RANKING COLLEGE BASKETBALL TEAMS

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I. Introduction

The problem of ranking college basketball teams belongs to the class of problems associated with analyzing the results of a paired comparisons experiment; that is, an experiment in which a set of objects are compared two at a time, and the better one in each pair is identified. The reader should bear in mind that the results presented in this paper are applicable to the general paired comparisons experiment although the paper is written in the terminology of sports, using such words as "team" and "game" instead of "object" and "comparison".

There is a considerable literature to draw upon for analyzing paired comparisons experiments, but there are two major reasons why most published methods are inappropriate for ranking college basketball teams. First, most of the methods are directed towards the balanced tournament in which every team plays every other team the same number of times. College basketball is very unbalanced. Secondly, most of the methods are oriented towards selecting the best team in the tournament or in making tests of hypothesis about the equality of different sets of teams. In the present case, we are concerned with obtaining an ordered ranking of all the teams.

There is also a wide range in the amount of information which can be incorporated into a ranking algorithm. One may restrict oneself to utilizing only the knowledge of the better (winning) team as is the case with the methods of this paper. As an extension, one might include information on the measure of difference between the two teams. This is usually accomplished by including the score of the game as part of the data, and such methods tend to be oriented toward regression or analysis of variance techniques.

Finally, one might include in the data various additional measures obtained for the individual members of each team. Of course, the more measures one introduces, the greater is the danger that an unexpected interaction between the measures will be introduced which may render the rankings invalid. For example, in many sports, hockey in particular, an "all-star" game is played in which the first-place team plays against an "all-star" team composed of the best players from the remaining teams in the league. Almost any algorithm which used measures based on the players' performances would rank the all-star team ahead of the first-place team - yet the first-place team seldom loses such games. This is usually attributed to such causes as teamwork and spirit, which are impossible to include in an objective ranking scheme, but certainly do exist.

In light of these comments, it seems reasonable to define three desirable properties that any objective ranking scheme should contain.

First, a scheme should restrict itself to <u>objective</u> data. For ranking sports, this means that only the results of games should be used and no modification should be included because a key player may have had an upset stomach. The amount of objective data to be used may vary, but one should keep in mind the aforementioned danger of including too much.

Secondly, the scheme should be <u>impartial</u>. This means that if a team has a certain rank then any other team with the identical record (with respect to the algorithm) should have the exact same rank.

Finally, the scheme should be <u>directionally invariant</u>. This property, which was originally proposed by W. A. Larsen [4], means that if a ranking of all the teams has been computed and then two teams play one additional game, the rank of the winning team shall not decrease, nor shall the losing team's rank increase.

II. Currently Used Methods

At present, college basketball teams are ranked by the two major news services, the Associated Press (AP) and the United Press International (UPI). They derive the ranking by polling voters: the voters in the UPI poll are a consistent panel of 35 coaches, while the panel for the AP poll consists of a varying group of 35 to 45 sportswriters.

Prior to 1968, both polls asked each voter to name what he considered the top ten teams. Every first place vote received 10 points, a second place vote earned 9 points, and so on. The polls totaled the votes received by each team and then released a list of the top ten vote getters, the so-called top ten teams. They also released a list of all other teams receiving any votes.

In 1968, the AP initiated an arbitrary elaboration on the simple scheme: voters were asked to list the top 15 teams. Points were assigned on a 20-18-16-14-12-10-9-8-7-6-5-4-3-2-1 basis, and a list of the top 20 teams were released. (The UPI, while continuing to vote on only ten teams, also began listing the top 20.)

The unusual point assignment used by the AP does not lack precedent; for example, in balloting for the most valuable player in baseball, each voter ranks ten men, and a weighting system of 14-9-8-7-...-1 is used.

The methods currently in use suffer from the serious defect that the identities of the voters will influence the outcome of the poll. For example, a coach in the UPI poll can virtually assure his own team being ranked in the top 20 by ranking it fourth or fifth himself. A fourth place ranking gives a team 7 points and a team with 7 points will usually be ranked between 16th and 19th in the UPI poll. Such a situation seemed to exist in the 1968-69 UPI basketball poll when a well-known Western school received six or seven points almost every week even though their record was mediocre, and, moreover, they received <u>no</u> points at all in the AP poll. This meant that <u>no</u> writer thought this school belonged in the top 15, but some coach thought they were fourth. Of course, this defect is partly due to a system which ranks 20 teams when only 10 are voted on, and it would appear no matter what weights were used. One way to combat it might be to prevent any coach from voting on his own team and then multiplying the total votes for his team by $N/(N-1)$.

A more serious aspect of the same defect is that no coach or writer can watch every good team play. Consequently, their vote will partly reflect the few schools that they have actually seen play. For the rest, they will consider a team's record; specifically, whom they have beaten and to whom they have lost.

Here an interesting proposition arises: since much of the ranking is already done on the basis of whom a team has played, it seems reasonable to create an impartial, formal mathematical method for doing so. The remainder of this paper will discuss the problems in creating such a method and will describe a method which seems to yield a reasonable ranking of the college basketball teams.

III. Forerunners

Our first attempt to develop a ranking algorithm commenced with an investigation of a method proposed by Wei [5] and published by Kendall [3]. This method is based on the hypothesis that the winning team in a round robin tournament should not necessarily be the one with the most victories; rather teams should get more credit for beating good teams than poor ones. To accomplish this end the method uses as ranks the eigenvector corresponding to the largest eigenvalue of the won-lost matrix, W. This matrix is defined by its elements: w_{ij} = the number of times team i has beaten team j. Since the eigenvector has the property that premultiplying it by the matrix is the same as multiplying it by a constant, the value assigned in the ranking to any particular team may be seen to be the normalized sum of the values of the teams it has defeated. Thus a team does get more credit for defeating a good team. It was the eigenvector corresponding to the largest eigenvalue that was used because the method as originally developed used an iterative procedure to determine the rankings, and when this method is applied to the original won-lost matrix, it is the largest eigenvector which is obtained. Additional statistical implications and interpretations of using this specific eigenvector need to be studied further.

This ranking method was applied in Kendall's original paper to only the results of a balanced, round-robin tournament. We, of course, want to apply it to a very unbalanced case. To do so, data was gathered for the 1968-69 college basketball season on 191 teams. The details of the data gathering are given in the Appendix.

One important consideration was how to include games played by schools in the group of 191 against schools not in the group. The magnitude of the problem may be seen in Table 1 which contains the distributions of total games played and non-group games played by the schools in the study. It may be seen that while the average team played 25 games, only three were against non-group opponents, and only four schools played more than half their games against such opposition. Several modifications were tried to account for these games; none of them seemed to have a serious effect on the rankings; and the results of such games have been omitted from the rankings included in this paper.

A sample of the results of directly applying Wei's method to the 1968-69 college basketball data is given in the K-score column of Table 2. These may be seen to differ substantially from the AP and UPI rankings for the same week. Moreover, several schools with mediocre records are included in the K-score's top 20, and all of the teams belong to major conferences; in fact, 17 of the top 20 belong to just four conferences, the Big Ten, Big Eight, Pacific Eight, and Western Athletic. Wei's method may thus be seen to inflate the ranks of conference schools at the expense of independents; the supreme example of this for the week of March 2 is that Stanford of the Pacific Eight Conference with a won-lost record of 8-17 was ranked 25th while LaSalle, one of the top Eastern independents, was ranked 59th, even though their record was 23-1.

It was felt that perhaps one of the reasons that Wei's method performed poorly in the unbalanced case was that while it was ranking teams on the basis of whom they have beaten, it was completely ignoring all information about to whom they had lost. This is not a serious drawback in the balanced case since all teams play the same number of games against the same opponents and losses are considered in that they are games which are not won. Such is not the situation, however, in the unbalanced case; hence an alternative method was developed which utilizes information on both wins and losses.

IV. Proposed Method

This alternative method, which is similar in nature to Wei's, attempts to account simultaneously both for whom a team has lost to as well as for whom a team has beaten. To do this it assumes that every team has some underlying value. For a given team this value is the normalized sum of the values of the teams it has beaten minus a correction for the teams to whom it has lost. For each loss, this correction is computed to be $V_{max} - V_L$, where V_{max} is the value of the top ranked team and V_L is the value of the team to whom you lost.

The method may be most easily understood by referring to formulas (4.1) to (4.4). Thus, the value of the jth team, V_j, is determined as

$$V_j = U_j/K \, , \tag{4.1}$$

where

$$K = \frac{2}{N} \sum_{i=1}^{N} U_i \, , \tag{4.2}$$

and

$$U_j = T_j - T_{min} \, , \tag{4.3}$$

where

$$T_j = \sum_{\substack{W=\text{all} \\ \text{teams} \\ \text{beaten}}} V_W - \sum_{\substack{L=\text{all} \\ \text{teams} \\ \text{lost to}}} (V_{max} - V_L) \tag{4.4}$$

$$= \sum_{\substack{p=\text{all} \\ \text{teams} \\ \text{played}}} V_p - N_L V_{max}$$

where N_L = number of games lost.

An iterative procedure is used to determine the rankings derived by this method. Thus, if at some point in the iterative process, we have a vector of ranking values, $\underline{V}$, then the value for the jth team in the next iteration is computed as follows: First obtain the T_j value which is equal to the sum of the values of the teams defeated minus the correction for teams lost to as in equation (4.4). Next, the bottom ranked team is constrained to have a value of 0; this is accomplished by the subtraction in equation (4.3). Finally, in order to achieve convergence, the sum of the values for all teams is constrained to equal N/2. The value N/2 was chosen because the sum of the teams' won-lost percentages will also approximately equal N/2; it was felt that this approximate equality would enable comparisons to be made between a team's percentage and its ranking value. In any case, the constant, K, of equation (4.2) is the divisor necessary to yield the correct sum, and equation (4.1) merely indicates the division.

Under this method it may be seen that a team gets no credit for beating the poorest team in the country, but loses nothing for losing to the best. In addition, when two good teams play, the one who loses is penalized very little in relation to all other teams (since $V_{max}-V_L$ will be small), while the one who wins gains quite a bit. The converse is true for a game between two poor teams.

Finally, the method quickly iterates to a vector of stable values. Using the college basketball data and using the won-loss percentages as the first vector of values in the iterative process, the author has found the five digit accuracy is obtained within 20 iterations.

The results of applying this method to the March 2 data are given in the G-score column of Table 2. It may be seen that these ranks do bear some resemblance to those produced by the news services, and the author would, of course, argue in favor of the G-score rankings because, as will be discussed in Section V, these rankings must closely satisfy the criteria set forth at the beginning of the paper. In addition, the final rankings, including all post-season tournament games, for all 191 teams are given in Table 3.

V. Summary

This paper has discussed three possible methods for ranking teams in badly unbalanced tournaments, and the methods have been applied to college basketball. It seems appropriate to examine how well the three methods conform to the three criteria for ranking algorithms set forth in the beginning of the paper. These were (i) objectivity, (ii) impartiality, and (iii) directional invariance.

The news service polls, as discussed earlier, are neither objective nor impartial. Due to the psychology of the voters they are likely to have directional invariance, but this property cannot be proved.

Wei's method is both objective and impartial but is seriously deficient in directional invariances as several test cases have shown.

The alternative method is also both objective and impartial. Tests have shown that it is also directionally invariant except in one rare case where a team defeats the poorest team in the country having already defeated that team earlier in the season. In such a case, the winning team adds nothing to its T value in equation (4.4) but the losing team has its T value decreased by $V_{max} - V_L$. In equation (4.3), T_{min} is now smaller than before; hence the U and V values of all teams are increased. Now, since the worst team is lower ranked, relative to the other teams, than it was before, the teams which have earlier beaten this poorest team have their T values increased less than the average. Hence, the winning team in the game just played shows a less than average increase due to the poorest team having lost again, and gets nothing for its latest win. It thus can fall in the rankings. As mentioned above, however, such cases are extremely rare. This seems a small price to pay for a method which seems to have so many desirable properties, including the ability to rank more than one undefeated team.

Finally, it seems worthwhile to ask how this method behaves in the completely balanced case for which Wei's method was originally developed. Tests on sample data have shown that in the completely balanced case the ranking values derived by the proposed method are merely a linear transformation of the won-loss percentages. This result leads this author to conclude that these percentages yield the most reasonable ranks in the balanced case while the proposed algorithm should be applied in very unbalanced situations.

APPENDIX

The college teams that have been included in this ranking are those whose complete schedules were available to the author prior to the start of the 1968-69 college basketball season. The schedules of 190 of the teams were found in the Basketball Yearbook [2]. The schedule for Long Island University was given in the New York Times [1] and this school was included in the rankings because it played most of its games against schools already in the group.

Most of the results of the games were called by the author from the daily sports pages of the New York Times. The author would like to thank Mr. James Blinn and Mrs. Ione Breyer who regularly made available sports sections from the Des Moines Register and the Chicago Tribune, respectively. These papers often contained scores of games not reported in the Times.

Finally, the results of all games for all teams in the study are not included in the ranking. This is because the author was unable to obtain the results of many games played in the Rocky Mountains and Far West, due to the somewhat parochial orientation of his sources which were located in the East and Midwest. This incompleteness of results has no effect on the ranking algorithm described in this paper; it does mean, however, that the ranks reported in this paper are not the absolute, final season rankings for the 1968-69 college basketball season. To remedy this, the author would greatly appreciate any readers who can supply an accurate record of schools whose records as given in this paper are incorrect or incomplete.

REFERENCES

[1] "Basketball Schedules for Colleges in the Metropolitan Area and other Eastern Teams," New York Times, Sports Section, November 24, 1968.

[2] Hollander, Zander, Ed., Basketball Yearbook 1969, Popular Library, Inc., New York, 1968.

[3] Kendall, M. G., "Further Contributions to the Theory of Paired Comparisons," Biometrics, 11 (1955), 43-62.

[4] Larsen, W. A., personal communication.

[5] Wei, T. H., The Algebraic Foundations of Ranking Theory, unpublished thesis, Cambridge University, England, 1952.

Total Games Played

# Games	# Teams
18	1
19	3
20	1
21	4
22	6
23	14
24	40
25	36
26	40
27	18
28	13
29	10
30	3
31	1
32	1

Median = 25
Mean = 25.06

Games Played Against Non-Group Teams

# Games	# Teams
0	30
1	25
2	27
3	32
4	16
5	14
6	12
7	6
8	9
9	7
10	3
11	5
12	1
13	2
14	1
15	1

Median = 3
Mean = 3.72

TABLE 1

DISTRIBUTIONS OF GAMES PLAYED

	K-Score				AP				UPI					G-Score			
		W	L	Score		W	L	Points*		W	L	Points**			W	L	Score
1.	UCLA	24	0	2.798	UCLA	24	0	898	UCLA	24	0	350	1.	UCLA	24	0	1.056
2.	Purdue	18	4	2.159	LaSalle	23	1	724	Santa Clara	24	1	254	2.	North Carolina	22	3	.967
3.	Kansas	20	5	1.909	Santa Clara	24	1	650	North Carolina	22	3	244	3.	Davidson	25	2	.940
4.	Colorado	19	6	1.865	North Carolina	22	3	606	Davidson	25	2	204	4.	St. John's	22	4	.931
5.	Ohio State	15	7	1.731	Davidson	25	2	573	LaSalle	23	1	193	5.	Villanova	21	4	.905
6.	North Carolina	22	3	1.719	Purdue	18	4	465	Purdue	19	4	173	6.	LaSalle	23	1	.901
7.	Illinois	17	5	1.691	Kentucky	20	4	300	Kentucky	21	4	141	7.	Purdue	18	4	.867
8.	Northwestern	13	9	1.645	St. John's	22	4	335	St. John's	22	4	92	8.	Santa Clara	24	1	.857
9.	Washington State	17	8	1.544	Duquesne	19	3	292	Duquesne	19	3	44	9.	Kentucky	20	4	.855
10.	Kentucky	20	4	1.511	Villanova	21	4	203	Villanova	20	4	44	10.	Drake	21	4	.849
11.	Brigham Young	16	11	1.511	Drake	21	4	159	Drake	21	4		11.	Duquesne	19	3	.847
12.	Michigan	13	9	1.367	New Mexico State	23	2	154	New Mexico State	23	2		12.	New Mexico State	23	3	.839
13.	Wyoming	20	7	1.349	South Carolina	19	5	122	Wyoming	20	7		13.	Notre Dame	20	5	.836
14.	USC	14	11	1.342	Marquette	21	4	119	Notre Dame	20	5		14.	South Carolina	19	5	.823
15.	Missouri	14	9	1.335	Louisville	21	4	102	Colorado	19	6		15.	Illinois	17	5	.819
16.	Drake	21	4	1.306	Boston College	20	3	85	South Carolina	19	5		16.	Boston College	20	3	.818
17.	Michigan State	11	10	1.288	Notre Dame	20	5	61	Marquette	12	4		17.	Kansas	20	5	.789
18.	Utah	14	13	1.234	Colorado	19	6	46	Kansas	20	5		18.	Louisville	18	4	.787
19.	Iowa State	13	12	1.282	Kansas	20	5	38	Boston College	20	3		19.	Ohio State	15	7	.767
20.	Kansas State	12	12	1.260	Illinois	17	5	27	Princeton	19	6		20.	Dayton	20	5	.767

TABLE 2

RANKINGS INCLUDING GAMES OF MARCH 2

* 45 writers vote for 15 teams. Points are given on a 20-18-16-14-12-10-9-8-7-6-5-4-3-2-1 basis.

** 35 coaches vote for 10 teams. Points are given on a 10-9-8-7-6-5-4-3-2-1 basis.

TABLE 3

FINAL RANKINGS FOR 1968-9 COLLEGE BASKETBALL SEASON

RANK		W	L	T	PCT.	SCORE
1	U C L A	29.	1.	0.	0.967	1.2177848
2	NORTH CAROLINA	27.	5.	0.	0.844	1.0385638
3	DAVIDSON	27.	3.	0.	0.900	1.0085019
4	PURDUE	23.	5.	0.	0.821	1.0065071
5	ST. JOHN'S	23.	6.	0.	0.793	0.9632869
6	DRAKE	26.	5.	0.	0.839	0.9538918
7	BOSTON COLLEGE	24.	4.	0.	0.857	0.9292973
8	LA SALLE	23.	1.	0.	0.958	0.9288516
9	KENTUCKY	23.	5.	0.	0.821	0.9250950
10	WEBER STATE	26.	3.	0.	0.897	0.9127226
11	DUQUESNE	21.	5.	0.	0.808	0.9087441
12	VILLANOVA	21.	5.	0.	0.808	0.8932999
13	SANTA CLARA	27.	2.	0.	0.931	0.8862888
14	ILLINOIS	19.	5.	0.	0.792	0.8756470
15	OHIO STATE	17.	7.	0.	0.708	0.8312137
16	TEMPLE	22.	8.	0.	0.733	0.8277592
17	SOUTH CAROLINA	21.	7.	0.	0.750	0.8218129
18	NEW MEXICO STATE	24.	5.	0.	0.828	0.8210571
19	MARQUETTE	24.	5.	0.	0.828	0.7870573
20	COLUMBIA	20.	4.	0.	0.833	0.7835201
21	RUTGERS	21.	4.	0.	0.840	0.7787215
22	LOUISVILLE	21.	6.	0.	0.778	0.7780006
23	NOTRE DAME	20.	7.	0.	0.741	0.7769433
24	TENNESSEE	21.	7.	0.	0.750	0.7752372
25	PRINCETON	19.	7.	0.	0.731	0.7725692
26	WASHINGTON STATE	18.	8.	0.	0.692	0.7599324
27	COLORADO	21.	7.	0.	0.750	0.7508259
28	KANSAS	20.	7.	0.	0.741	0.7351411
29	NORTHWESTERN	14.	10.	0.	0.583	0.7306671
30	WAKE FOREST	18.	9.	0.	0.667	0.7136241
31	DAYTON	20.	7.	0.	0.741	0.7019833
32	FLORIDA	18.	9.	0.	0.667	0.6949419
33	TULSA	20.	8.	0.	0.714	0.6837789
34	MURRAY STATE	22.	6.	0.	0.786	0.6762792
35	ST. BONAVENTURE	17.	7.	0.	0.708	0.6664945
36	ARMY	18.	10.	0.	0.643	0.6660492
37	MASSACHUSETTS	17.	7.	0.	0.708	0.6630674
38	ST. PETER'S	21.	7.	0.	0.750	0.6614033
39	COLORADO STATE	18.	7.	0.	0.720	0.6485279
40	WYOMING	20.	9.	0.	0.690	0.6452762
41	TEXAS A & M	18.	9.	0.	0.667	0.6439517
42	FLORIDA STATE	18.	8.	0.	0.692	0.6385160
43	BAYLOR	18.	6.	0.	0.750	0.6375750
44	SOUTHERN CALIF.	15.	12.	0.	0.556	0.6372300
45	MICHIGAN	13.	11.	0.	0.542	0.6361748
46	FORDHAM	17.	9.	0.	0.654	0.6333660
47	NORTH CAROLINA ST.	15.	10.	0.	0.600	0.6292224
48	HOLY CROSS	17.	8.	0.	0.680	0.6284317
49	OHIO UNIVERSITY	17.	9.	0.	0.654	0.6278469
50	MONTANA STATE	17.	8.	0.	0.680	0.6216159
51	ARIZONA	17.	10.	0.	0.630	0.6213655
52	VANDERBILT	15.	11.	0.	0.577	0.6210283
53	SEATTLE	19.	9.	0.	0.679	0.6134436
54	ST. JOSEPH'S	17.	11.	0.	0.607	0.6118016
55	WESTERN KENTUCKY	16.	9.	0.	0.640	0.6077598
56	CINCINNATI	17.	9.	0.	0.654	0.6061935

57	WEST TEXAS STATE	16.	8.	0.	0.667	0.5992673
58	DUKE	15.	14.	0.	0.517	0.5985894
59	AUBURN	15.	10.	0.	0.600	0.5972895
60	MOREHEAD STATE	20.	9.	0.	0.690	0.5844282
61	HOUSTON	16.	10.	0.	0.615	0.5800981
62	PACIFIC	17.	9.	0.	0.654	0.5789539
63	MINNESOTA	12.	12.	0.	0.500	0.5782612
64	PROVIDENCE	14.	10.	0.	0.583	0.5776248
65	PENNSYLVANIA STATE	13.	9.	0.	0.591	0.5751085
66	WISCONSIN	11.	13.	0.	0.458	0.5750757
67	LONG ISLAND UNIV	17.	6.	0.	0.739	0.5716541
68	MICHIGAN STATE	11.	12.	0.	0.478	0.5711356
69	CREIGHTON	13.	13.	0.	0.500	0.5693349
70	NEW MEXICO	17.	9.	0.	0.654	0.5631830
71	EASTERN KENTUCKY	13.	8.	0.	0.619	0.5607526
72	MIAMI (OHIO)	15.	12.	0.	0.556	0.5588999
73	SOUTHERN ILLINOIS	17.	7.	0.	0.708	0.5586438
74	DETROIT	16.	10.	0.	0.615	0.5561265
75	OREGON	13.	13.	0.	0.500	0.5556530
76	PENNSYLVANIA	15.	10.	0.	0.600	0.5521900
77	IOWA	12.	12.	0.	0.500	0.5511747
78	UC - SANTA BARBARA	17.	9.	0.	0.654	0.5501344
79	BRIGHAM YOUNG	17.	12.	0.	0.586	0.5490079
80	NEW YORK UNIV.	12.	9.	0.	0.571	0.5482714
81	ST. FRANCIS (PA)	14.	8.	0.	0.636	0.5458268
82	KANSAS STATE	14.	12.	0.	0.538	0.5423048
83	TEXAS EL PASO	15.	9.	0.	0.625	0.5355758
84	MIAMI (FLA)	14.	9.	0.	0.609	0.5292407
85	WASHINGTON	13.	13.	0.	0.500	0.5254429
86	BOSTON UNIVERSITY	14.	10.	0.	0.583	0.5232376
87	JACKSONVILLE	16.	7.	0.	0.696	0.5216934
88	SAN JOSE STATE	16.	8.	0.	0.667	0.5165821
89	MANHATTAN	13.	9.	0.	0.591	0.5136680
90	EAST CAROLINA	17.	11.	0.	0.607	0.5096606
91	IOWA STATE	14.	13.	0.	0.519	0.5026182
92	GETTYSBURG	14.	9.	0.	0.609	0.5005942
93	OKLAHOMA CITY	20.	9.	0.	0.690	0.4993614
94	GEORGIA	13.	12.	0.	0.520	0.4984426
95	NORTH TEXAS STATE	15.	10.	0.	0.600	0.4982091
96	KENT STATE	14.	10.	0.	0.583	0.4966845
97	CALIFORNIA	12.	13.	0.	0.480	0.4934951
98	GONZAGA	8.	11.	0.	0.421	0.4900799
99	EAST TENNESSEE ST.	16.	11.	0.	0.593	0.4900774
100	INDIANA	9.	15.	0.	0.375	0.4849725
101	UTAH	14.	13.	0.	0.519	0.4848205
102	LOUISIANA STATE U	13.	13.	0.	0.500	0.4842134
103	MISSOURI	14.	11.	0.	0.560	0.4830031
104	DE PAUL	14.	11.	0.	0.560	0.4773446
105	OREGON STATE	12.	14.	0.	0.462	0.4699722
106	VIRGINIA TECH	14.	12.	0.	0.538	0.4639436
107	TOLEDO	13.	11.	0.	0.542	0.4636083
108	MAINE	11.	11.	0.	0.500	0.4630666
109	SOUTHERN METHODIST	12.	12.	0.	0.500	0.4529476
110	HARDIN-SIMMONS	12.	13.	0.	0.480	0.4496715
111	BUTLER	12.	14.	0.	0.462	0.4491024
112	GEORGE WASHINGTON	14.	11.	0.	0.560	0.4489108
113	NORTHERN ILLINOIS	13.	12.	0.	0.520	0.4377969
114	ARIZONA STATE	11.	15.	0.	0.423	0.4314986
115	OKLAHOMA STATE	13.	13.	0.	0.500	0.4285234
116	VIRGINIA	10.	15.	0.	0.400	0.4271492
117	BRADLEY	14.	12.	0.	0.538	0.4239027

118	WEST VIRGINIA	13.	14.	0.	0.481	0.4235923
119	IDAHO	7.	12.	0.	0.368	0.4218751
120	NEBRASKA	12.	14.	0.	0.462	0.4183628
121	NIAGARA	11.	13.	0.	0.458	0.4153466
122	TENNESSEE TECH	12.	11.	0.	0.522	0.4148331
123	GEORGETOWN	12.	12.	0.	0.500	0.4121817
124	C C N Y	3.	16.	0.	0.158	0.4120749
125	PEPPERDINE	14.	11.	0.	0.560	0.4104573
126	HOFSTRA	12.	13.	0.	0.480	0.4097295
127	RIDER	11.	14.	0.	0.440	0.4062102
128	BUCKNELL	13.	11.	0.	0.542	0.4030226
129	GEORGIA TECH	12.	13.	0.	0.480	0.4025187
130	IONA	11.	11.	0.	0.500	0.3981723
131	MIDDLE TENN. STATE	13.	13.	0.	0.500	0.3976493
132	TULANE	11.	14.	0.	0.440	0.3966306
133	MISSISSIPPI	10.	14.	0.	0.417	0.3857803
134	WICHITA STATE	12.	15.	0.	0.444	0.3856080
135	STANFORD	9.	17.	0.	0.346	0.3814375
136	VERMONT	12.	11.	0.	0.522	0.3803636
137	TEXAS CHRISTIAN	13.	12.	0.	0.520	0.3764197
138	SETON HALL	9.	16.	0.	0.360	0.3763733
139	MARSHALL	9.	15.	0.	0.375	0.3763352
140	FAIRFIELD	10.	16.	0.	0.385	0.3756861
141	WESTERN MICHIGAN	11.	13.	0.	0.458	0.3712312
142	DELAWARE	8.	10.	0.	0.444	0.3701057
143	NAVY	7.	14.	0.	0.333	0.3683732
144	MISSISSIPPI STATE	8.	17.	0.	0.320	0.3637952
145	COLGATE	11.	14.	0.	0.440	0.3629565
146	CORNELL	12.	13.	0.	0.480	0.3620943
147	FARLEIGH DICKINSON	10.	14.	0.	0.417	0.3594347
148	LOYOLA (ILL)	9.	14.	0.	0.391	0.3570189
149	RICE	10.	14.	0.	0.417	0.3499307
150	IDAHO STATE	6.	14.	0.	0.300	0.3465961
151	MARYLAND	8.	18.	0.	0.308	0.3393085
152	RHODE ISLAND	10.	15.	0.	0.400	0.3369106
153	MONTANA	5.	16.	0.	0.238	0.3361670
154	AUSTIN PEAY	9.	14.	0.	0.391	0.3350544
155	RICHMOND	13.	14.	0.	0.481	0.3346985
156	XAVIER	10.	16.	0.	0.385	0.3244307
157	TEXAS TECH	11.	14.	0.	0.440	0.3241227
158	THE CITADEL	13.	12.	0.	0.520	0.3175245
159	SYRACUSE	9.	16.	0.	0.360	0.3027223
160	NEW HAMPSHIRE	9.	15.	0.	0.375	0.3005763
161	AIR FORCE	11.	13.	0.	0.458	0.2986615
162	CANISIUS	7.	16.	0.	0.304	0.2837577
163	TEXAS	9.	15.	0.	0.375	0.2831118
164	UTAH STATE	10.	17.	0.	0.370	0.2824042
165	YALE	9.	16.	0.	0.360	0.2794774
166	BOWLING GREEN	9.	15.	0.	0.375	0.2771720
167	ST. FRANCIS (NY)	7.	16.	0.	0.304	0.2765337
168	ARKANSAS	10.	14.	0.	0.417	0.2687935
169	CLEMSON	7.	19.	0.	0.269	0.2616466
170	LEHIGH	6.	17.	0.	0.261	0.2545359
171	ST. MARY'S	6.	19.	0.	0.240	0.2436783
172	DARTMOUTH	10.	15.	0.	0.400	0.2378562
173	LAFAYETTE	9.	17.	0.	0.346	0.2279705
174	CENTENARY	8.	19.	0.	0.296	0.2250639
175	ST. LOUIS	6.	20.	0.	0.231	0.2189118
176	OKLAHOMA	7.	19.	0.	0.269	0.2172865
177	SAN FRANCISCO	8.	18.	0.	0.308	0.1945456
178	HARVARD	7.	18.	0.	0.280	0.1899031

179	FURMAN	9.	17.	0.	0.346	0.1800938
180	PORTLAND	2.	20.	0.	0.091	0.1765330
181	MEMPHIS STATE	6.	19.	0.	0.240	0.1738683
182	PITTSBURGH	4.	20.	0.	0.167	0.1704313
183	VIRGINIA MIL INST	5.	18.	0.	0.217	0.1657655
184	LOYOLA (LA)	5.	19.	0.	0.208	0.1488945
185	CONNECTICUT	5.	19.	0.	0.208	0.1480441
186	ALABAMA	4.	20.	0.	0.167	0.1399336
187	LOYOLA (CAL)	5.	19.	0.	0.208	0.1285840
188	AMERICAN UNIV.	4.	19.	0.	0.174	0.1192185
189	WILLIAM & MARY	6.	20.	0.	0.231	0.0871988
190	DENVER	2.	24.	0.	0.077	0.0034623
191	BROWN	3.	23.	0.	0.115	0.