

# ANALYSIS OF NBA'S PARITY PROBLEM USING SUPERVISED LEARNING TECHNIQUE

Student: CHOW MING HUN

Supervisor: Ms CHOO LEY YA

## ABSTRACT

NBA's parity problem arose from the current playoffs format will be investigated and analyzed by comparison between the current playoff format (**Best of 7 Elimination**) and the **double Round-robin format**.

The supervised learning technique applied in this project which is the **Gaussian Naïve Bayes Classifier**, used for predicting the matches' results to support this analysis and it managed to reach 70.6 % of accuracy with only 2460 datasets for training.

## OBJECTIVES

- Discuss the issues arising from NBA's parity problem.
- Predict NBA's matches results using selected supervised learning technique.
- Analyze NBA's matches' results with different playoff formats

## METHODOGY

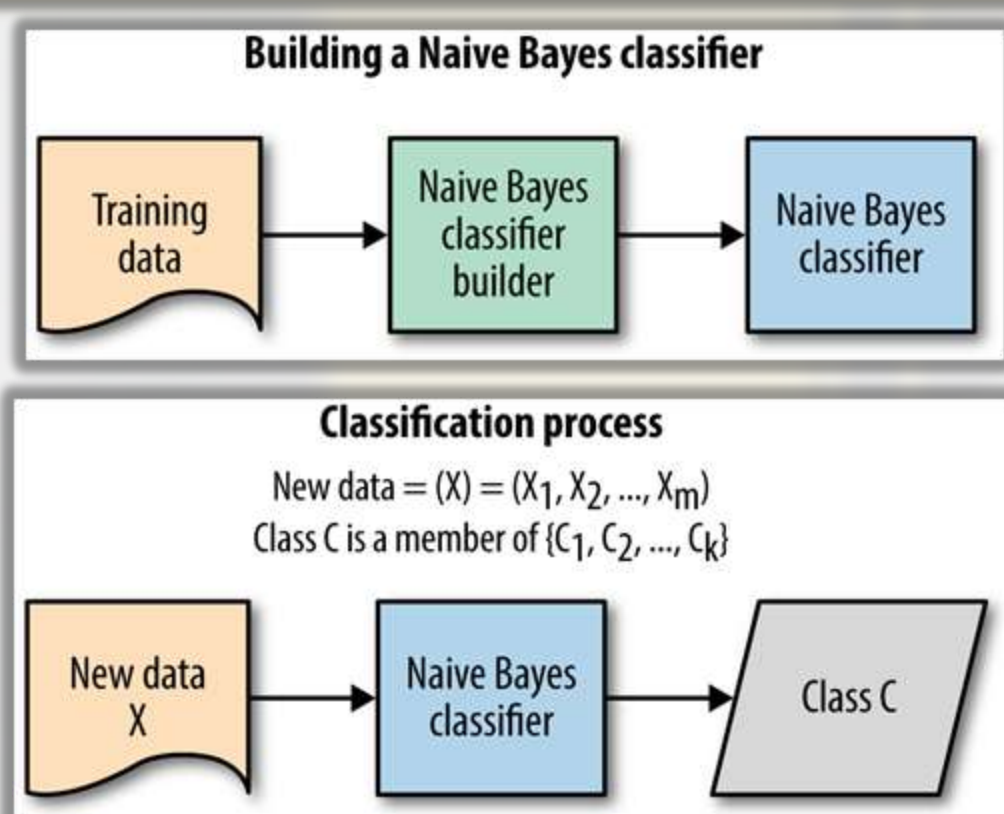
### Gaussian Naïve Bayes Classifier

$$P(\text{class} | \text{data}) \propto P(\text{data} | \text{class}) \cdot P(\text{class})$$

Gaussian :  $P(\text{data} | \text{class}) \sim \text{Normal Distribution}$

Naïve :  $x_1, x_2, \dots, x_p$  are independent, where  $p$  is number of features

Bayes : Bayes' Theorem



### NBA Data (Modeling)

- Data collected from Basketball Reference.
- 2 teams per match
- 13 players selected for each team
- Team Rating (Home/ Away)
- Players' attributes:
  - Minute Played
  - Field Goal Rating
  - Efficiency Rating
  - Position

### Modeling

The statistical data collected which contain 3 years(2016, 2017 and 2018) of the season matches, and the 2016's and 2017's data use for training and 2018's used for testing. Playoff 2018 data also taken ,for the purpose of the analysis between the different rule systems.



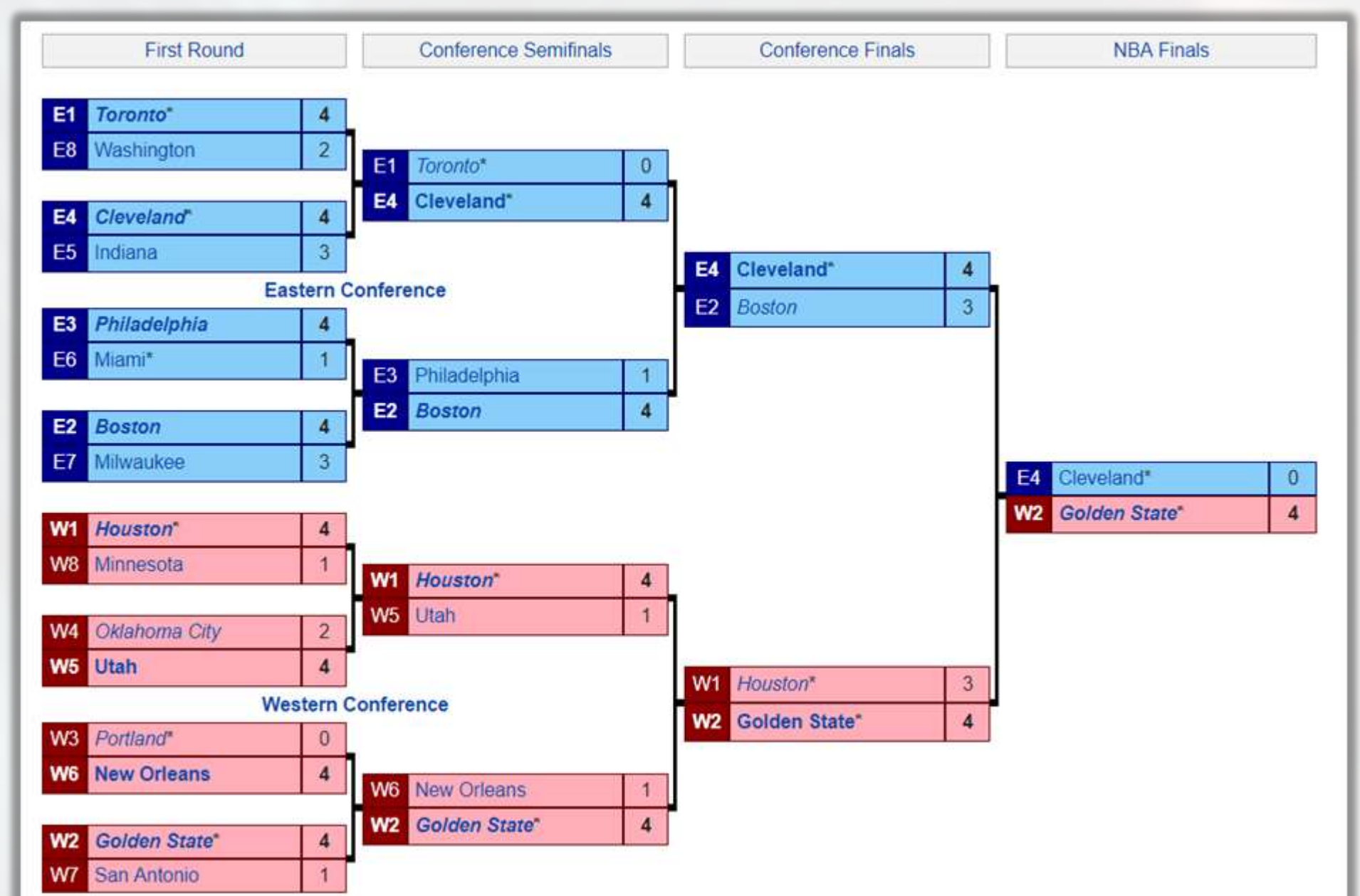
## RESULTS & DISCUSSION

### Analysis NBA Playoff Season 2017-18

#### NBA Parity Problem

The problem occurred obviously due to the **strength differences** between western conferences and eastern conferences which the west got the higher strength average compare to the east.

#### Result (Best of 7 Elimination)



#### Result (Double Round-robin)

	TOR	BOS	PHI	CLE	IND	MIA	MIL	WAS	HOU	GOS	POT	OKC	UTA	NEO	SAA	MIN	HScore	Total	Rank
TOR		1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	13	23	3
BOS	0		1	1	0	1	1	1	0	0	0	0	1	1	1	0	8	15	8
PHI	0	0		1	0	1	1	1	0	0	0	0	1	0	1	0	6	10	11
CLE	0	0	0		0	1	0	0	0	0	0	0	0	0	1	0	2	2	15
IND	0	1	1	1		1	1	1	0	0	1	0	1	1	1	1	11	19	6
MIA	0	0	0	1	0		0	0	0	0	0	0	0	0	0	1	2	2	15
MIL	0	0	1	1	0	1		0	0	0	0	0	1	0	1	0	5	9	13
WAS	0	0	1	1	0	1	1		0	0	0	1	0	1	0	1	6	11	10
HOU	1	1	1	1	1	1	1	1		0	1	1	1	1	1	1	14	28	2
GOS	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	15	30	1
POT	0	1	1	1	1	1	1	1	0	0		0	1	1	1	1	11	19	6
OKC	1	1	1	1	1	1	1	1	0	0	1		1	1	1	1	13	23	3
UTA	0	0	0	1	0	1	0	0	0	0	0	0		0	1	0	3	5	14
NEO	0	0	0	1	0	1	0	0	0	0	0	0	1		1	0	4	10	11
SAA	1	1	1	1	1	1	1	1	0	0	1	1	1	1		1	13	13	9
MIN	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1		13	21	5
AScore	10	7	4	0	8	0	4	5	14	15	8	10	2	6	0	8			

#### Comparison (Round-robin VS Elimination)

Rank	Team (Round-robin)	Team (Elimination)	Rank
1	Golden State Warriors	Golden State Warriors	1
2	Houston Rockets	Cleveland Cavaliers	2
3	Toronto Raptors	Houston Rockets	3
3	Oklahoma City Thunder	Boston Celtics	3
5	Minnesota Timberwolves	Toronto Raptors	4
6	Indiana Pacers	Philadelphia 76ers	4
6	Portland Trail Blazers	Utah Jazz	4
8	Boston Celtics	New Orleans Pelicans	4
9	San Antonio Spurs	Washington Wizards	5
10	Washington Wizards	Indiana Pacers	5
11	Philadelphia 76ers	Miami Heat	5
11	New Orleans Pelicans	Milwaukee Bucks	5
13	Milwaukee Bucks	Minnesota Timberwolves	5
14	Utah Jazz	Oklahoma City Thunder	5
15	Cleveland Cavaliers	Portland Trail Blazers	5
15	Miami Heat	San Antonio Spurs	5

From Western Conference	
From Eastern Conference	

#### Bonus Prediction (NBA Season 2018-19)

Team(East)	CurrentWin	UpdatedWin
Milwaukee Bucks*	56	62
Toronto Raptors*	52	59
Philadelphia 76ers*	47	54
Indiana Pacers*	45	49
Boston Celtics*	44	49
Brooklyn Nets*	38	41
Detroit Pistons*	37	41
Orlando Magic	37	38
Miami Heat*	36	40
Charlotte Hornets	35	39
Washington Wizards	31	34
Atlanta Hawks	27	29
Chicago Bulls	21	24
Cleveland Cavaliers	19	20
New York Knicks	14	17

\*Team Joined Playoff

Team(West)	CurrentWin	UpdatedWin
Golden State Warriors*	51	59
Denver Nuggets*	50	52
Portland Trail Blazers*	47	53
Houston Rockets*	47	49
Utah Jazz*	45	49
Los Angeles Clippers*	45	47
Oklahoma City Thunder*	44	48
San Antonio Spurs*	43	46
Sacramento Kings	37	40
Minnesota Timberwolves	33	35
Los Angeles Lakers	33	37
New Orleans Pelicans	31	34
Memphis Grizzlies	30	32
Dallas Mavericks	29	32
Phoenix Suns	17	19

\*Team Joined Playoff