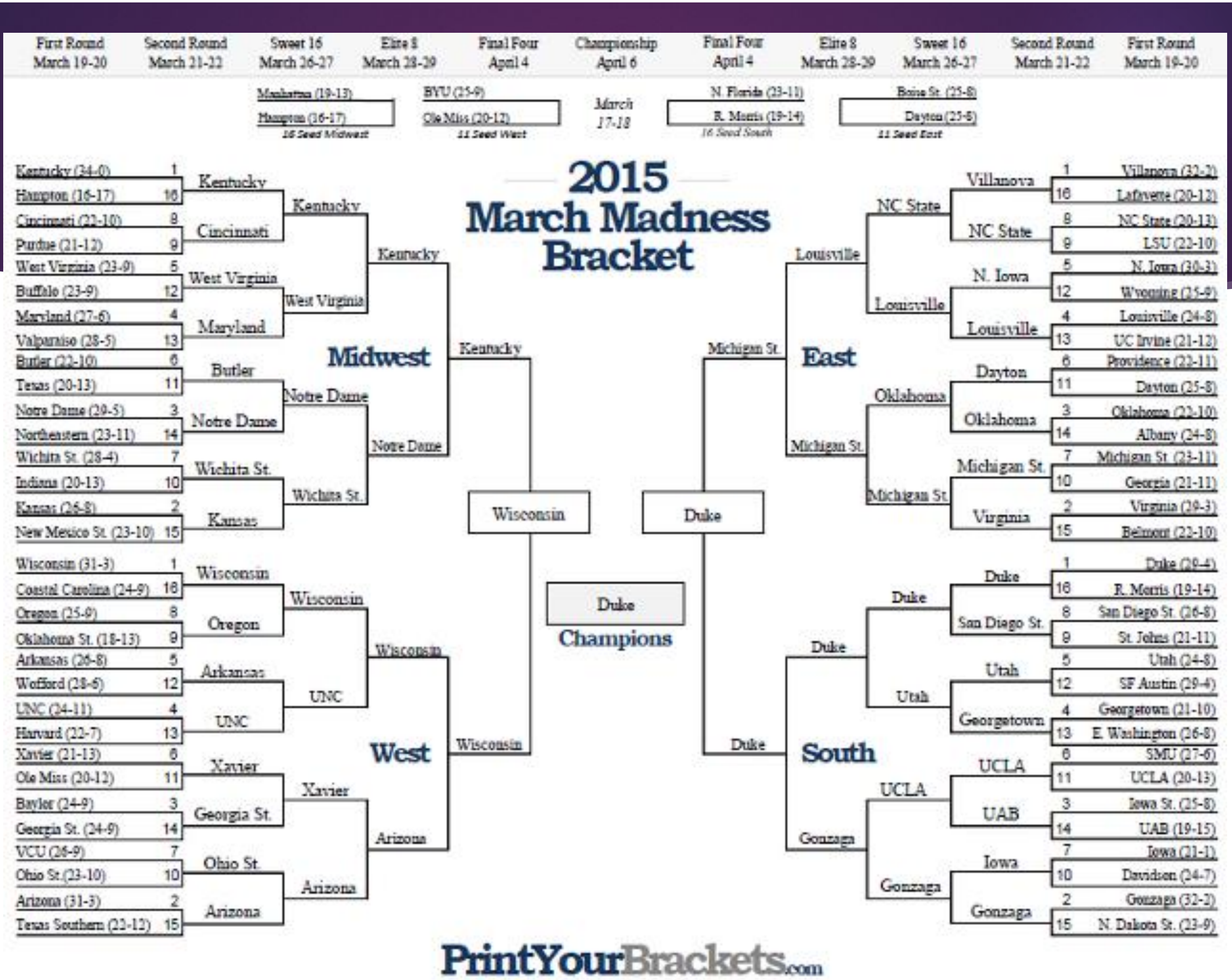
Group
Erick Calzadilla
Clayton Ragsdale

What is March Madness

- March Madness- the “holy grail” of basketball tournaments
- 68 teams competing , single game elimination
- Fans and Analysts around the country decide to compete in their own way.
- Scientific formulas, dumb luck, favorite teams, and historical data



First Round March 19-20 | Second Round March 21-22 | Sweet 16 March 26-27 | Elite 8 March 28-29 | Final Four April 4 | Championship April 6 | Final Four April 4 | Elite 8 March 28-29 | Sweet 16 March 26-27 | Second Round March 21-22 | First Round March 19-20

Manhattan (19-13)
Hampton (16-17)
16 Seed Midwest

BYU (25-9)
Ole Miss (20-12)
11 Seed West

March
17-18

N. Florida (23-11)
R. Morris (19-14)
16 Seed South

Boise St. (25-8)
Dayton (25-8)
11 Seed East

2015 March Madness Bracket

Midwest

Kentucky (34-0) 1
Hampton (16-17) 16
Cincinnati (22-10) 8
Purdue (21-12) 9
West Virginia (23-9) 5
Buffalo (23-9) 12
Maryland (27-6) 4
Valparaiso (28-5) 13
Butler (22-10) 6
Texas (20-13) 11
Notre Dame (29-5) 3
Northeastern (23-11) 14
Wichita St. (28-4) 7
Indiana (20-13) 10
Kansas (26-8) 2
New Mexico St. (23-10) 15

Kentucky
Cincinnati
West Virginia
Maryland
Butler
Notre Dame
Wichita St.
Kansas

Kentucky
West Virginia
Notre Dame
Wichita St.

Kentucky
Notre Dame

Kentucky

West

Wisconsin (31-3) 1
Coastal Carolina (24-9) 16
Oregon (25-9) 8
Oklahoma St. (18-13) 9
Arkansas (26-8) 5
Wofford (28-6) 12
UNC (24-11) 4
Harvard (22-7) 13
Xavier (21-13) 6
Ole Miss (20-12) 11
Baylor (24-9) 3
Georgia St. (24-9) 14
VCU (26-9) 7
Ohio St.(23-10) 10
Arizona (31-3) 2
Texas Southern (22-12) 15

Wisconsin
Oregon
Arkansas
UNC
Xavier
Georgia St.
Ohio St.
Arizona

Wisconsin
UNC
Xavier
Arizona

Wisconsin
Arizona

Wisconsin

Wisconsin

Duke

Duke

Champions

East

1 Villanova (32-2)
16 Lafayette (20-12)
8 NC State (20-13)
9 LSU (22-10)
5 N. Iowa (30-3)
12 Wyoming (25-9)
4 Louisville (24-8)
13 UC Irvine (21-12)
6 Providence (22-11)
11 Dayton (25-8)
3 Oklahoma (22-10)
14 Albany (24-8)
7 Michigan St. (23-11)
10 Georgia (21-11)
2 Virginia (29-3)
15 Belmont (22-10)

Villanova
NC State
N. Iowa
Louisville
Dayton
Oklahoma
Michigan St.
Virginia

NC State
Louisville
Oklahoma
Michigan St.

Louisville
Michigan St.

Michigan St.

South

1 Duke (29-4)
16 R. Morris (19-14)
8 San Diego St. (26-8)
9 St. Johns (21-11)
5 Utah (24-8)
12 SF Austin (29-4)
4 Georgetown (21-10)
13 E. Washington (26-8)
6 SMU (27-6)
11 UCLA (20-13)
3 Iowa St. (25-8)
14 UAB (19-15)
7 Iowa (21-1)
10 Davidson (24-7)
2 Gonzaga (32-2)
15 N. Dakota St. (23-9)

Duke
San Diego St.
Utah
Georgetown
UCLA
UAB
Iowa
Gonzaga

Duke
Utah
UCLA
Gonzaga

Duke
Gonzaga

Duke

PrintYourBrackets.com

Objective

- Out of 67 games try to create a model using historical data
- From that model we will try to predict as many games possible correct
- To be able to predict the 2015 champion Duke University Blue Devils
- In order to establish a highly successful model using Random Forrest algorithm for classification
- 1 = Win, 0= Loss

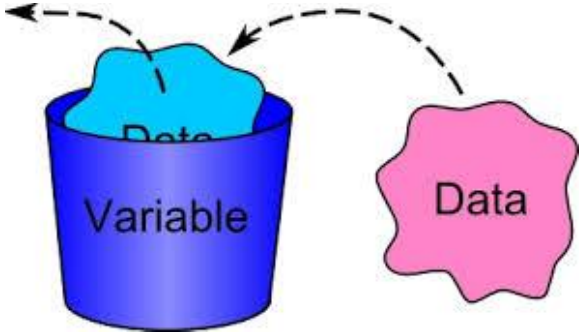
DATA

- Gathered data from Kaggle
- Regular season data from 2003-2016
- Created Model from half of data, and tested
- -on other half
- Post season data from 2015 tested on
- 71242 observations
- Started with 33 variables
- Ended with 23 variables

Dependent Variable & Independent Variables

- Dependent Variables
- Win

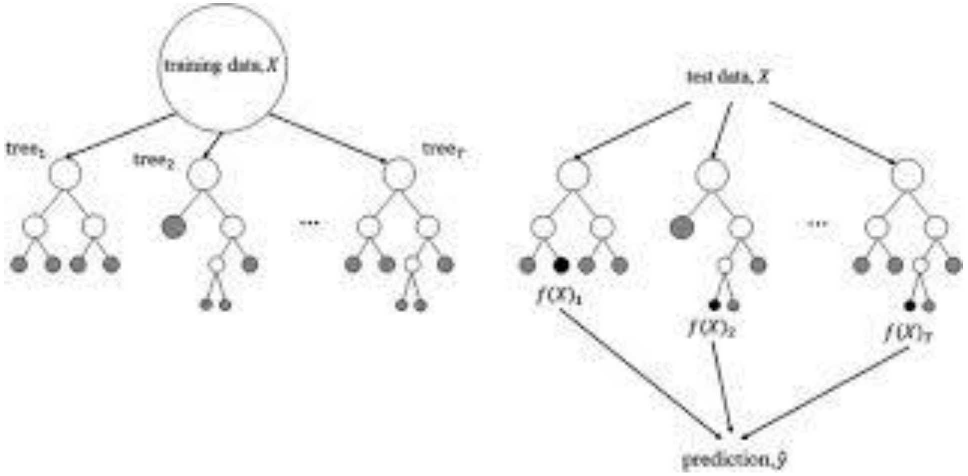
- Independent Variables
- ftm
- fta
- or
- dr
- ast
- to
- stl



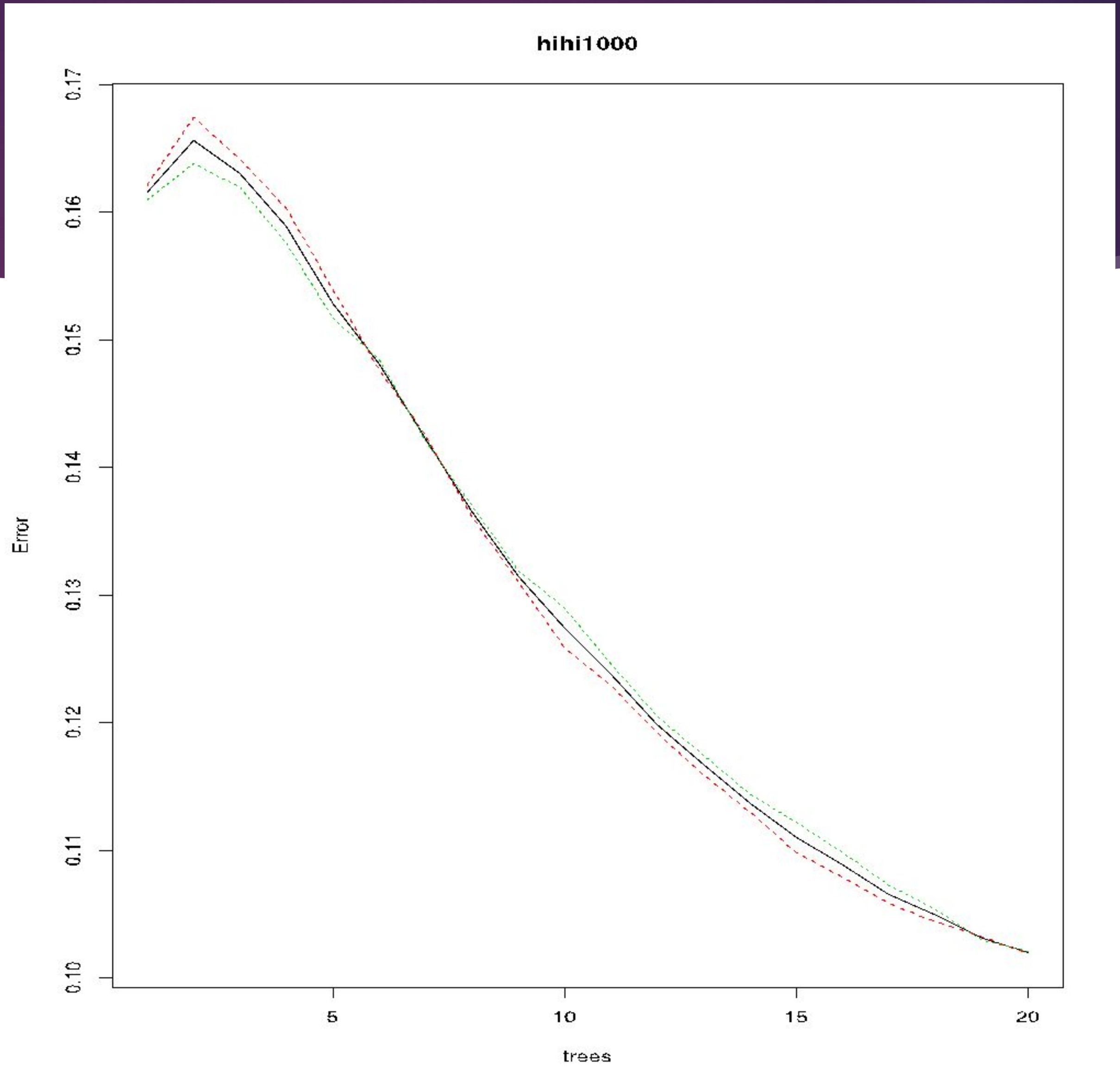
Random Forrest

- It develops lots of decision tree based on randomly selecting random variables from a random selection of data

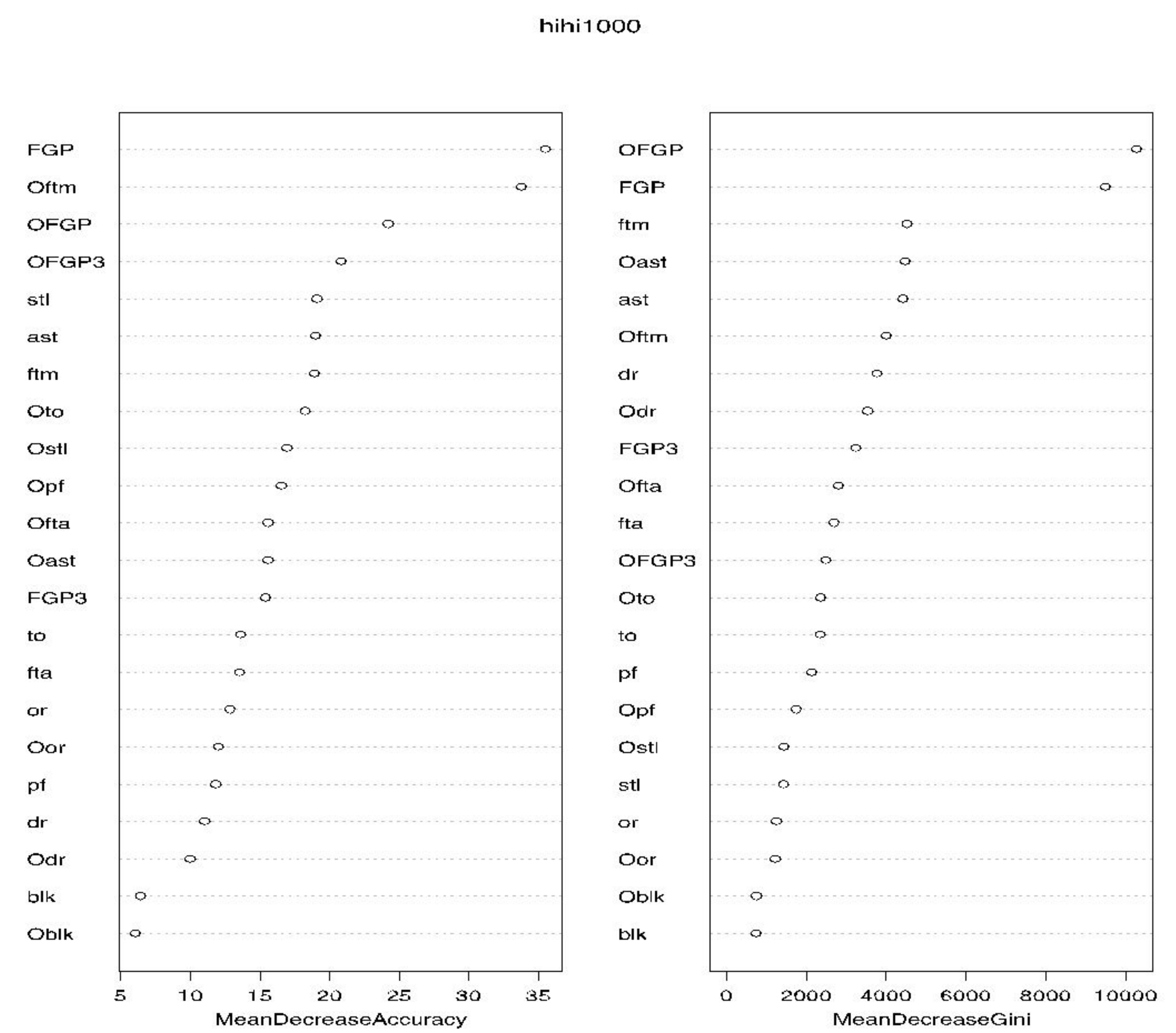
- Two principles
- - most of the trees are predicting correctly
- -Trees are making mistakes at different nodes
- Majority Rules



Error Rate



VIP



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FGP
Oftm
OFGP
OFGP3
stl
ast
ftm
Oto
Ostl
Opf
Ofta
Oast
FGP3
to
fta
or
Oor
pf
dr
Odr
blk
Oblk
5
10
15
20
25
30
35
MeanDecreaseAccuracy
OFGP
FGP
ftm
Oast
ast
Oftm
dr
Odr
FGP3
Ofta
fta
OFGP3
Oto
to
pf
Opf
Ostl
stl
or
Oor
Oblk
blk
0
2000
4000
6000
8000
10000
MeanDecreaseGini

Training and Testing

- Split the random sample half and half
- The error rate was 10.2% on the training data
- The error rate on the testing data was 8.53%
- Next goal to test on 2015 tournament teams based on their averages

Explaining Averages

- From the tournament we now use season averages of 2015, instead of post game data to predict outcome

- By doing so we expect a higher error rate since we are now feeding the model average season data instead of post game data

- We took the Average of the 2015 Season

$$\overline{X} = \frac{\Sigma X}{n}$$

By Round Model

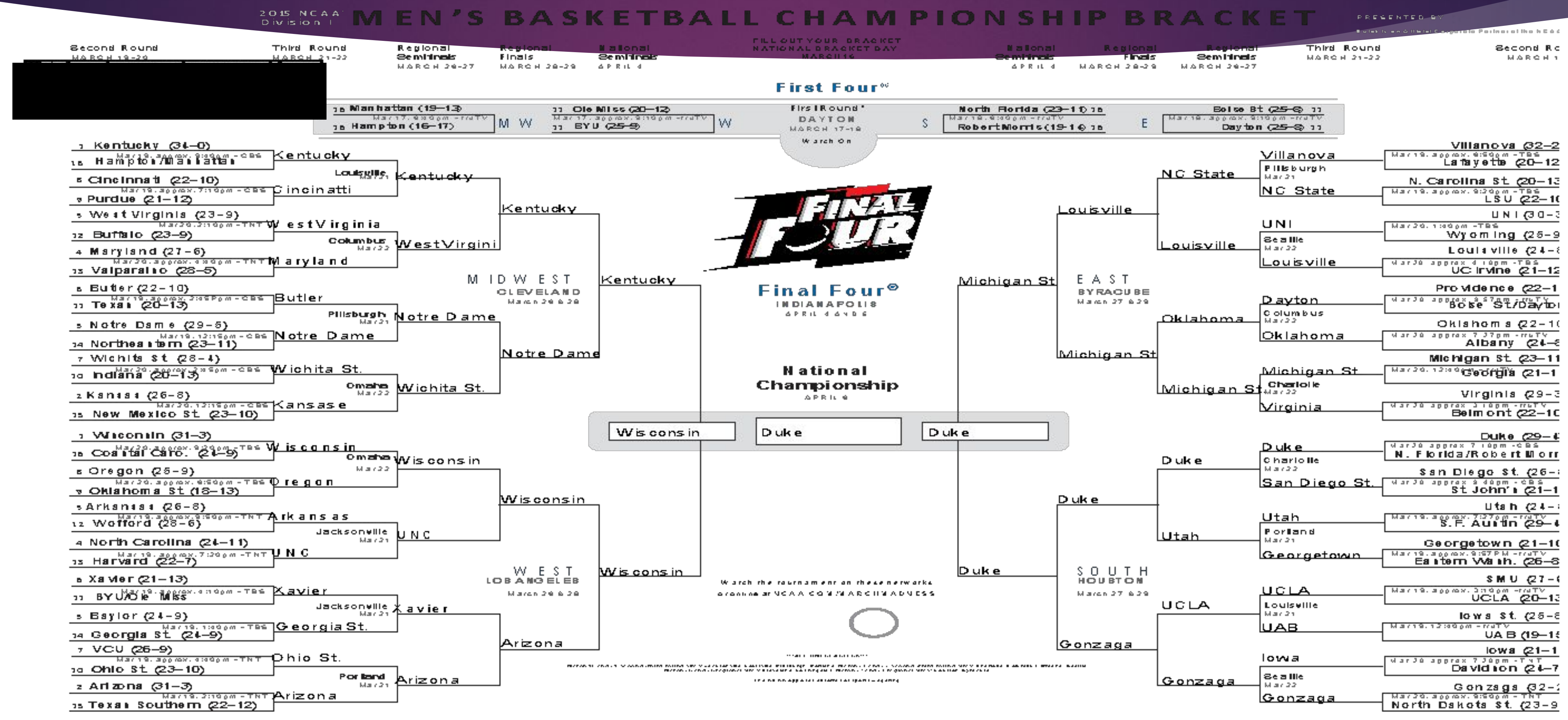
- Each round was run separately, and does not include wins from previous rounds.

- Even if game in previous round is incorrect, the next round is reset with all correct winners.

- This allows model to perform better than it would on the traditional bracket

Bracket by Round

65.67% Correct



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2015 NCAA Division I **MEN'S BASKETBALL CHAMPIONSHIP BRACKET**

PRESENTED BY

Second Round MARCH 19-20 | Third Round MARCH 21-22 | Regional Semifinals MARCH 26-27 | Regional Finals MARCH 28-29 | National Semifinals APRIL 4

FILL OUT YOUR BRACKET NATIONAL BRACKET DAY MARCH 16

National Semifinals APRIL 4 | Regional Finals MARCH 28-29 | Regional Semifinals MARCH 26-27 | Third Round MARCH 21-22 | Second Round MARCH 1

First Four

16 Manhattan (19–13)
Mar 17, 6:40pm - truTV
16 Hampton (16–17)
MW

11 Ole Miss (20–12)
Mar 17, approx. 9:10pm - truTV
11 BYU (25-9)
W

First Round
DAYTON
MARCH 17-18
Watch On

S
North Florida (23–11) 16
Mar 18, 6:40pm - truTV
Robert Morris (19-14) 16

E
Boise St (25-8) 11
Mar 18, approx. 9:10pm - truTV
Dayton (25-8) 11

MIDWEST
CLEVELAND
March 26 & 28

1 Kentucky (34–0)
Mar 19, approx. 9:40pm - CBS
16 Hampton/Manhattan
Kentucky

8 Cincinnati (22–10)
Mar 19, approx. 7:10pm - CBS
9 Purdue (21–12)
Cincinatti

Louisville Mar 21
Kentucky

5 West Virginia (23-9)
Mar 20, 2:10pm - TNT
12 Buffalo (23–9)
WestVirginia

4 Maryland (27-6)
Mar 20, approx. 4:40pm - TNT
13 Valparaiso (28–5)
Maryland

Columbus Mar 22
WestVirgini

Kentucky

6 Butler (22-10)
Mar 19, approx. 2:45pm - CBS
11 Texas (20–13)
Butler

3 Notre Dame (29-5)
Mar 19, 12:15pm - CBS
14 Northeastern (23–11)
Notre Dame

Pittsburgh Mar 21
Notre Dame

7 Wichita St (28-4)
Mar 20, approx. 2:45pm - CBS
10 Indiana (20–13)
Wichita St.

2 Kansas (26-8)
Mar 20, 12:15pm - CBS
15 New Mexico St (23–10)
Kansase

Omaha Mar 22
Wichita St.

Notre Dame

Kentucky

WEST
LOS ANGELES
March 26 & 28

1 Wisconsin (31–3)
Mar 20, approx. 9:20pm - TBS
16 Coastal Caro. (24–9)
Wisconsin

8 Oregon (25-9)
Mar 20, approx. 6:50pm - TBS
9 Oklahoma St (18–13)
Oregon

Omaha Mar 22
Wisconsin

5 Arkansas (26-8)
Mar 19, approx. 9:50pm - TNT
12 Wofford (28-6)
Arkansas

4 North Carolina (24–11)
Mar 19, approx. 7:20pm - TNT
13 Harvard (22–7)
UNC

Jacksonville Mar 21
UNC

Wisconsin

6 Xavier (21–13)
Mar 19, approx. 4:10pm - TBS
11 BYU/Ole Miss
Xavier

3 Baylor (24-9)
Mar 19, 1:40pm - TBS
14 Georgia St (24–9)
Georgia St.

Jacksonville Mar 21
Xavier

7 VCU (26–9)
Mar 19, approx. 4:40pm - TNT
10 Ohio St (23–10)
Ohio St.

2 Arizona (31–3)
Mar 19, 2:10pm - TNT
15 Texas Southern (22–12)
Arizona

Portland Mar 21
Arizona

Arizona

Wisconsin

Final Four®
INDIANAPOLIS
APRIL 4 AND 6

National Championship
APRIL 6

Wisconsin	Duke	Duke

Watch the tournament on these networks
or online at NCAA.COM/MARCHMADNESS

EAST
SYRACUSE
March 27 & 29

Villanova (32–2
Mar 19, approx. 9:40pm - TBS
Lafayette (20–12
Villanova

N. Carolina St (20–13
Mar 19, approx. 9:20pm - TBS
LSU (22–10
NC State

Pittsburgh Mar 21
NC State

UNI (30–3
Mar 20, 1:40pm - TBS
Wyoming (25-9
UNI

Louisville (24–8
Mar 20, approx. 4:10pm - TBS
UC Irvine (21–12
Louisville

Seattle Mar 22
Louisville

Louisville

Providence (22–1
Mar 20, approx. 9:57pm - truTV
Boise St/Dayton
Dayton

Oklahoma (22–10
Mar 20, approx. 7:27pm - truTV
Albany (24–8
Oklahoma

Columbus Mar 22
Oklahoma

Michigan St (23–11
Mar 20, 12:40pm - truTV
Georgia (21–1
Michigan St

Virginia (29–3
Mar 20, approx. 3:10pm - truTV
Belmont (22–10
Virginia

Charlotte Mar 22
Michigan St

Michigan St

Michigan St

SOUTH
HOUSTON
March 27 & 29

Duke (29–4
Mar 20, approx. 7:10pm - CBS
N. Florida/Robert Morr
Duke

San Diego St. (26–
Mar 20, approx. 9:40pm - CBS
St John's (21–1
San Diego St.

Charlotte Mar 22
Duke

Utah (24–
Mar 19, approx. 7:27pm - truTV
S.F. Austin (29–4
Utah

Georgetown (21–10
Mar 19, approx. 9:57PM - truTV
Eastern Wash. (26–8
Georgetown

Portland Mar 21
Utah

Duke

SMU (27–
Mar 19, approx. 3:10pm - truTV
UCLA (20–13
UCLA

Iowa St. (25–8
Mar 19, 12:40pm - truTV
UAB (19–15
UAB

Louisville Mar 21
UCLA

Iowa (21–1
Mar 20, approx. 7:30pm - TNT
Davidson (24–7
Iowa

Gonzaga (32–
Mar 20, approx. 9:50pm - TNT
North Dakota St. (23–9
Gonzaga

Seattle Mar 22
Gonzaga

Gonzaga

Duke

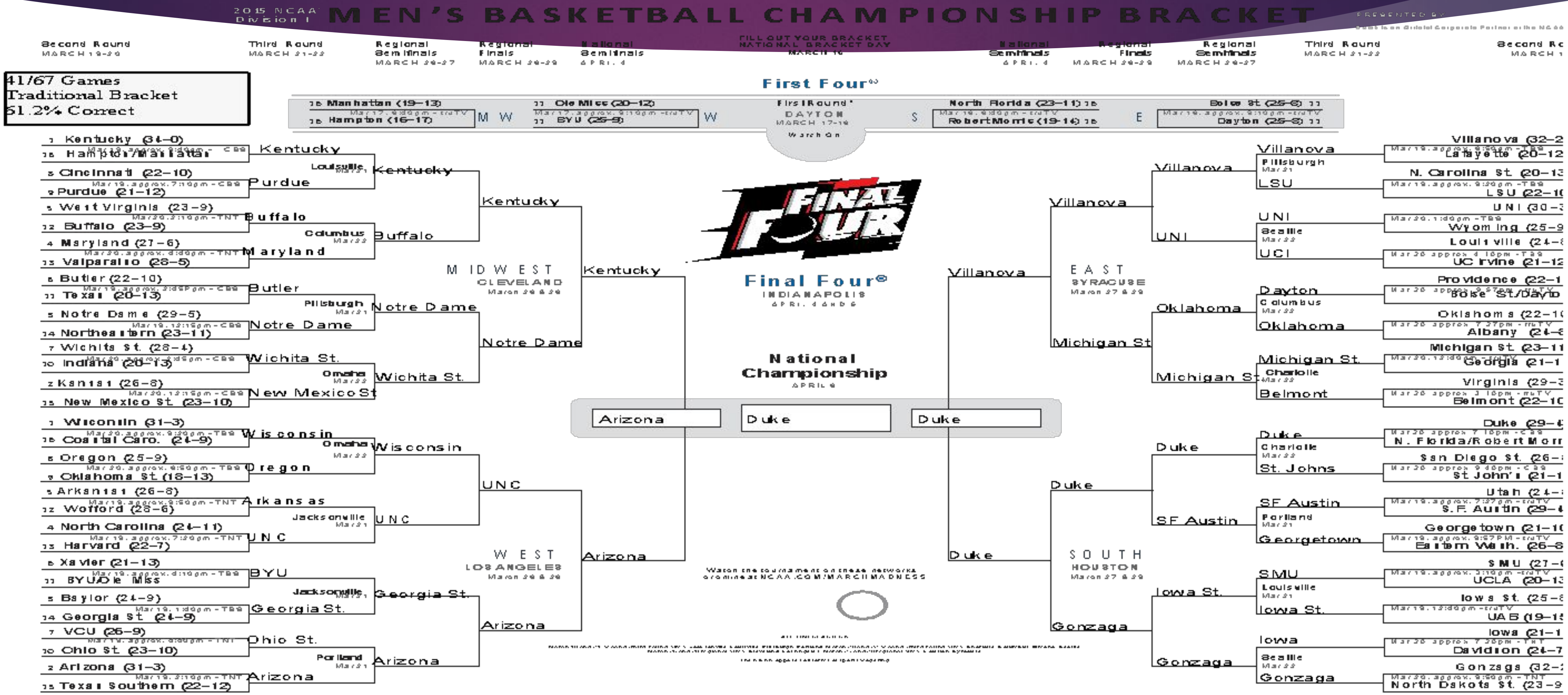
Results by Round

- Winner Duke Blue Devils
- ¼ - play in round
- 22/32– first round
- 11/16- second round
- 6/8- Sweet Sixteen
- ¾- Elite Eight
- ½-Final Four
- Winner predicted correctly

Traditional Tournament

- Single game elimination
- Fill out bracket entirely even if previous winners are incorrect
- Assumption: error rate will be greater than by Round bracket since games are conditional upon previous rounds

Traditional Bracket



41/67 Games
Traditional Bracket
61.2% Correct

2015 NCAA Division I MEN'S BASKETBALL CHAMPIONSHIP BRACKET

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First Round DAYTON MARCH 17-18 Watch On

North Florida (23–11) 16
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S Robert Morris (19-14) 16

Boise St (25–8) 11
Mar 18, approx. 9:10pm - truTV
E Dayton (25–8) 11

MIDWEST CLEVELAND March 26 & 28

1 Kentucky (34–0)
16 Hampton/Manhattan
Kentucky
8 Cincinnati (22–10)
9 Purdue (21–12)
Mar 19, approx. 7:10pm - CBS
Purdue
Louisville Mar 21
Kentucky

5 West Virginia (23–9)
12 Buffalo (23–9)
Mar 20, 2:10pm - TNT
Buffalo
4 Maryland (27–6)
13 Valparaiso (28–5)
Mar 20, approx. 4:40pm - TNT
Maryland
Columbus Mar 22
Buffalo

Kentucky

6 Butler (22–10)
11 Texas (20–13)
Mar 19, approx. 2:45pm - CBS
Butler
3 Notre Dame (29–5)
14 Northeastern (23–11)
Mar 19, 12:15pm - CBS
Notre Dame
Pittsburgh Mar 21
Notre Dame

7 Wichita St. (28–4)
10 Indiana (20–13)
Wichita St.
2 Kansas (26–8)
15 New Mexico St. (23–10)
Mar 20, 12:15pm - CBS
New Mexico St
Omaha Mar 22
Wichita St.

Notre Dame

Kentucky

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1 Wisconsin (31–3)
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Wisconsin
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Omaha Mar 22
Wisconsin

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UNC
Jacksonville Mar 21
UNC

UNC

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Mar 19, approx. 4:10pm - TBS
BYU
3 Baylor (24–9)
14 Georgia St. (24–9)
Mar 19, 1:40pm - TBS
Georgia St.
Jacksonville Mar 21
Georgia St.

7 VCU (26–9)
10 Ohio St. (23–10)
Ohio St.
2 Arizona (31–3)
15 Texas Southern (22–12)
Mar 19, 2:10pm - TNT
Arizona
Portland Mar 21
Arizona

Arizona

Arizona

Final Four® INDIANAPOLIS APRIL 4 AND 6

National Championship APRIL 6

Arizona | Duke | Duke

Watch the tournament on these networks or online at NCAA.COM/MARCHMADNESS

EAST SYRACUSE March 27 & 29

Villanova (32–2
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Mar 19, approx. 9:50pm - TBS
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Louisville (24–8
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UCI
Seattle Mar 22
UNI

Villanova

Providence (22–1
Boise St/Dayton
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Gonzaga

Duke

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- 6/8- Sweet Sixteen
- 2/4- Elite Eight
- ½-Final Four
- Winner predicted correctly

How to improve model ?

- For loop can be ran in order to calculate averages that are updated every game per team.
- Model would now resemble more of our test data format
- Create a model in which in can do team by team comparisons.
- - or create model where it compares different conferences
- -assumption: conferences has specific style
- Each team has their own model would then predict winner off of predicted independent variables .

What to take away

- Winners heavily dependent upon shooting percentage and there opponents overall shooting percentage.
- Though some predictions were incorrect since teams with a lower strength of schedule had higher shooting percentages for playing weaker teams
- Ex-New Mexico State beats Kansas
- Overall Random Forest algorithm provides exceptional results considering lack of data and descriptive independent variables.
- Shows us the power of many decision trees

Questions?