

All-NBA Teams Prediction

Zayn Sui & Cindy Zhang



Background

- Players with top performance in the regular season
- Voting is conducted by a global panel of sportswriters and broadcasters.
- Somehow subjective?

 **Lunatico** @LakeShow4Life9 · May 24, 2022
Replying to @NBAPR @Giannis_An34
BOOKER LMAO?

5 2 130

 **Greg Cross** @gregjcross · May 24, 2022
Replying to @LakeShow4Life9 @NBAPR
Chosen in December

 **Dami** @KingDami5299 · May 24, 2022
Replying to @NBAPR and @NBA
As usual these voters don't know ball.

1 55

 **Alex** @0toHerr0 · May 24, 2022
Replying to @NBAPR @wojespn and 5 others
BOOKER? LMAO

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		2021-22 KIA ALL-NBA TEAM			
		PERFORMANCE AWARDS			
Position	Player (Team)	1 st Team Votes (5 Points)	2 nd Team Votes (3 Points)	3 rd Team Votes (1 Point)	Total Points
2021-22 KIA ALL-NBA FIRST TEAM					
Forward	Giannis Antetokounmpo (Milwaukee)	100	0	0	500
Guard	Luka Dončić (Dallas)	88	12	0	476
Center	Nikola Jokić (Denver)	88	12	0	476
Guard	Devin Booker (Phoenix)	82	16	2	460
Forward	Jayson Tatum (Boston)	49	47	4	390
2021-22 KIA ALL-NBA SECOND TEAM					
Center	Joel Embiid (Philadelphia)	57	43	0	414
Guard	Ja Morant (Memphis)	13	76	8	301
Forward	Kevin Durant (Brooklyn)	10	68	22	276
Guard	Stephen Curry (Golden State)	9	69	22	274
Forward	DeMar DeRozan (Chicago)	2	39	57	184
2021-22 KIA ALL-NBA THIRD TEAM					
Center	Karl-Anthony Towns (Minnesota)	0	38	60	174
Forward	LeBron James (L.A. Lakers)	2	35	54	169
Guard	Chris Paul (Phoenix)	0	16	66	114
Guard	Trae Young (Atlanta)	0	11	77	110
Forward	Pascal Siakam (Toronto)	0	7	42	63

Objective Understanding

Using player performance and team performance to predict members of All-NBA teams in Season 2022-23

All-NBA First-Team Voting 2014-15 Season

PLAYER, TEAM	POSITION	VOTES (1ST)
LeBron James, Cavs	F	645 (129)
Anthony Davis, Pelicans	F/C	625 (119)
Marc Gasol, Grizzlies	C	453 (65)
Stephen Curry, Warriors	G	645 (129)
James Harden, Rockets	G	637 (125)

Target:

the share of votes a player receives

2016-17 ALL-NBA FIRST TEAM

Position	Player, Team	1 st Team	2 nd Team	3 rd Team	Total
Guard	James Harden, Houston	100	--	--	500
Forward	LeBron James, Cleveland	99	1	--	498
Guard	Russell Westbrook, Oklahoma City	99	1	--	498
Forward	Kawhi Leonard, San Antonio	96	3	1	490
Center	Anthony Davis, New Orleans	45	34	16	343

Data Source and Data Collection

<https://www.basketball-reference.com/>
NBA API

Step1: Scrape the **url** for players in All-NBA Teams from Season 1998-99 to Season 2021-22

Step2: Scrape the player's performance on the **season** when he was in ALL-NBA Team in **Per-Game** table and **Advanced** table

2020-21 NBA Awards Voting

« 2019-20 Awards Voting 2021-22 Awards Voting »

Most Valuable Player

Share & Export ▼ Glossary

			Voting					Per Game					Advanced		Bold indicates league leader		Share & Export ▾		Glossary																							
Rank	Player	Age	Tm	First	Pts Won	Pts Max	Share	G	MP	PTS	TRB	AST	STL	BLK	FG%	Regular Season		Playoffs																								
1	Nikola Jokić	25	DEN	91.0	971.0	1010	0.961	72	34.6	26.4	10.8	8.3	1.3	0.7	.56	Season	Age	Tm	Lg	Pos	G	MP	PER	TS%	3PAr	FTr	ORB%	DRB%	TRB%	AST%	STL%	BLK%	TOV%	USG%	OWS	DWS	WS	WS/48	OBPM	DBP		
2	Joel Embiid	26	PHI	1.0	586.0	1010	0.580	51	31.1	28.5	10.6	2.8	1.0	1.4	.51	2020-21	25	DEN	NBA	C	72	2488	31.3	.647	.183	.305	9.4	26.1	17.8	40.4	1.9	1.9	13.1	29.6	12.2	3.4	15.6	.301	9.1	3		
3	Stephen Curry	32	GSW	5.0	453.0	1010	0.449	63	34.2	32.0	5.5	5.8	1.2	0.1	.45	2021-22	26	DEN	NBA	C	74	2476	32.8	.661	.220	.357	9.6	35.5	23.0	42.6	2.2	2.3	15.6	31.9	10.8	4.5	15.2	.296	9.2	4		
4	Giannis Antetokounmpo	26	MIL	1.0	348.0	1010	0.345	61	33.0	28.1	11.0	5.9	1.2	1.2	.56	2020-21	25	DEN	NBA	C	72	2488	31.3	.647	.183	.305	9.4	26.1	17.8	40.4	1.9	1.9	13.1	29.6	12.2	3.4	15.6	.301	9.1	3		
5	Chris Paul	35	PHO	2.0	139.0	1010	0.138	70	31.4	16.4	4.5	8.9	1.4	0.3	.45	2021-22	26	DEN	NBA	C	74	2476	32.8	.661	.220	.357	9.6	35.5	23.0	42.6	2.2	2.3	15.6	31.9	10.8	4.5	15.2	.296	9.2	4		
6	Luka Dončić	21	DAL	0.0	42.0	1010	0.042	66	34.3	27.7	8.0	8.6	1.0	0.5	.479	2020-21	25	DEN	NBA	C	72	2488	31.3	.647	.183	.305	9.4	26.1	17.8	40.4	1.9	1.9	13.1	29.6	12.2	3.4	15.6	.301	9.1	3		
7	Damian Lillard	30	POR	0.0	38.0	1010	0.038	67	35.8	28.8	4.2	7.5	0.9	0.3	.451	2021-22	26	DEN	NBA	C	74	2476	32.8	.661	.220	.357	9.6	35.5	23.0	42.6	2.2	2.3	15.6	31.9	10.8	4.5	15.2	.296	9.2	4		
8	Julius Randle	26	NYK	0.0	20.0	1010	0.020	71	37.6	24.1	10.2	6.0	0.9	0.3	.45	2020-21	25	DEN	NBA	C	72	2488	31.3	.647	.183	.305	9.4	26.1	17.8	40.4	1.9	1.9	13.1	29.6	12.2	3.4	15.6	.301	9.1	3		
9	Derrick Rose	32	TOT	1.0	10.0	1010	0.010	50	25.6	14.7	2.6	4.2	1.0	0.4	.47	2021-22	26	DEN	NBA	C	74	2476	32.8	.661	.220	.357	9.6	35.5	23.0	42.6	2.2	2.3	15.6	31.9	10.8	4.5	15.2	.296	9.2	4		
10	Rudy Gobert	28	UTA	0.0	8.0	1010	0.008	71	30.8	14.3	13.5	1.3	0.6	2.7	.67	2020-21	25	DEN	NBA	C	72	2488	31.3	.647	.183	.305	9.4	26.1	17.8	40.4	1.9	1.9	13.1	29.6	12.2	3.4	15.6	.301	9.1	3		
11	Russell Westbrook	32	WAS	0.0	5.0	1010	0.005	65	36.4	22.2	11.5	11.7	1.4	0.4	.43	2021-22	26	DEN	NBA	C	74	2476	32.8	.661	.220	.357	9.6	35.5	23.0	42.6	2.2	2.3	15.6	31.9	10.8	4.5	15.2	.296	9.2	4		
12	Ben Simmons	24	PHI	0.0	3.0	1010	0.003	58	32.4	14.3	7.2	6.9	1.6	0.6	.51	2020-21	25	DEN	NBA	C	72	2488	31.3	.647	.183	.305	9.4	26.1	17.8	40.4	1.9	1.9	13.1	29.6	12.2	3.4	15.6	.301	9.1	3		
13T	James Harden	31	TOT	0.0	1.0	1010	0.001	44	36.6	24.6	7.9	10.8	1.2	0.8	.51	2021-22	26	DEN	NBA	C	74	74	33.5	10.3	17.7	.583	1.3	3.9	.337	9.0	13.8	.652	.620	5.1	6.3	.810	2.8	11.0	13.8	7.9	1.5	0.9
13T	LeBron James	36	LAL	0.0	1.0	1010	0.001	45	33.4	25.0	7.7	7.8	1.1	0.6	.51	2022-23	27	DEN	NBA	C	64	64	33.9	9.5	15.0	.634	0.8	2.1	.394	8.6	12.8	.674	.662	4.9	6.0	.818	2.4	9.5	11.9	9.9	1.2	0.7
13T	Kawhi Leonard	29	LAC	0.0	1.0	1010	0.001	52	34.1	24.8	6.5	5.2	1.6	0.4	.51	2020-21	25	DEN	NBA	C	72	2488	31.3	.647	.183	.305	9.4	26.1	17.8	40.4	1.9	1.9	13.1	29.6	12.2	3.4	15.6	.301	9.1	3		

Data Source and Data Collection

<https://www.basketball-reference.com/>
NBA API

Step3: Scrape the **performance for the team** when and where the player was in ALL-NBA Team using **NBA API**

Step4: Scrape the player performance(**Per Game** and **Advance**) and **performance of the their team** in Season 2022-23 for **prediction**

Per Game Stats

Share & Export ▼

Glossary

Team

Opponent

Rk	Team	G	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	FT	FTA	FT%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS
1	Sacramento Kings	70	241.8	43.6	87.5	.498	13.7	36.6	.374	29.9	50.9	.588	20.2	25.4	.795	9.2	33.2	42.3	27.2	6.9	3.3	14.0	19.8	121.1
2	Golden State Warriors	77	242.1	42.9	88.7	.476	16.5	43.1	.384	26.4	47.7	.550	15.9	20.1	.793	10.7	33.9	44.1	29.5	7.0	3.9	16.3	21.7	118.3
3	Oklahoma City Thunder	Advanced																						
4	Boston Celtics	Share & Export ▼ <input checked="" type="checkbox"/> When table is sorted, hide non-qualifiers for rate stats																						
5	Atlanta Hawks	Glossary																						
6	Utah Jazz	Hide Partial Rows																						
7	Denver Nuggets																							
8	Los Angeles Lakers																							
9	Milwaukee Bucks																							
10	Memphis Grizzlies																							

Rk	Player	Pos	Age	Tm	G	MP	PER	TS%	3PAr	FTr	ORB%	DRB%	TRB%	AST%	STL%	BLK%	TOV%	USG%	OWS	DWS	WS	WS/48	OBBPM	DBPM	BPM	VORP
1	Precious Achiuwa	C	23	TOR	47	1004	14.3	.542	.250	.341	9.0	23.7	15.8	6.5	1.3	2.6	11.7	18.8	0.6	1.1	1.7	.081	-2.0	-0.8	-2.8	-0.2
2	Steven Adams	C	29	MEM	42	1133	17.6	.564	.004	.490	19.9	25.2	22.5	11.3	1.5	3.7	19.8	14.6	1.3	2.1	3.4	.145	-0.3	0.9	0.6	0.7
3	Bam Adebayo	C	25	MIA	68	2389	20.4	.595	.012	.366	7.8	23.9	15.5	16.4	1.7	2.5	12.8	25.5	3.4	3.7	7.1	.142	0.9	0.9	1.8	2.3
4	Ochai Agbaji	SG	22	UTA	47	844	8.8	.582	.636	.143	4.2	6.8	5.5	5.4	0.7	0.7	8.2	13.2	0.8	0.3	1.1	.060	-1.8	-1.3	-3.1	-0.2
5	Santi Aldama	PF	22	MEM	67	1467	13.8	.585	.515	.256	5.1	17.1	11.1	7.5	1.3	2.8	8.8	16.1	1.8	2.2	4.0	.129	-0.5	0.9	0.4	0.9
6	Nickell Alexander-Walker	SG	24	TOT	49	759	12.1	.564	.529	.201	1.9	11.0	6.5	17.9	1.9	2.1	15.3	18.5	0.3	0.7	1.0	.062	-1.1	0.5	-0.6	0.3
6	Nickell Alexander-Walker	SG	24	UTA	36	528	13.1	.609	.512	.229	1.7	10.4	6.1	20.1	2.2	2.2	19.4	18.4	0.3	0.5	0.8	.076	-0.6	1.0	0.5	0.3
6	Nickell Alexander-Walker	SG	24	MIN	13	231	9.7	.475	.562	.146	2.5	12.4	7.5	12.8	1.2	1.9	6.0	18.6	-0.1	0.2	0.1	.031	-2.5	-0.6	-3.1	-0.1
7	Grayson Allen	SG	27	MIL	65	1809	12.2	.612	.652	.225	3.4	8.8	6.2	11.1	1.4	0.5	10.8	14.7	2.6	2.1	4.7	.124	-0.6	0.6	0.0	0.9
8	Jarrett Allen	C	24	CLE	62	2048	19.8	.673	.016	.353	11.1	23.9	17.5	7.5	1.3	3.4	11.6	16.3	5.0	3.7	8.7	.204	1.3	1.1	2.3	2.2
9	Jose Alvarado	PG	24	NOP	61	1310	11.9	.525	.505	.164	2.4	9.8	6.1	20.0	2.5	0.7	13.4	19.8	0.2	1.5	1.7	.061	-1.9	0.6	-1.4	0.2
10	Kyle Anderson	PF	29	MIN	59	1631	14.8	.585	.206	.312	3.6	17.3	10.6	22.0	1.9	2.9	15.5	14.4	2.1	2.2	4.3	.126	0.1	2.2	2.3	1.8



Data Understanding



Data Range: 1988-99 season - 2021-22 season



Observation: Players who received at least one vote for All-NBA Teams



Feature: 29 variables



Individual Performance

Basic statistics:

PTS TRB AST
STL BLK
FG% 3P% FT%

Advanced Statistics:

WS WS/48 PER TS%
3PAr FTr
ORB% DRB% TRB%
AST% STL% BLK%
TOV% USG%
OWS DWS
OBPM DBPM BPM
VORP WinPCT



Team Performance

Team winning percentage

Modeling

Train Test Split : 80% / 20% on 1988-99 season - 2021-22 season

Prediction: All players in 2022-23 season

Model Used: Supper Vector Regression with Standardization,

Random Forest Regressor,

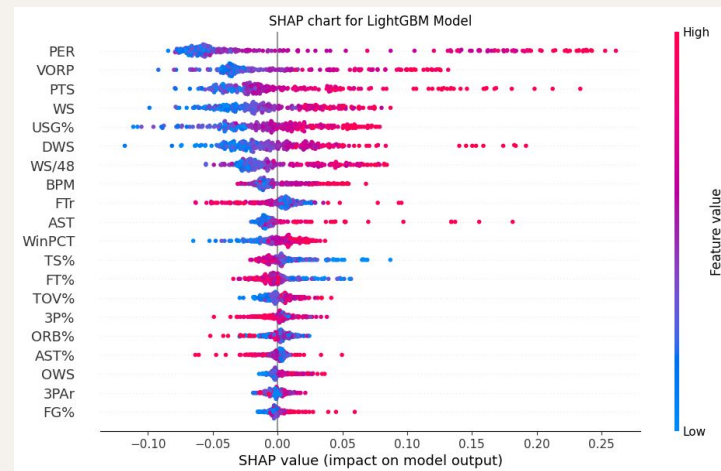
LightGBM, XGBoost Regressor,

AdaBoost Regressor, CatBoost Regressor



Performance Evaluation

Model	RMSE	R ²
Random Forest	0.1434	0.7845
SVM	0.1529	0.7552
LightGBM	0.1335	0.8134
XGBoost	0.1391	0.7973
CatBoost	0.147	0.7738
AdaBoost	0.1625	0.7235



Prediction

All-NBA Third Team:

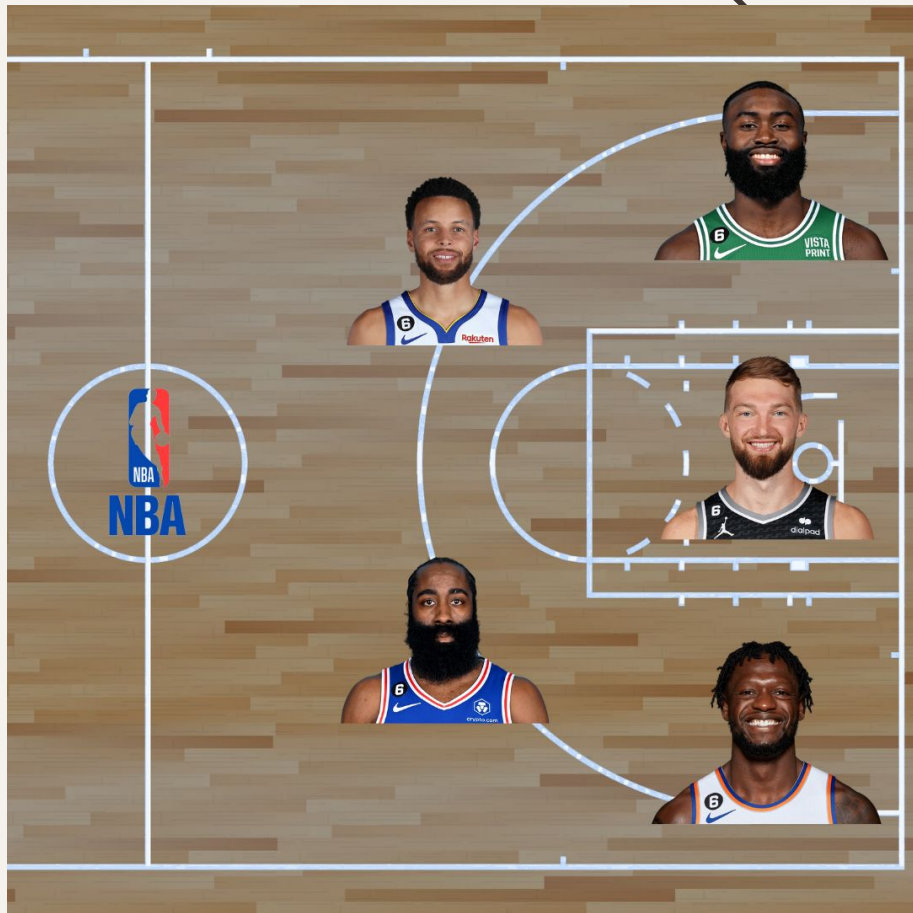
Stephen Curry

James Harden

Jaylen Brown

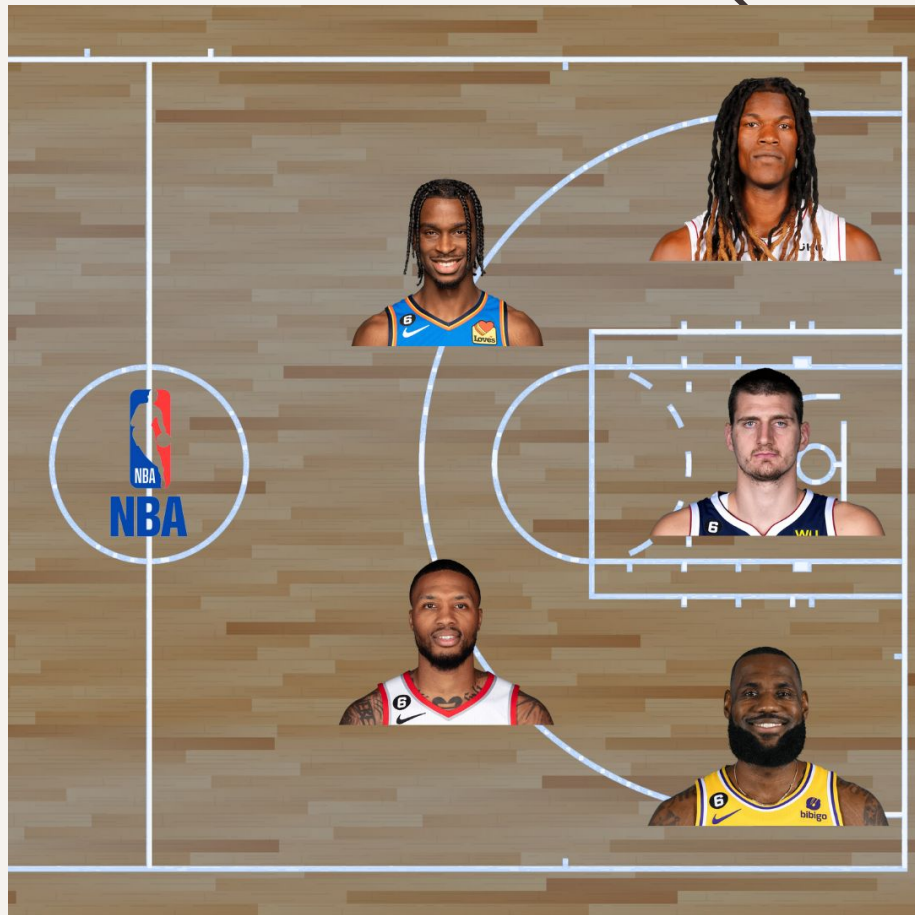
Julius Randle

Domantas Sabonis



Prediction

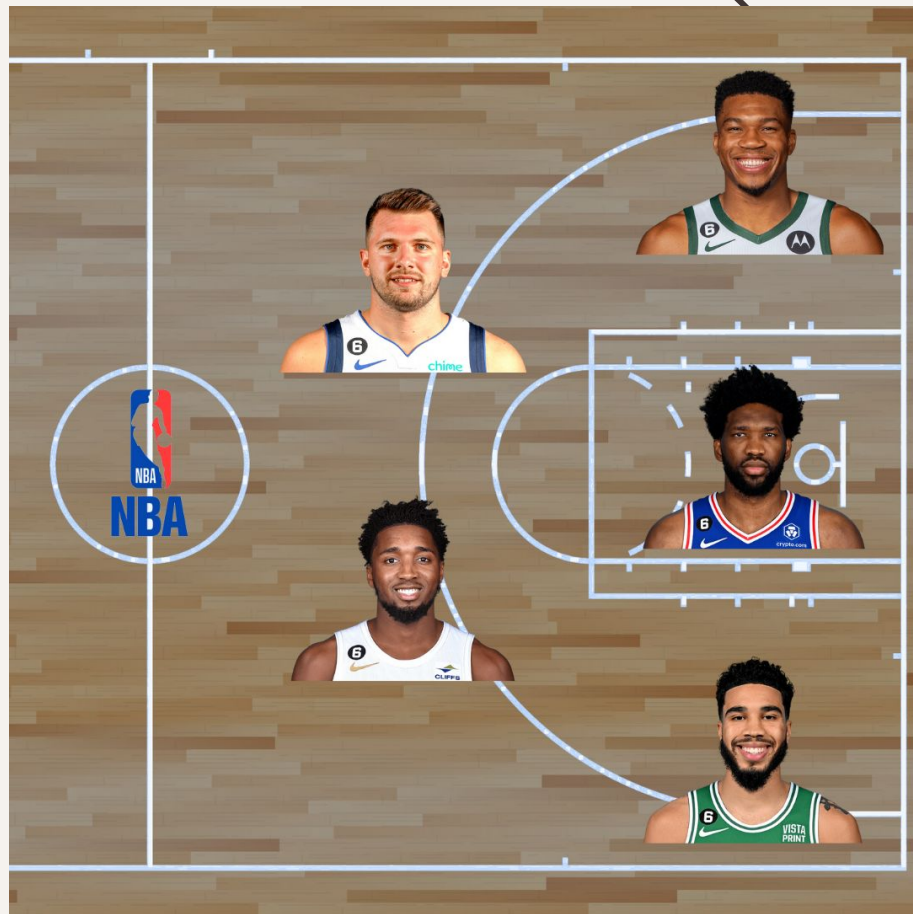
All-NBA Second Team:
Shai Gilgeous-Alexander
Damian Lillard
Jimmy Butler
LeBron James
Nikola Jokić



Prediction

All-NBA First Team:

Luka Dončić
Donovan Mitchell
Giannis Antetokounmpo
Jayson Tatum
Joel Embiid



Model Improvement

Variables in other dimensions:

- Improvement on the players' performance compared to last season
- Player's contribution to team (ie. average of (individual score / overall team score) in one season)
- If a player makes any historical records (Russell Westbrook triple-double season)
- Player's behaviour off the court



Thank you !
Any Questions?