Predicting the Top 25 Players of the 2019 Draft Class

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Abstract

This paper attempts to predict the top 25 players in the 2019 NBA draft class using machine learning. The predictor variable dataset consists of 43 variables recorded for each of the relevant player's college careers. The response variable is NBA win shares. The purpose of the model is to understand the relationship between these college statistics and the response variable in order to highlight potential NBA stars out of college and make stronger drafting choices.

1 Introduction and Background

This paper seeks to predict the top 25 2019 draft prospects by utilizing 43 of their college statistics. To do so, a neural net model is utilized to determine the relationship between various types of college data and NBA career success (WS). Past draft classes (2012-2016) will be used as training data to discern this relationship, and the resultant model will be used to predict the success of the 2019 draft class by plugging in their statistics for the same 43 college predictors . Further, while analytics is rapidly growing in the NBA, it is still not perfect - we believe a combination of computational models and subjective "eye-test" evaluations are needed to fully measure a player.

From looking at past draft classes, it is clear the order of the draft is never consistently optimal. Players fall more than they should and plenty get taken too high. NBA super stars like Kawhi Leonard (15), Paul George (10), Giannis Antetokounmpo (15), Steph Curry (7), Klay Thompson (11), and Nikola Jokic (41) are all some of the very top current players who went under-drafted for their talent level. Countless teams missed opportunities of drafting franchise changing players, and this project seeks to highlight some of these opportunities. Future reflection in several years will better show the accuracy of this model.

2 Data

2.1 Predictors

The predictor dataset consists of 43 variables from 2012-2016 drafted players' **college** career. The statistics recorded reflect the performance of the player in their last college year only. Further, only United States collegiate players who ultimately played in the NBA are considered. The predictors consist of various types of information: (1) basic information, such as position and games played; (2) anthrometric statistics, such as wingspan and height; (3) basic statistics, such as field goals and free throws made; (4) and advanced statistics, such as true shooting percentage and offensive rating. The strength of schedule was also taken into account. Data was obtained from basketball-reference[1] and real-gm[2]. A list of the predictors is provided below in **Table 1** .

Info	Anthro	Basic Off	Basic Def	Advanced Stats	Advanced Stats Cont.
		Table 1: Predictors Used			
Years Played	Height	FGM	ORB	TS %	ORB %
Games Played	Weight	FGA	DRB	eFG %	DRB %
Games Started	Wingspan	FG %	TRB	AST %	TRB %
Min		3PM	STL	TOV %	BLK %
Position		3PA	BLK	STL %	DRtg
Strength of Schedule		3P%	PF	USG %	
		FTM	TOV	TotalS %	
		FTA	PPR	ORtg	
		FT %	PPS		
		AST %	PER		
		PTS %			

2.2 Response

The response variable used is **NBA** Win Shares (WS). WS serve as a way to rank players in the training data. For the 2019 draft class, this score is what the model is predicting. This statistic was chosen as it is one of the most effective catch-all measures for career success [3].

3 Methods

A Bayesian regularized neural net (BRNN) was used for this model. Neural net models are comprised of many interconnected processing elements, referred to as neurons. The output of each neuron is computed by a non-linear function of the sum of its inputs. Neural nets are also adaptive models, such that the weights of neurons and inputs can be adjusted. The neurons are sometimes separated into several layers.

BRNN models are more robust than standard models, and use a method similar to ridge regression to convert a non-linear regression into a "well-posed statistical problem" [4]. Neural net models are difficult to visualize, as it serves as somewhat of a black-box algorithm. It does not rely on any underlying pattern assumption in the data. A BRNN model with four neurons in one hidden layer was used for final analysis. A minor ex post facto bonus was applied for each player based on their college three pointers made and attempted, with the objective of reducing the model's slight over-valuation of big men and forwards without three point shooting ability. We believe this adjustment better represents success in the modern NBA.

4 Results

The relevant statistics of 86 top US draft prospects were inputted into the final model to produce the list of scores, shown in its entirety on the subsequent page in **Table 2**.

Table 2: 2019 Draft Prospects

Rank	Player	Score	Rank	Player	Score
1	Brandon Clarke	75.81	⋮	⋮	⋮
2	Jaxson Hayes	74.22	45	Marques Bolden	9.43
3	Bol Bol	57.18	46	Ty Jerome	9.40
4	Chris Clemons	31.27	47	Ignas Brazdeikis	9.21
5	Zion Williamson	28.44	48	Kris Wilkes	9.18
6	Tacko Fall	25.12	49	Romeo Langford	9.17
7	C.J. Massinburg	24.94	50	Charles Bassey	9.08
8	Ja Morant	15.26	51	PJ Washington	8.90
9	Cam Reddish	14.57	52	Jalen Smith	8.85
10	Terance Mann	14.52	53	KZ Okpala	8.82
11	Grant Williams	14.51	54	John Petty	8.69
12	Dylan Windler	14.39	55	Talen Horton-Tucker	8.67
13	Mfiondu Kebengele	14.04	56	Brandon Randolph	8.67
14	Keldon Johnson	13.13	57	Jarrett Culver	8.66
15	Eric Paschall	12.07	58	Isaiah Roby	8.44
16	Kyle Guy	11.89	59	Makai Mason	8.07
17	R.J. Barrett	11.82	60	Nassir Little	7.96
18	Cameron Johnson	11.67	61	Ky Bowman	7.92
19	Naz Reid	11.61	62	Jalen McDaniels	7.91
20	Tyler Herro	11.54	63	Coby White	7.79
21	James Palmer, Jr.	11.41	64	Daniel Gafford	7.67
22	Jordan Poole	11.39	65	Aric Holman	7.44
23	DeAndre Hunter	11.38	66	Terence Davis	7.18
24	Zach Norvell	11.35	67	Cody Martin	6.98
25	OShae Brissett	11.30	68	Zylan Cheatham	6.75
26	Markis McDuffie	11.28	69	Tremont Waters	6.65
27	Louis King	11.18	70	D'Marcus Simonds	6.62
28	Tyus Battle	11.13	71	Austin Wiley	6.48
29	Chuma Okeke	11.08	72	Bennie Boatwright	6.42
30	Jaylen Nowell	10.98	73	Jaylen Hands	5.93
31	Dedric Lawson	10.83	74	Matisse Thybulle	5.93
32	Luguentz Dort	10.56	75	Moses Brown	5.80
33	Jalen Hudson	10.22	76	Kerwin Roach, Jr.	5.62
34	Carsen Edwards	10.14	77	Shamorie Ponds	4.68
35	Simi Shittu	10.11	78	Udoka Azubuike	4.14
36	Tyler Cook	10.04	79	Nicolas Claxton	3.89
37	Admiral Schofield	9.98	80	Robert Franks	2.87
38	Jaylen Hoard	9.93	81	Jontay Porter	2.46
39	Ethan Happ	9.84	82	Jarrey Foster	1.83
40	Caleb Martin	9.69	83	Bruno Fernando	1.26
41	Lamar Peters	9.58	84	DaQuan Jeffries	0.25
42	Jordan Bone	9.55	85	Kevin Porter, Jr.	-0.29
43	Nickeil Alexander-Walker	9.45	86	Lindell Wigginton	-0.99
44	Rui Hachimura	9.43	87	Miye Oni	-6.58
⋮	⋮	⋮	88	Darius Garland	-18.71

5 Conclusion

Due to the imperfect nature of the data, the **Table 2** list should not be interpreted as an ordinal ranking. Rather, the output should be supplemented by non-quantitative interpretation and be used to highlight players who may be undervalued. The consensus in player selection is efficient consistent players who fit the NBA mold. Below is our top 25 players in order of predicted NBA career success for this year's draft class, with the model ranking to the right in parentheses. The below list and the model's top 25 list have 19 out of 25 (76 %) players in common. An in-depth explanation of the reasoning behind these rankings, and the choice to deviate from the model for several players, is available in Appendix I.

1. Zion Williamson (5)
2. Rui Hachimura (44)
3. Bol Bol (3)
4. Ja Morant (8)
5. Cam Reddish (9)
6. Darius Garland (88)
7. Tyler Herro (20)
8. Dylan Windler (12)
9. Brandon Clarke (1)
10. Jaxson Hayes (2)
11. Grant Williams (11)
12. DeAndre Hunter (23)
13. Chris Clemons (4)
14. Rj Barrett (17)
15. Keldon Johnson (14)
16. Ty Jerome (46)
17. Chuma Okeke (29)
18. Cameron Johnson (18)
19. Mfiondu Kabengele (13)
20. Eric Paschall (15)
21. Kyle Guy (16)
22. Matise Thybulle (74)
23. Bruno Fernando (83)
24. Naz Reid (19)
25. Tacko Fall (6)

References

[1] Basketball Reference:Basketball Statistics and History. basketball-reference.com

[2] RealGM - Basketball News, Rumors, Scores, Stats, and Analysis. basketball.realgm.com

[3] The Success of NBA Draft Picks: Can College Careers Predict NBA Winners? Alexander Carl Greene, St. Cloud State University. repository.stcloudstate.edu

[4] Burden, F., Winkler, D. (2008). Bayesian regularization of neural networks. *Methods in Molecular Biology (Clifton, N.J.)*, 458, 25–44.

6 Appendix I

1. Zion Williamson (5)

   - This one goes without needing much explanation. Zion will be a position-less player who can finish games at the 5. He can guard all positions - his energy and love for the game will be what makes him so impactful.

2. Rui Hachimura (44)

   - Rui is an incredibly talented player who reads defenders as well as anyone in the draft. One of the most versatile scorers in the draft, Rui's demeanor, size, and style of play are most similar to Kawhi Leonard. Of course, comparing NBA prospects to Kawhi Leonard is extreme. However this comparison is not rooted in expectation of success of consistency, but rather similarity of playing style. As NBA history tells, a dangerous mid-range/post shooter tends to become very successful in the league. Rui loves his midrange game and has improved tremendously offensively, making him the best midrange shooter in this draft by far. A patient humble player who never lets his emotions take over, Hachimura is great at letting the game come to him, refraining from chucking up bad shots or panicking when being double teamed/trapped. Rui remains calm and waits for the best option to become available, whether it be finding a teammate or pulling up and rising over defenders. Rui has one of the best stories in this draft being born and raised in Japan and then coming over to the US when he started college at Gonzaga. Rui will take his calm and efficient playmaking to another level in the league. Rui will be a multiple all star selection and one of the best players in this draft. Rui's low number of three pointers as well as below-average block and steal stats led to a lower model ranking than desired, but we believe the eye-test trumps analytics in this specific case.

3. Bol Bol (3)

   - Bol Bol is one of the most special talents in this draft. Bol is currently underweight, due to recovering from foot surgery as this caused him to miss an extensive amount of time. Offensively, Bol has every tool in the bag. A 7'3" player with a 7'8" wingspan who shoots confidently at an extremely high level. He can stretch his game far out past the 3-point line. His ability to shoot on the catch, off the dribble, post up and pick and pop is special. A natural scorer, Bol has a good handle you don't see with players his size. He can go by guards with his crossover, similar to KD, to finish comfortably at the rim. He can dribble well into a pull-up, reminiscent of KD. Like Durant, Bol loves to get to his spots in the paint where he knows he can shoot over anyone. Bol will be able to play the 3-5 but I think he will excel the most as a forward. He would rather be behind the 3-point line than on the block and his shooting ability complements this tendency. Bol's biggest threats: medical report (worrisome knees, lower body and weight), motor, and defensive effort. Similar to KD, when Bol gives his best effort defensively he becomes a lock down defender. Patiently timing his blocks and quick feet make it incredibly hard for opponents to shoot over him or get by him. At times very lackadaisical effort leads to giving up inexcusable points on defense. Bol's biggest question mark, besides health, will be his defensive motor and resultant ability to serve as a 2-way player. However, if Bol can stay focused on every play every

night, every team will regret not taking him. Bol scored extremely highly in every model tested, underscoring his potential.

4. Ja Morant (8)

- The most important skill at the point guard position is decision making. Ja is an incredible decision maker and understands the game as well as anyone. Ja excels on the fast break with his court vision and freakish athletic ability. His analytics paint the same picture as the eye-test; Ja can do it all at the point guard position - shoot, pass, lead, defend and set up teammates.

5. Cam Reddish (9)

- Cam's game fits extremely well with the prototypical NBA forward today - tall, long, and athletic who can shoot and drive very well. Being behind the spotlight of Zion and RJ limited Cam, and he was unable to display all his talents. Cam is another gifted scorer who offensively plays fairly similarly to Paul George. He is a confident shooter who can take it off catch or dribble pull up with lethal driving ability. Reddish will have a very successful NBA career, we believe even more so than the model predicts.

6. Darius Garland (88)

- Garland is one of the most fluid players in this draft. His small size and quick feet allow him to get by defenders with ease. Garland's best attribute is likely his shooting, featuring a release so fast it's easy for him to in a comfortable position and pull it. Garland is a great point guard with an excellent feel for the position, often setting up teammates with great shots and being able to score at any time. However, in our model, Garland was heavily penalized for his low number of games played, assist, and rebounding numbers, as well as his relatively low PPG in the context of his position and other statistics.

7. Tyler Herro (20)

- Tyler Herro is a killer, and the best shooter in this class by far. Featuring an excellent shooting stroke, Herro is so lethal because he can beat you off the dribble with his underrated ball handling skills. Herro's fff the catch, dribble and crossover pull up, step back and post up shooting ability is off the charts. From his playing days in high school, Herro has been nothing but consistent in college.A current NBA player comparison is Klay Thompson. Herro, like Klay, has a tremendous confidence and killer-like mentality to his competitive nature. A lethal shooter is the most dangerous player to an opposing team. Herro is everything you are looking for in a shooting guard, with strong model and stronger eye-test results.

8. Dylan Windler (12)

- Windler will catch and shoot from the parking lot. Windler excelled on the biggest stage this year as Belmont made the NCAA tournament for the first time in nearly five years. In his senior season, the 6'8" forward averaged 21 PPG, 10 RPG and 40% from three while finishing 18th in college basketball history in effective field goal percentage (.640). In the first round of the tournament, the eleven seeded Belmont only lost by two to six seeded Maryland with Windler adding 35 points and 11 rebounds. Windler has a great feel for the game and excelling at moving without the ball to get himself open. A great back door cutter, Windler makes it challenging for defenders to guard him even when he does not have the ball. His ready-for-NBA skillset pushes him into our 8th position.

9. Brandon Clarke (1)

- One of the most athletic player's college basketball has ever seen. Brandon has incredible balance on his drives getting into the paint while bodying off defenders and powering over or through them. Clarke is dangerously active around the rim, catching lobs over anyone in his way and blocking shots out of nowhere. Brandon has a great second jump allowing him to get his own put backs before defenders can get the rebound. Defensively he needs to improve out of pick and roll

defense. Clarke's quick hips allow him to get by defenders setting up the very crafty and gifted finisher around the rim. It is no surprise that his strong numbers led to a high rank in our model, but we have moved him down slightly to more accurately reflect his areas for improvement.

10. Jaxson Hayes (2)

- Hayes is a great modern day big man. He is incredibly athletic and runs the court very well for his size. Hayes and Zion are going to make a dangerous front court for the Pelicans and opponents won't enjoy driving to the rim when they switch over in rotation. Hayes has a great feel on timing shots to block. Offensively, he is a great pick and roll player and can go over the top of anyone for an alley-oop. Another consistent top 10 model finisher, Jaxson Hayes has a promising career.

11. Grant Williams (11)

- Grant Williams reminds us a lot of Draymond Green without the attitude and with a much better shooting touch. Williams is an excellent decision maker and always finds himself in the right position. A completely unselfish player, Williams is an excellent player to fit in any team. While it ironically seems increasingly hard to find players good at it, Williams is a great screen setter and allows his teammates to create more separation from their defender than an average pick would. Not only a good on-ball screener but even better off-ball, Williams creates separation for his shooters.. Like Draymond, Williams is fantastic at creating team offensive motion with or without the ball. However, Williams is a much better scorer than Draymond because of his more consistent shooting from midrange to three and a great post-up game. You will often find Williams starting plays at the top of the key to screen the ball handler and give him an array of options to choose from. Williams is a great defender comfortable guarding one through five on the perimeter, off the pick and roll, and in the post. Williams is an incredibly strong, athletic and good decision player maker, leading to a high rank in both the model and our selection.

12. DeAndre Hunter (23)

- Hunter can fit into any NBA team/system. He has great instincts but is an even better shooter who takes advantage of the midrange. Hunter can defend all five positions and crash the glass from anywhere. Hunter feeds for rebounds and has a great ability to stay balanced while jumping continuously on a single possession. Hunter's confidence might take time to develop and will determine his career. Hunter was rated somewhat lower than desired in the model due to his reliance on the midrange and low PPG, but has high NBA potential.

13. Chris Clemons (4)

- A 5'9" player who plays like he is 6'5" and one of the best scorers in college basketball history, Clemons is a really underrated scorer and decision maker. Despite Clemons height, he is an incredibly tough player who carries a huge chip on his shoulder. Clemons has a great shooting motion causing a very high arch, known to be beneficial for three point shooters. Even though Clemons shot the ball often at Campbell, averaging 30 PPG, he is a very unselfish player. Clemons has bounce that will turn heads when he drives to the rim. Slightly overrated by the model due to his incredible scoring ability, Clemons still appears to be a top-ranking prospect in our view.

14. Rj Barrett (17)

- One of the more interesting prospects, the biggest question mark with RJ is his decision making and efficiency. In order to succeed in the league you need to be a good decision maker as well as being efficient every time on the floor. He is an incredibly talented point guard who can score, pass and rebound standing at 6'8". Some might list RJ as a wing but he will not excel there nor does he want to be there. RJ wants to take the ball up the court and keep it in his hands for a majority of the plays. There is reasonable concern that RJ won't be a consistent good decision maker in the league and it is hard to imagine his style helping lead a team to a championship in this era. It is a very premature take, only time will tell. RJ has a very high ceiling with a similar style to Ben Simmons except much more active shooting the rock. RJ will play in the NBA for a longtime, and fits well into the second echelon of our rankings.

15. Keldon Johnson (14)

- An aggressive, fiery and competitive player, Keldon gets to his spots on the court with ease. A soft touch layup/floater allows for Keldon to excel in the paint. A good shooter with a technically sound jump shot, Keldon's driving ability is his best attribute, but expect a big increase in his shooting as he transitions to the NBA life. Keldon's long arms create a lot of turnovers defensively as he can poke and swipe at the ball. Keldon's love to compete will allow him to excel in the league.

16. Ty Jerome (46)

- Two words: Decision making. Ty has a cool calm feel to him no matter how big the stage gets. Always waiting for his teammates to get set in position in order to eliminate any potential turnovers. Ty has very high basketball IQ and does not force anything. He is very efficient utilizing a shot clock possession to find the best shot. A 6'5" point guard, Ty loves to take advantage of his height in the paint versus smaller defenders. Because of his "read and react" ability, Ty hardly forces contested shots although he is a great shooter from beyond the arch with serious range. A quick, high release Ty makes it hard for defenders to react in time. Jerome is great at closing games, trying to draw the best play to execute. Ty is a very efficient player and will be a solid point guard with a long career in the league. We've moved Ty up somewhat from the model rankings, to better represent his high IQ and calm demeanor.

17. Chuma Okeke (29)

- A high intensity competitor describes Okeke. He is always calm on the court and has great patience to allow plays to come to him. Okeke does it all - defends at a high rate, scores from all levels, has a tight solid handle, and crashes the glass. Okeke is going to take advantage of the space in the league and utilize the pick and pop highly. Okeke has a great high release but needs to work more on his post play. Developing a better turnaround jump shot could make Okeke a special talent in this draft, and this high level of potential leads to his placement at 17.

18. Cameron Johnson (18)

- Johnson shot an incredible 45% from three at his senior season at UNC. Johnson is a terrific shooter who shoots without hesitation. His 6'9" and high releasing shot allow him to not need much space to shoot. A great defender and underrated ball handler and finisher, Johnson excels on the fast break. Johnson will have a high value for his "three and d" ability. We believe Cam's long frame and extremely strong three point shooting ability will find success in the current NBA.

19. Mfiondu Kabengele (13)

- A relentless worker on both sides of the ball. Kabengele is a seriously gifted big man who can play the F-C. Kabengele uses his 6'10" 250-pound frame to punish people in the paint. Kabengele is great catching the ball from behind the three-point line with his ability to shoot from deep and take you off the dribble to the rim. Kabengele's "workhorse" mentality will give him a successful career in the NBA.

20. Eric Paschall (15)

- A product of a Villanova program that produces winning players as well as anyone, Paschall is excellent at creating offensive motion and can go get a bucket when needed. The increased spacing of the NBA will be a big asset for Paschall as he can take guys off the dribble to the rim, shoot smoothly from three point to mid range, and play his spot well along the baseline. A 6'7" athletic strong player with a very high basketball IQ, Paschall will be a great fit for the Warriors especially with the fear of losing Draymond Green to free agency in the summer of 2020.

21. Kyle Guy (16)

- A lethal shooter and very improved shot creator, Kyle Guy will be a valuable asset in the NBA. In a three point driven league, having a weapon from behind the arc is necessary for any team in pursuit of a championship. A very quick high release allows Guy to pull it without hesitation. Guy is an underrated all around scorer who should be able to better display his game in the league. Weaknesses on the defensive side as well as in build and athleticism push him down slightly in our rankings.

22. Matise Thybulle (74)

- The best defender in college basketball this past season, Thybulle is a problem for anyone to score on. Thybulle is a great competitor who needs to continue working on his jump shot to make him a potential future starting player. Thybulle's extensive defensive prowess did not appear in our model rankings, but we believe he has a high talent level and potential.

23. Bruno Fernando (83)

- Incredibly active and athletic for a player at his size, Fernando establishes position very well in the paint in pursuit for rebounds and getting position over defenders. Bruno showed flashes of his shooting ability being able to stretch it out from the mid range to three-point line. Bruno is a strong finisher with long arms and a wide frame. Bruno does a great job of keeping the ball high whenever in the paint to not let smaller defenders grab it. Be careful when driving to the rim because Fernando might aggressively swat the ball into the stands. Expect a big three point shooting improvement, Fernando has as high a ceiling as any big man in this draft, leading to his placement here. However, his inability to make shots resulted in a low model ranking.

24. Naz Reid (19)

- Naz Reid's offensive potential is one of the best in this class. Naz has a great handle for his 6'11" 250 pound frame. A physical, tough competitor who has an impressive bag of post up moves, Naz is a winning player who always finds his way to impact late game possessions whether its points or rebounds/put-backs. Reid needs to become more patient and mature defensively as he lacks a defensive presence. Reid runs the floor well in transition and can shoot from deep. Naz Reid is the best post player in the draft.

25. Tacko Fall (6)

- It is almost impossible to imagine that Tacko could be athletic standing at 7'7", but that's exactly what he is. An underrated athlete, Tacko can run the court well in transition and is quick enough to slide in rotation and block shots with his 8'0" wingspan. Tacko has a very improved post game and should continue to grow and hone his skill set. We believe Tacko's model placement to be in-line with our own judgment.