Draft Analyzer

1. Modeling

1.1. Defining Items and Objects

Let us define a champion by an ID: each champion has a unique ID between 1 and 170 (since there are currently 170 champions).
Let us define the Victory-Defeat matrix $M \in M_{170}(\mathbb{N})$.
For $(i, j) \in [\![1; 170]\!]^2$, the coefficient$M_{i,j}$ represents the number of victories of champion i over the champion j.
Consequently we can have the number of win $w_i \in \mathbb{N}$ and the number of loose $l_i \in \mathbb{N}$.

$$w_i = \frac{\sum_{k=1}^{170} M_{i,k}}{5}$$
$$l_i = \frac{\sum_{k=1}^{170} M_{k,i}}{5}$$

w_i will be the sum of the line i and l_i will be the sum of the column i . We will explain later why these sums are divided by 5.

1.2. Draft

What is a draft ? A draft is the selection of 5 champions against 5 others champions, all of which are distinct. Mathematically, we can define a draft as a 10-tuple, denoted by D :

$$D = (x_1, x_2, x_3, x_4, x_5, x_5, x_6, x_7, x_8, x_9, x_{10})$$
$$\forall (i, j) \in [\![1, 10]\!] \text{ we have : } \ x_i \neq x_j$$

The draft is divided into two teams: the “Red” team and the “Blue” team. We can define these teams as two $5-$tuple: R and B:

$$R = (x_1, x_2, x_3, x_4, x_5)$$
$$B = (x_5, x_6, x_7, x_8, x_9, x_{10})$$

And finnaly after a match one of the two team win and the other team loose and we need to update M.
After a match, one team wins and the other loses, and we update the matrix M accordingly. For each victorious champion, we add 1 to each column corresponding to the defeated champions of the opposing team. Since there are 5 champions on each team, this explains why we divide by 5 when calculating the number of wins and losses.

1.3. Probability

Now let’s create your model to calculate probability of win of the “Red” or “Blue” with the history of the last match.
First define define the “Strength of a champion” called S_i :

$$S_i = \sum_{k=1}^{5} \left(\left(\frac{w_{x_k}}{w_{x_k} + l_{x_k}} \right) \frac{1}{3} + \left(\frac{M_{i,k}}{M_{i,k} + M_{k,i}} \right) \frac{2}{3} \right)$$

Lets add details about S_i :

- i is the indice of the champion in draft.

- x_i is the indice of the chmapion in the oppenent team for $i \in [\![1, 5]\!]$.
- $\frac{1}{3}$ and $\frac{2}{3}$ are weights for the general win probability and for the direct matchup.

Now we can define the "Strength of team" for the "Red" and for the "Blue" : S_R and S_B

$$S_t = \sum_{k=1}^{5} S_k$$

with $t \in \{R, B\}$

Now lets use the logistic function to have the probabilty of winnig of one side :

$$\mathbb{P}_R = \frac{1}{1 + e^{-(S_R - S_B)}}$$

2. Historical of draft and command in Prolog

```
initialiser(Matrix).
```

2.1. KC - TL :

	Victory					Defeat				
Game 1 **TL Victory**	Ornn	Maokai	Tristana	Varus	Nautilus	Jayce	Vi	Aurora	Ezreal	Rell
Game 2 **KC Victory**	Camille	Sejuani	Azir	Miss Fortune	Leona	Ambessa	Skarner	Aurelion Sol	Ashe	Pantheon
Game 3 **TL Victory**	K'Sante	Nocturne	Taliyah	Lucian	Nami	Gnar	Xin Zhao	Ahri	Zeri	Yuumi

Add victory in matrix of the match :

```
add_victory('Ornn','Maokai','Tristana','Varus','Nautilus','Jayce','Vi','Aurora','Ezreal','Rell').
add_victory('Camille','Sejuani','Azir','Miss
Fortune','Leona','Ambessa','Skarner','Aurelion Sol','Ashe','Pantheon').
add_victory('K\'Sante','Nocturne','Taliyah','Lucian','Nami','Gnar','Xin
Zhao','Ahri','Zeri','Yuumi').
```

2.2. TES - HLE

2.2.1. Draft :

	Victory					Defeat				
Game 1 **HLE Victory**	Jax	Skarner	Azir	Ezreal	Alistar	Kennen	Vi	Aurora	Miss Fortune	Leona
Game 2 **HLE Victory**	Aatrox	Nidalee	Akali	Varus	Poppy	Gragas	Nocturne	Orianna	Kalista	Renata Glasc

2.2.2. Calcul of winning proba of the drafts

TES-HLE Game 1 :

```
load_matrix('matrix.txt',Matrix),win_proba_draft('Jax','Skarner','Azir','Ezreal','Alistar','Kennen'
Fortune','Leona',Matrix,P).
-> Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0,
0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...],
```

```
[...|...]|...],
-> P = 0.47834688488309984.
```

This model give probability of 0.47 at the first five champ entered in data.
In the final result the 5 first champ win this game We can say the model guess wrong the issue of the match.

TES - HLE Game 2 :

```
load_matrix('matrix.txt',Matrix),win_proba_draft('Gragas','Nocturne','Orianna','Kalista','Renata
Glasc','Aatrox','Nidalee','Akali','Varus','Poppy',Matrix,P).
-> Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0,
0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...],
[...|...]|...],
-> P = 0.5.
```

This model give probability of 0.5 at the first five champ entered in data.
In the final result the 5 first champ win this game.

2.2.3. Add Victory in Matrix

```
add_victory('Jax','Skarner','Azir','Ezreal','Alistar','Kennen','Vi','Aurora','Miss
Fortune','Leona').
add_victory('Aatrox','Nidalee','Akali','Varus','Poppy','Gragas','Nocturne','Orianna','Kalista','Ren
Glasc').
```

2.3. KC - CFO

2.3.1. Draft

	Victory					Defeat				
Game 1 **CFO Victory**	Rumble	Skarner	Viktor	Ezreal	Leona	Ambessa	Vi	Aurora	Kai'Sa	Rakan
Game 2 **CFO Victory**	Sion	Sejuani	Taliyah	Miss Fortune	Rell	Jayce	Brand	Yone	Varus	Nautilus

2.3.2. Calculus of the winning probability of the drafts

KC - CFO Game 1 :

```
load_matrix('matrix.txt',Matrix),win_proba_draft('Ambessa','Vi','Aurora','Kai\'Sa','Rakan','Rumble'
-> Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0,
0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...],
[...|...]|...],
-> P = 0.44192989412604 67.
```

This model give probability of 0.44 at the first five champ entered in data.
In the final result the 5 last champ win this game. We can say the model give a good reponse because he give a proba of 56% to win at the last five champ.

KC -CFO Game 2 :

```
load_matrix('matrix.txt',Matrix),win_proba_draft('Jayce','Brand','Yone','Varus','Nautilus','Sion','
Fortune','Rell',Matrix,P).
->Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0,
0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...],
[...|...]|...],
->P = 0.5133301737382324.
```

This time the model don't give a good prediction.

2.3.3. Add victory in matrix

```
add_victory('Rumble','Skarner','Viktor','Ezreal','Leona','Ambessa','Vi','Aurora','Kai\'Sa','Rakan').
add_victory('Sion','Sejuani','Taliyah','Miss
Fortune','Rell','Jayce','Brand','Yone','Varus','Nautilus').
```

2.4. TES - TL

2.4.1. Draft

	Victory					Defeat				
Game 1 **TES Victory**	Rumble	Vi	Aurora	Ashe	Braum	Galio	Xin Zhao	Tristana	Ezreal	Rakan
Game 2 **TES Victory**	Aatrox	Pantheon	Sylas	Varus	Neeko	K'Sante	Maokai	Hwei	Kalista	Nautilus

2.4.2. Calculus of the winning probability of the drafts

TES - TL Game 1 :

```
load_matrix('matrix.txt',Matrix),win_proba_draft('Rumble','Vi','Aurora','Ashe','Braum','Galio','Xin
Zhao','Tristana','Ezreal','Rakan',Matrix,P).
-> Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0,
0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...],
[...|...]|...],
-> P = 0.46892897678537176.\
```

The model don't give a good prediction here.

TES - TL Game 2 :

```
load_matrix('matrix.txt',Matrix),win_proba_draft('K\'Sante','Maokai','Hwei','Kalista','Nautilus','A
Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0,
0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...],
[...|...]|...],
P = 0.49222284950490025.
```

Here the model give a good prediction.

2.4.3. Add victory in matrix

```
add_victory('Rumble','Vi','Aurora','Ashe','Braum','Galio','Xin
Zhao','Tristana','Ezreal','Rakan').
add_victory('Aatrox','Pantheon','Sylas','Varus','Neeko','K\'Sante','Maokai','Hwei','Kalista','Nauti
```

2.5. HLE - CFO

load_matrix('matrix.txt',Matrix),win_proba_draft('Rumble','Vi','Yone','Ashe','Rakan','Karma','Wukong','Azir','Ezreal','Al
Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...],
[0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.4553966612109141.

add_victory('Rumble','Vi','Yone','Ashe','Rakan','Karma','Wukong','Azir','Ezreal','Alistar').

load_matrix('matrix.txt',Matrix),win_proba_draft('Vladimir','Nidalee','Zed','Miss
Fortune','Rell','Gragas','Kindred','Taliyah','Corki','Leona',Matrix,P). Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...],
[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...],
[...|...]|...], P = 0.51499550161941.

add_victory(‘Vladimir’,‘Nidalee’,‘Zed’,‘Miss Fortune’,‘Rell’,‘Gragas’,‘Kindred’,‘Taliyah’,‘Corki’,‘Leona’).

2.6. TES - KC

load_matrix(‘matrix.txt’,Matrix),win_proba_draft(‘Ambessa’,‘Viego’,‘Aurora’,‘Kalista’,‘Renata Glasc’,‘Jayce’,‘Skarner’,‘Taliyah’,‘Ashe’,‘Karma’,Matrix,P). Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.46588641397664204.

add_victory(‘Jayce’,‘Skarner’,‘Taliyah’,‘Ashe’,‘Karma’,‘Ambessa’,‘Viego’,‘Aurora’,‘Kalista’,‘Renata Glasc’).

load_matrix(‘matrix.txt’,Matrix),win_proba_draft(‘Gnar’,‘Karthus’,‘Corki’,‘Varus’,‘Rell’,‘Aatrox’,‘Ivern’,‘Yone’,‘Ezreal’,‘Le
Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.5036110483266414.

add_victory(‘Aatrox’,‘Ivern’,‘Yone’,‘Ezreal’,‘Leona’,‘Gnar’,‘Karthus’,‘Corki’,‘Varus’,‘Rell’).

2.7. CFO - TL

load_matrix(‘matrix.txt’,Matrix),win_proba_draft(‘K'Sante’,‘Xin Zhao’,‘Azir’,‘Ezreal’,‘Alistar’,‘Gwen’,‘Vi’,‘Taliyah’,‘Kai'Sa’,‘Rakan’,Matrix,P). Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.4830620392311757.

add_victory(‘K'Sante’,‘Xin Zhao’,‘Azir’,‘Ezreal’,‘Alistar’,‘Gwen’,‘Vi’,‘Taliyah’,‘Kai'Sa’,‘Rakan’).

load_matrix(‘matrix.txt’,Matrix),win_proba_draft(‘Jax’,‘Sejuani’,‘Corki’,‘Ziggs’,‘Poppy’,‘Gangplank’,‘Maokai’,‘Yone’,‘Tris
Matrix = [[0, 0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.5122197884189273.

add_victory(‘Gangplank’,‘Maokai’,‘Yone’,‘Tristana’,‘Leona’,‘Jax’,‘Sejuani’,‘Corki’,‘Ziggs’,‘Poppy’).

2.8. KC - HLE

load_matrix(‘matrix.txt’,Matrix),win_proba_draft(‘Rumble’,‘Xin Zhao’,‘Taliyah’,‘Ezreal’,‘Leona’,‘Aurora’,‘Vi’,‘Sylas’,‘Varus’,‘Poppy’,Matrix,P). Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.5647338377718968.

add_victory(‘Aurora’,‘Vi’,‘Sylas’,‘Varus’,‘Poppy’,‘Rumble’,‘Xin Zhao’,‘Taliyah’,‘Ezreal’,‘Leona’).

load_matrix(‘matrix.txt’,Matrix),win_proba_draft(‘Ambessa’,‘Ivern’,‘Azir’,‘Jhin’,‘Alistar’,‘Gnar’,‘Maokai’,‘Corki’,‘Ashe’,‘R
Glasc’,Matrix,P). Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.5271953567276605.

add_victory(‘Ambessa’,‘Ivern’,‘Azir’,‘Jhin’,‘Alistar’,‘Gnar’,‘Maokai’,‘Corki’,‘Ashe’,‘Renata Glasc’).

load_matrix(‘matrix.txt’,Matrix),win_proba_draft(‘Vladimir’,‘Wukong’,‘Jayce’,‘Kai'Sa’,‘Rell’,‘Sion’,‘Sejuani’,‘Ryze’,‘Drave
Matrix = [[0, 0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.4628463872345206.

add_victory(‘Vladimir’,‘Wukong’,‘Jayce’,‘Kai'Sa’,‘Rell’,‘Sion’,‘Sejuani’,‘Ryze’,‘Draven’,‘Rakan’).

2.9. CFO - TES

load_matrix(‘matrix.txt’,Matrix),win_proba_draft(‘Jayce’,‘Sejuani’,‘Taliyah’,‘Ezreal’,‘Alistar’,‘K'Sante’,‘Nidalee’,‘Yone’,‘Jh
Matrix = [[0, 0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.4652676676122881.

add_victory(‘Jayce’,‘Sejuani’,‘Taliyah’,‘Ezreal’,‘Alistar’,‘K'Sante’,‘Nidalee’,‘Yone’,‘Jhin’,‘Leona’).

load_matrix('matrix.txt',Matrix),win_proba_draft('Rumble','Xin Zhao','Sylas','Corki','Poppy','Sion','Skarner','Azir','Caitlyn','Nautilus',Matrix,P). Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.5049998333399998.

add_victory('Sion','Skarner','Azir','Caitlyn','Nautilus','Rumble','Xin Zhao','Sylas','Corki','Poppy').

2.10. HLE - TL

load_matrix('matrix.txt',Matrix),win_proba_draft('K'Sante','Pantheon','Ziggs','Kalista','Renata Glasc','Kayle','Vi','Ryze','Draven','Pyke',Matrix,P). Matrix = [[0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.5020833212770899.

add_victory('Kayle','Vi','Ryze','Draven','Pyke','K'Sante','Pantheon','Ziggs','Kalista','Renata Glasc').

load_matrix('matrix.txt',Matrix),win_proba_draft('Renekton','Maokai','Cassiopeia','Varus','Rakan','Quinn','Zyra','Trista
Matrix = [[0, 0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.48611468225399523.

add_victory('Renekton','Maokai','Cassiopeia','Varus','Rakan','Quinn','Zyra','Tristana','Jhin','Rell').

load_matrix('matrix.txt',Matrix),win_proba_draft('Ambessa','Skarner','Kassadin','Sivir','Braum','Jax','Ivern','Viktor','Ezr
Matrix = [[0, 0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0, 0|...], [0, 0, 0, 0, 0|...], [0, 0, 0, 0|...], [0, 0, 0|...], [0, 0|...], [0|...], [...|...]|...], P = 0.4775151752081999.

add_victory('Ambessa','Skarner','Kassadin','Sivir','Braum','Jax','Ivern','Viktor','Ezreal','Leona').

3. Semi Final 1 : KC - CFO

4. Semi Final 2 : HLE - TES

5. FINAL : HLE - KC

6. Result and conclusion