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Adjustment of Maas' Rating System for USA College Football.

RATIONALE.

After two years of experience with Maas' Rating System for USA College Football (Division IA) some shortcomings of the unbiased system for this specific application can be noted of which the two most striking ones are:

- The **Average** Strength of Opponents, which is one of the two components of each team's Rating according to Maas' Rating System, results in unreasonable changes in Ratings in cases of loss against much-higher-rated teams and win against much-lower-rated teams.
- Maas' Rating System does not include any Home Field Advantage component.

STRENGTH OF OPPONENTS.

The Average "Strength of Opponents", also known as "Strength of Schedule" (SOS), in fact is one of the two components composing each team's Rating. The other component consists of a Win/Loss score.

Since each team's Rating is the sum of both components, there is a disadvantage in using the **Average** "Strength of Opponents" in the Formula for defining the Ratings.

This disadvantage is clearly described by John Wobus in his "Explanation of the Rankings and Ratings" (see Wobus Sports: www.vaporium.com/sports/explanation.html and : www.vaporium.com/sports/formula.html):

*"There is at least one potential problem regarding SOS. If you treat SOS as a total or an **average**, as does Maas' Rating System, then one can imagine scenarios where the whole story is not told. Should a team happen to schedule twenty teams consisting of the top ten teams in the division (other than itself) and the bottom ten teams in the division, then a totalled or **averaged** SOS would be roughly average as compared with all the teams in the division. However, if this team won all those games, the fact that it beat every one of the top ten teams tells you this team is very good, thus a reasonable Rating would be quite high. However, the **averaged** SOS would drag down such a team's Rating. This Rating, on the other hand, credits you for each top team you beat, and it doesn't require many wins (assuming no losses) before your Rating is higher than theirs. The fact that you may also have easy games in your schedule is far less relevant unless you lose some of those. While this exact scenario is unlikely to happen, probably this effect does happen to some extent: some teams tend to have both very strong and very weak teams on their schedule making their SOS a bit lower than teams with more middle-to-upper opponents."*

In my opinion the above explained scenario shows a shortcoming of Maas' Rating System when applied to USA College Football and therefore justifies an adjustment for Strength of Opponents in order to raise the face validity of the resulting Ranking Table.

Adjustment for Strength of Opponents.

For this adjustment all individual games are investigated separately and any losing Opponent with a much-lower-rating or any winning Opponent with a much-higher-rating than the other team is referred to as an "Irrelevant Opponent" for that other team in that particular game.

My solution for handling results obtained against "Irrelevant Opponents" is to fix the Rating of those Opponents to a value in such a way that the adjusted **difference** between the Ratings of two teams **equals** a well defined **limit** for each individual game. This limit is derived from the chance to win/lose a particular game.

A formula to compute these chances for all individual games is derived from the results of Logistic Regression using the outcome of all games and the initially computed differences between the Ratings of the teams as derived from the original Maas' Rating System.

For a particular game an Opponent is referred to as an "Irrelevant Opponent" if the chance of the other team to win/lose that game is **higher than 95%**.

If, for a particular game, a team's chance to **win** would be higher than 95%, then the **losing** Opponent is considered as an "Irrelevant Opponent" and the much-lower Rating of this losing Opponent will be corrected (raised) for that game.

If, for a particular game, a team's chance to **lose** would be higher than 95%, then the **winning** Opponent is considered as an "Irrelevant Opponent" and the much-higher Rating of this winning Opponent will be corrected (lowered) for that game.

After these corrections the **difference** (between the Ratings of the two teams involved in such particular game) corresponds with a chance of **exactly 95%** for the team in question to win (respectively to lose) that game.

HOME FIELD ADVANTAGE.

It is common knowledge that there exists some kind of Home Field Advantage in USA College Football which can be computed in several ways.

For many teams the number of games at home is not exactly equal to the number of games on the road. Furthermore, even in cases with equal number of matches at home and on the road, it can be demonstrated that this Home Field Advantage component not necessarily has the same weight for all teams.

Example:

- *Team A plays six matches at home against other teams of approximately the same strength (as Team A) and six matches on the road against much-lower-rated teams.*
- *Team B plays six matches at home against much-lower-rated teams and six matches on the road against other teams of approximately the same strength(as Team B).*

Team A as well as team B will easily win all their matches against the much-lower-rated teams but Team A has great (Home Field) Advantage over Team B with respect to the expected results against the other scheduled opponents.

Conclusion: having the same opponents does not necessarily result in the same Strength of Schedule taking into account the clear existence of a Home Field Advantage factor.

While this exact scenario is unlikely to happen, probably this effect does happen to some extent. In Maas' Rating System this effect of Home Field Advantage is not counted in at all.

In my opinion the above explained scenario shows a shortcoming of Maas' Rating System when applied to USA College Football and therefore justifies an adjustment for Home Field Advantage in order to raise the face validity of the resulting Ranking Table.

Adjustment for Home Field Advantage.

A formula to compute the Home Field Advantage (HFA) is derived from the results of Logistic Regression using the outcome of all games and the initially computed differences between the Ratings of the teams as derived from Maas' Rating System.

The adjustment for Home Field Advantage is applied for each individual game, after the earlier discussed adjustment for Strength of Opponents as shown in the procedure described hereafter.

PROCEDURE FOR ADJUSTMENTS.

The full procedure of adjustment for Strength of Opponents (or Strength of Schedule: SOS) and for Home Field Advantage (HFA) consists of the following steps:

1. compute all (provisional) Ratings by using the original Maas' Rating System.
2. for each and all matches compute the difference between the two teams' Ratings for matches between two Division IA teams (excluding the ones played on neutral sites).
3. apply the Logistic Regression technique using the outcome of all games and the computed differences between the two teams' (provisional) Ratings.
4. adjust the Rating of all so-called "Irrelevant Opponents" for SOS.
5. adjust the Rating of all Opponents for HFA.
6. recalculate all teams' SOS based on all (adjusted) Ratings of their Opponents.
7. recalculate all teams Ratings including the recalculated SOS.
8. rescale all recalculated Ratings so that they can be used to make predictions.

ORIGINAL VERSUS ADJUSTED RESULTS.

In the table below I present the results from the adjusted System next to the ones from the original System. I also include the so-called Average Computer Rank as derived from the official BCS standings. The presented tops of the Rankings refer to the **pre-bowl** standings as per December 6, 2003 and December 4, 2004 respectively.

Pre-bowl Standings 2003					Pre-bowl Standings 2004				
Original Rating System		Adjusted Rating System		Comp Avg.	Original Rating System		Adjusted Rating System		Comp. Avg.
1	Oklahoma	1	Oklahoma	(1)	1	USC	1	USC	(2)
2	USC	2	LSU	(2)	2	Oklahoma	2	Oklahoma	(1)
3	Ohio State	3	USC	(3)	3	Texas	3	Auburn	(3)
4	Florida St	4	Michigan	(4)	4	California	4	Utah	(5)
5	Michigan	5	Ohio State	(5)	5	Auburn	5	Texas	(4)
6	LSU	6	Miami OH	(6)	6	Utah	6	California	(6)
7	Texas	7	Florida St	(7)	7	Arizona St	7	Boise St	(7)

From this table we can conclude that especially the Rank of LSU (2003) and Auburn (2004) were more in line with the BCS Computer Average Rank **after adjustment** of Maas' Rating System when compared to the results derived from the original Maas' Rating System.

DISCUSSION.

With the first development of Maas' Rating System I focussed on simplicity and integrity of the system. Simplicity: by just using win/loss records and by applying only linear techniques. Integrity: by constructing an unbiased system without any subjective element.

For a number of applications this unbiased Rating System did reveal very satisfying results. Applied to USA College Football however, some shortcomings became evident.

It was a very difficult decision for me to adjust this unbiased system for Strength of Schedule and for Home Field Advantage because by doing so at least one subjective element is included in the adjusted system.

The introduction of so-called "Irrelevant Opponents" is based on an arbitrary criterion: 95% chance to win/lose a particular match. If I would have chosen another criterion (e.g. 90% or 97.5%) then the results would not be exactly the same. Hence, the **Adjusted** Maas' Rating System is **not** completely **unbiased**.

However, I am very curious to see whether this bias will result in College Football Ranking Tables that will have higher face validity than the ones obtained by the unbiased Rating System. A careful evaluation of the results of this adjusted System during next season(s) hopefully will show that these adjustments were worthwhile.

REFERENCES.

I want to thank John Wobus for his permission to quote from his website (see Wobus Sports: www.vaporio.com/sports/).