

Player score:

(打)

$$B = \frac{(OPS_{season} \times PA_{season} + OPS_{month} \times PA_{month} + OPS_{field} \times PA_{field} + OPS_{vsp} \times PA_{vsp})}{PA_{season} + PA_{month} + PA_{field} + PA_{vsp}}$$

(守)

$$F = \frac{FPCT_{season}}{FPCT_{\mu_{pos}}}$$

CPBL Avg:

$$OBPM (\text{上壘}) = 0.327$$

$$SLGM (\text{長打}) = 0.365$$

$$FPCTM (\text{守備}) = 0.980$$

$$M_{pos} \left\{ \begin{array}{l} C = 0.992 \\ 1B = 0.993 \\ 2B = 0.977 \\ 3B = 0.929 \\ SS = 0.964 \\ LF = 0.977 \\ CF = 0.988 \\ RF = 0.976 \end{array} \right.$$

Position weight:

	w_B	w_F
C	0.95	1.05
1B	1.21	0.83
2B	0.97	1.03
3B	0.96	1.04
SS	0.94	1.06
LF	1.02	0.98
CF	1.04	0.96
RF	1.17	0.85

Statistic formulation:

$$\textcircled{1} SLG = TB / AB$$

$$\textcircled{2} OPS = (OBP / OBPM) + (SLG / SLGM) - 1$$

$$\textcircled{3} wOBA(O_{jk}) =$$

↓ 1B

$$(0.121BB + 0.75HBP + 0.9(H - 2B - 3B - HR) + 1.242B + 1.563B + 1.95HR)$$

PA

stage 1: pick 8 players (no DH)

$X_{ijg} = 1$ if player i is in position j in game g

$A_{ij} = 1$ if player i can be in position j

V_{ij} is score of player i in position $j \Rightarrow V_{ij} = (w_B B_i + w_F F_{ij}) A_{ij}$

N is the number of games in a week

$G = \{1, \dots, N\}$

Z_g is weight of game g depends on opponent team

$\left\{ \begin{array}{l} \text{中信: } 1.15 \\ \text{統一: } 1.11 \\ \text{樂天: } 0.96 \\ \text{富邦: } 0.93 \\ \text{味全: } 0.85 \end{array} \right.$

S_1 is a set containing star players who must be starting player in every game.

S_2 is a set containing potential players who should be starting player at least 1 game.

S_3 is a set containing old or injured players who must be bench player at least 1 game.

$$\max \sum_{g \in G} \sum_{j \in J} Z_g V_{ij} X_{ijg}$$

S.t. ~~$F_{i8} X_{i8g} \geq F_{i7} X_{i7g} \quad \forall i \in I, \forall g \in G$~~

~~$F_{i8} X_{i8g} \geq F_{i7} X_{i7g} \quad \forall i \in I, \forall g \in G$~~

$$\sum_{i \in I} X_{ijg} = 1 \quad \forall j \in J, \forall g \in G$$

$$\sum_{j \in J} X_{ijg} \leq 1 \quad \forall i \in I, \forall g \in G$$

$$X_{ijg} \leq A_{ij} \quad \forall i \in I, \forall j \in J, \forall g \in G$$

$$\sum_{g=n}^{n+k} X_{izg} \leq 3 \quad \forall i \in I, n \in G, n+k \leq N \quad (C: \text{連續出賽} \leq 3)$$

$$\sum_{g \in G} X_{ijg} = N \quad \forall i \in I, j \in J, \text{ if player } i \in S_1$$

$$\sum_{g \in G} X_{ijg} \geq 1 \quad \forall i \in I, j \in J, \text{ if player } i \in S_2$$

$$\sum_{g \in G} X_{ijg} < N \quad \forall i \in I, j \in J, \text{ if player } i \in S_3$$

$$X_{ijg} \in \{0, 1\} \quad \forall i \in I, j \in J, g \in G$$

After stage 1, let the player with highest B_i be DH and go to stage 2.

Stage 2: batting order

P_{jk} : PA of k^{th} batting order player of position j

O_{jk} : wOBA of k^{th} batting order player of position j

(if $P_{jk} < 30$ or no data of k^{th} batting order, then O_{jk} is player of position j 's wOBA_{season}, $\forall k \in K$)

y_{jk} | if player of position j is k^{th} batting order

$$J = K = \{1, \dots, 9\}$$

$$\max \sum_{k \in K} \sum_{j \in J} O_{jk} y_{jk}$$

s.t.

$$\sum_{j \in J} y_{jk} = 1 \quad \forall k \in K$$

$$\sum_{k \in K} y_{jk} \geq 1 \quad \forall j \in J$$

$$y_{jk} \in \{0, 1\} \quad \forall j \in J, k \in K$$

Bench Mark:

Stage 1:

每人守位: 守備機會(TC)最多

選擇各守位 $OPS_{\text{season}}^{\max}$

Stage 2:

按 wOBA_{season} 由大到小排序 1~9 棒