Intra-Season Rankings

Rankings within a season is split into two parts. The first part is an initial ranking system that uses the cumulative margin of victory (M_v) for a team and their strength of schedule (SoS) for that season. The second part is to scale the results of each game based on location of the game, results, and initial rank of the opponent. This creates a score that rates how positive or negative that game's result has on the team's season.

1 Initial Team Rankings

$O =$ Average Opponent's Win Percentage

$O_2 =$ Average of Opponent's Win Percentage for each Opponent

$M_v =$ Average Margin of Victory

$$\textit{Initial Ranking Score} = M_v \frac{2O + O_2}{3}$$

2 Seasonal Team Rankings

2.1 Set Definitions

$\mathbf{T} = \{\, t \mid t \in \text{FBS} \,\}$: Set of All FBS Teams

$\mathbf{G} = \{\, g_t \mid t \in \mathbf{T} \,\}$: the number of games for each FBS team

$\mathbf{M} = \{\, [m_{t,1}, m_{t,2}, \ldots, m_{t,g_t}] \mid t \in \mathbf{T} \,\}$

: Margin of victory for each game for team t

$\mathbf{R} = \{\, [r_{t,0}, r_{t,1}, \ldots, r_{t,g_t}] \mid t \in \mathbf{T},\ r_{t,0} = \text{Ranking for team } t \,\}$

: the rankings for every FBS team and their opponents

$\mathbf{V} = \{[v_{t,1}, v_{t,2}, \ldots, v_{t,g_t}] \mid t \in \mathbf{T},\ v_{t,i} \in \{\text{Home, Neutral, Away}\}\}$

: the location for every game for each FBS team

2.2 Opponent Difficulty Scaling

$t \in \mathbf{T}$, $1 \leq i \leq g_t$

$$g(t,\, i) = \left(\frac{m_{t,i}}{|m_{t,i}|}\right)\left(\frac{r_{t,0} - r_{t,i}}{|\mathbf{T}|}\right)$$

2.3 Game Location Difficulty Scaling

$t \in \mathbf{T}$, $1 \leq i \leq g_t$

$$loc(x \in \{\text{Home, Neutral, Away}\}) = \begin{Bmatrix} 0.875 & : & x = \text{Home} \\ 1 & : & x = \text{Neutral} \\ 1.125 & : & x = \text{Away} \end{Bmatrix}$$

$$h(t,\, i) = loc(v_{t,i}) + 0.125\sqrt[3]{r_{t,i} - r_{t,0}}$$

2.4 Season Score

$$\Gamma(t \in \mathbf{T}) = \sum_{i=1}^{g_t} m_{t,i} \cdot h(t,i) \cdot 3^{\,g(t,i)}$$