.20
STL	14092.0	0.657373	0.459879	0.000	0.300	0.600	0.9000	3.00
BLK	14092.0	0.417450	0.491581	0.000	0.100	0.300	0.5000	4.50
TOV	14092.0	1.205741	0.803192	0.000	0.600	1.000	1.6000	5.70
PF	14092.0	1.878172	0.827922	0.000	1.300	1.900	2.5000	6.00
PTS	14092.0	8.254449	5.989571	0.000	3.600	6.700	11.7000	36.10
Year	14092.0	2006.744394	8.954063	1991.000	1999.000	2007.000	2015.0000	2021.00
Pts Won	14092.0	6.596225	67.841599	0.000	0.000	0.000	0.0000	1310.00
Pts Max	14092.0	38.792932	208.941452	0.000	0.000	0.000	0.0000	1310.00
Share	14092.0	0.005719	0.058533	0.000	0.000	0.000	0.0000	1.00
W	14092.0	39.567840	12.899535	7.000	30.000	41.000	49.0000	73.00
L	14092.0	40.081890	12.857083	9.000	30.000	39.500	49.0000	72.00
W/L%	14092.0	0.496628	0.156606	0.106	0.378	0.512	0.6100	0.89
GB	14092.0	15.669635	13.155088	0.000	3.500	14.000	25.0000	56.00
PS/G	14092.0	100.689604	6.780205	81.900	95.800	99.900	104.9000	120.10
PA/G	14092.0	100.798120	6.876584	83.400	96.000	100.500	105.4000	130.80
SRS	14092.0	-0.105202	4.568400	-14.680	-3.300	-0.015	3.1875	11.80

Kategorilerin Anlamları

count: girdilerin sayısı mean : girdilerin ortalaması

std : standart sapma

min : minimum veri değeri

25% : ilk çeyrek (alt medyan) Ortancadan küçük olan değerlerin medyanı

50% : medyan

75% : üçüncü çeyrek (üst medyan) Ortancadan büyük olan değerlerin medyanı

max : maksimum veri değeri

2018'den sonra en çok sayı bulan oyuncular sıralandı. Liste 250 ile sınırlı tutuldu.

```
nbaBasic = nba[nba["Year"] > 2018].sort_values("PTS", ascending=False).head(250)
#2018ten sonra en çok sayı bulan oyuncuları sıraladım.
#Listeyi 250 ile sınırlı tuttum çok büyük veri oluyordu.
nbaBasic
```

Unnamed: 0	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%	ORB
9701	James Harden	PG	29	HOU	78	78	36.8	10.8	24.5	0.442	4.8	13.2	0.368	6.0	11.3	0.528	0.541	9.7	11.0	0.879	0.8
9718	James Harden	SG	30	HOU	68	68	36.5	9.9	22.3	0.444	4.4	12.4	0.355	5.5	9.9	0.556	0.543	10.2	11.8	0.865	1.0
3760	Stephen Curry	PG	32	GSW	63	63	34.2	10.4	21.7	0.482	5.3	12.7	0.421	5.1	9.0	0.569	0.605	5.7	6.3	0.916	0.5
3972	Bradley Beal	SG	27	WAS	60	60	35.8	11.2	23.0	0.485	2.2	6.2	0.349	9.0	16.8	0.535	0.532	6.8	7.7	0.889	1.2
1924	Bradley Beal	SG	26	WAS	57	57	36.0	10.4	22.9	0.455	3.0	8.4	0.353	7.4	14.4	0.515	0.520	6.8	8.0	0.842	0.9
...
6178	Kendrick Nunn	PG	24	MIA	67	67	29.3	6.0	13.6	0.439	2.0	5.8	0.350	3.9	7.8	0.505	0.514	1.3	1.5	0.850	0.3
11449	Nikola Mirotić	PF	27	MIL	46	25	27.1	5.2	11.8	0.439	2.5	6.9	0.365	2.7	4.9	0.545	0.546	2.3	2.7	0.847	1.3
11296	Clint Capela	C	26	ATL	63	63	30.1	6.6	11.0	0.594	0.0	0.0	0.000	6.6	11.0	0.594	0.594	2.1	3.6	0.573	4.7
11333	Jordan Clarkson	SG	27	UTA	71	2	24.0	5.5	12.2	0.454	2.1	5.8	0.368	3.4	6.4	0.533	0.542	1.9	2.3	0.836	0.7
13860	Kelly Oubre Jr.	SF	23	PHO	69	19	28.0	5.4	12.2	0.445	1.6	4.9	0.320	3.9	7.3	0.530	0.510	2.7	3.5	0.775	1.0

Oyuncuların isimleri getirildi.

```
print(nbaBasic.Player.unique())
```

```
['James Harden' 'Stephen Curry' 'Bradley Beal' 'Damian Lillard'
 'Trae Young' 'Giannis Antetokounmpo' 'Luka Don?i?' 'Joel Embiid'
 'Paul George' 'Zach LaVine' 'LeBron James' 'Kyrie Irving'
 'Russell Westbrook' 'Kawhi Leonard' 'Zion Williamson' 'Kevin Durant'
 'Devin Booker' 'Karl-Anthony Towns' 'Jayson Tatum' 'Donovan Mitchell'
 'Nikola Joki?' 'Anthony Davis' 'Kemba Walker' 'De'Aaron Fox'
 'Jaylen Brown' 'Blake Griffin' 'Collin Sexton' 'Julius Randle'
 'Brandon Ingram' 'Shai Gilgeous-Alexander' 'Nikola Vu?evi?'
 'D'Angelo Russell' 'CJ McCollum' 'Pascal Siakam' 'Jerami Grant'
 'DeMar DeRozan' 'Andrew Wiggins' 'John Collins' 'Klay Thompson'
 'Jimmy Butler' 'LaMarcus Aldridge' 'Malcolm Brogdon' 'Jrue Holiday'
 'Jamal Murray' 'Mike Conley' 'Christian Wood' 'Khris Middleton'
 'Buddy Hield' 'John Wall' 'Spencer Dinwiddie' 'Kristaps Porzi??is'
 'Terry Rozier' 'Domantas Sabonis' 'Bojan Bogdanovi?' 'Caris LeVert'
 'Lou Williams' 'JaKarr Sampson' 'Tobias Harris' 'T.J. Warren'
 'Danilo Gallinari' 'Victor Oladipo' 'Malik Beasley' 'Gordon Hayward'
 'Fred VanVleet' 'Kyle Lowry' 'Anthony Edwards' 'Ja Morant'
 'Michael Porter Jr.' 'Dennis Schröder' 'Kelly Oubre Jr.' 'Kyle Kuzma'
 'Bam Adebayo' 'Lauri Markkanen' 'Norman Powell' 'Montrezl Harrell'
 'Evan Fournier' 'Jordan Clarkson' 'Devonte Graham' 'Deandre Ayton'
 'J.J. Redick' 'Derrick Rose' 'Tim Hardaway Jr.' 'Eric Gordon'
 'Andre Drummond' 'Jusuf Nurki?' 'Kevin Love' 'Chris Paul' 'RJ Barrett'
 'Darius Garland' 'Jaren Jackson Jr.' 'Dillon Brooks' 'Jonas Valan?i?nas'
 'R.J. Hunter' 'Ben Simmons' 'Marcus Morris' 'Josh Richardson'
 'Kevin Porter Jr.' 'Clint Capela' 'Khyri Thomas' 'Bogdan Bogdanovi?'
 'Harrison Barnes' 'DeMarcus Cousins' 'Goran Dragi?' 'Aaron Gordon'
 'Elijah Bryant' 'Rudy Gobert' 'OG Anunoby' 'Eric Bledsoe' 'Luke Kennard'
 'LaMelo Ball' 'Dejounte Murray' 'Terrence Ross' 'Hassan Whiteside'
 'Derrick White' 'Serge Ibaka' 'D?vis Bert?ns' 'Reggie Jackson'
 'Carmelo Anthony' 'Gary Trent Jr.' 'Jeremy Lamb' 'Kendrick Nunn'
 'Nikola Miroti?']
```

Oyuncu sayıları bulundu. İlk 250 içerisinde kaç kere geçtikleri bulundu.

```
nbaBasic["Player"].value_counts().count() # kaç kişi var.
```

122

```
nbaBasic["Player"].value_counts() #İlk 250 içinde kaç kere isimleri geçmiş.
```

```
James Harden      3
Jrue Holiday      3
Brandon Ingram    3
Chris Paul        3
Nikola Vu?evi?    3
..
Marcus Morris     1
Josh Richardson   1
Kevin Porter Jr.  1
Khyri Thomas      1
Nikola Miroti?    1
Name: Player, Length: 122, dtype: int64
```

Takımlar gösterildi (ilk 250 içerisindekiler)

```
nbaBasic["Tm"].value_counts() #İlk 250 içinde ki takımlar.
```

```
TOR    12
MIL    11
BOS    11
HOU    11
POR    11
PHI    10
LAC    10
GSW     9
MIN     9
IND     9
UTA     9
NOP     9
PHO     9
CLE     8
SAC     8
ATL     8
MIA     8
BRK     8
LAL     8
MEM     8
OKC     8
DAL     8
DEN     7
CHO     7
DET     7
SAS     7
WAS     6
CHI     6
ORL     5
NYK     3
Name: Tm, dtype: int64
```

nbaBasic kopyalanarak nb değişkenine atandı.

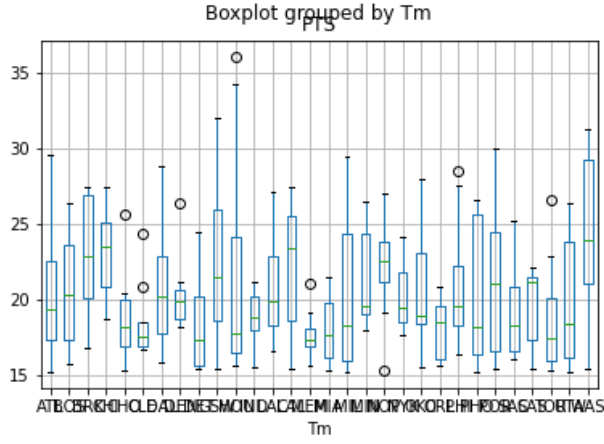
```
nb = nbaBasic.copy()
nb.head()
```

Unnamed: 0	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P
9701	James Harden	PG	29	HOU	78	78	36.8	10.8	24.5	0.442	4.8	13.2	0.368	6.0
9718	James Harden	SG	30	HOU	68	68	36.5	9.9	22.3	0.444	4.4	12.4	0.355	5.5
3760	Stephen Curry	PG	32	GSW	63	63	34.2	10.4	21.7	0.482	5.3	12.7	0.421	5.1
3972	Bradley Beal	SG	27	WAS	60	60	35.8	11.2	23.0	0.485	2.2	6.2	0.349	9.0
1924	Bradley Beal	SG	26	WAS	57	57	36.0	10.4	22.9	0.455	3.0	8.4	0.353	7.4

Takımların PTS durumuna ait verileri grafiğe aktarıldı.

```
nb.boxplot(column = "PTS", by = "Tm")
```

```
<AxesSubplot:title={'center':'PTS'}, xlabel='Tm'>
```



```
nb["Tm"].value_counts().plot.barh().set_title("Takım Değişkeninin Dağılımı")
```

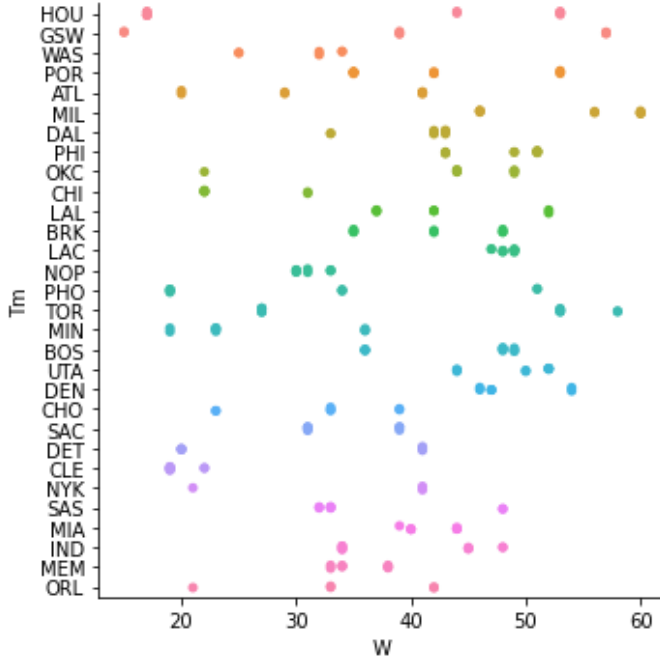
```
Text(0.5, 1.0, 'Takım Değişkeninin Dağılımı')
```



Çıkarım: Aşağıdaki grafiğe bakarak, 2018'ten sonra Toronto ve Portland takımındaki oyuncuların bireysel olarak diğerlerine kıyasla az sayı atıp çok maç kazandığını görebiliriz. Orlando' daki oyuncuların ise bireysel olarak çok sayı atıp az galibiyet aldığını görüyoruz

```
sns.catplot(x = "W", y = "Tm", data = nb)
```

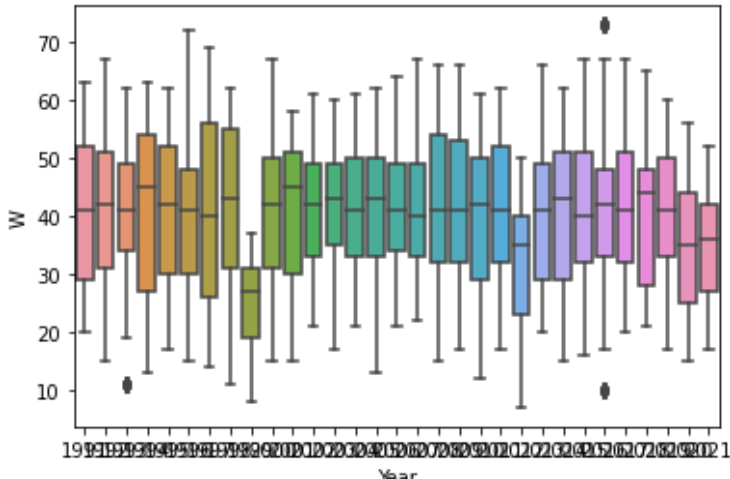
```
<seaborn.axisgrid.FacetGrid at 0x16566d04a30>
```



Yıllara göre değerler grafikte gösterildi.

```
sns.boxplot(x = "Year", y = "W", data = nba)
```

```
<AxesSubplot:xlabel='Year', ylabel='W'>
```



ISI HARİTASI

Isı Haritaları değişkenleri satırlara ve sütunlara yerleştirerek ve tablodaki hücreleri renklendirerek çok değişkenli verileri çapraz incelemek için kullanılmaktadır. Isı haritaları, birden çok değişken arasında varyans göstermek, herhangi bir tasarım ortaya çıkarmak, herhangi bir değişkenin birbirine benzer olup olmadığını göstermek ve aralarında herhangi bir korelasyon olup olmadığını tespit etmek için kullanılabilir.

```
(f, ax) = plt.subplots(figsize=(20, 20))
sns.heatmap(nba.corr(), annot = True, linewidths = 1, fmt = '.1f', ax = ax)
plt.show()
```

