

Baseball-AI

Real-time Winning Rate Computing

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Abstract— Today baseball is becoming more and more popular and getting new fans. Those who just have put their first step into baseball - find it hard to follow the rules and to understand the changes in the situation. Unlike our baseball league KBO, MLB already has many meaningful methods for in-game analyzing with real time statistics. So we are going to adopt those ideas into KBO league. Winning Probability Added, which is also known as WPA, is one of good factors which allows easy understanding of the situation and the impacts that pitcher or batter makes each time. Our project aims to show Winning Rate and WPA factor in real-time, with the algorithm that fits KBO situation.

1. Introduction

Baseball, even though the myriad scandals, attracts more and more fans and is becoming more nationwide sports. There is a major problem that, though baseball fans are inflowing, its hard for beginners to understand the rules and catch situation of the match. Though baseball is much more a number-oriented sport than any others such as soccer or basketball, the classical stats do not fully reflect the match stream and evaluate the value of the players properly. However, in MLB, a lot of sabermetricians have already quantified vague situations and values in numerical way, and KBO tends to follow it. (i.e Babip, OPS, etc..). Korean baseball websites nowadays use the same WPA algorithm which had been used in earlier days of MLB, so the differences between two leagues are not considered. We wanted

to solve this problem by creating our own WPA algorithm based on KBO, which not only calculates the stats suitable for KBO, but also analyzes winning possibilities of each team and the impacts each players make. We also focus on helping beginners to understand baseball. We will make KBO winning rate DB and we are going to put that into our program. The program represents ongoing situation of the match and each teams winning possibilities simultaneously. Also, by showing quantified stats such as batters WPA or pitchers WAR, it shows how much powerful the player is (or has been) throughout the game, seasons or his entire career. Whether baseball match is underway or not, the program will show player rank categorized by players, teams, or positions according to users request. It is not just Baseball statistic calculator, but also somewhat like websites such as Statiz or KReport. The software indicates different types of statistical analysis, and shows them in visualized ways. We thought that current WPA algorithm used in Korean web sites does not fit Korean baseball situation. That is why we have started this project.

This project is composed of 4 steps.

- 1) Crawl the data of last 10 seasons of KBO from baseball statistics websites.
- 2) Compute the data to make some statistics.
- 3) Apply the statistics to WPA algorithm.
- 4) Real-time data capturing and showing the winning rate and WPA.

May 2, 2016

2. Requirements

2.1. Data Handling

2.1.1. Crawling.

- Get every single raw data of KBO from baseball webpage to construct the root database.
- Crawling source : <http://www.koreabaseball.com>

2.1.2. Capturing.

- Get real-time data when the match is underway.

2.1.3. Real-Time Mirroring.

- Program should immediately renew the database according to the result of the match.

2.1.4. Computing.

- Calculate the numerical data to make some meaningful statistics.
- Every single data has different weight. e.g.) Hits at 1st inning have different value from those at 9th.
- Calculate numerical values including WPA.

2.1.5. Data Storage.

- Save every single stats data.
- Divide players into two tables. One table is for players who is in active service, the other for retired.
- Table for players who is in active service needs to be updated constantly, and the other table doesn't.
- User who wants to conceal the program from screen can do that by clicking window minimization button.

2.2. Function

2.2.1. EXCEL Compatibility.

- User can export data of specific player or stats to MS Excel files.
- User can import fixed form of MS Excel file of specific game result to compute changes of KBO algorithm winning rate shown as image file which can also be exported as jpeg, gif, png, or bmp.
- User can import fixed form of MS Excel file of specific league(fantasy or amateur) data to compute WAR stats. This data can be exported as EXCEL file.

2.2.2. On-Board Posting(abandoned).

- Someone who wants to post any idea or thoughts can share what they have.
- Make another Q&A board so as to help beginners solve their curiosity.

2.2.3. Board Log-in & Sign-out(abandoned).

- Log-in to or Sign-out from Board.
- User who logged-in the board can upload their post or reply to other users

2.2.4. Stats Visualization.

- Show current state of game in a table.
- Show current winning average of each team
- Show current WPA stats of players
- Show player's photograph

2.3. User Interface

2.3.1. Window Minimization & Window Maximization.

- User who wants to see the program widely can do that by clicking window maximization button

2.3.2. Program Turn On & Turn Off.

- User can turn on the program by clicking desktop icon
- If user tries to power on the program even if that is already turned on, terminate existing program and launch the program again
- User can turn off the program by clicking x button at the top-right corner of the program

2.3.3. Mouse Click Event.

- Provide user with three options [To Home, Window Minimization, Termination] when user right-clicks any area within program.

2.3.4. Player Stat Pop-Up.

- When user clicks certain player, program shows his profile by generating a new pop-up
- If player is a pitcher, pop up list of the first string who has not been on the match yet
- If player is taking the field, pop up his profile as batter
- Pitcher pop-up profile stats list : ERA(Earned Run Average) for applicable season, WPA, WAR, WHIP for last 5 matches, (KBB 9), hyperlink connected to NAVER article about him
- Batter pop-up profile stats list : BA(Batting Average), WAR, WPA, OPS for last 5 matches, BABIP for applicable season, hyperlink connected to NAVER article about him
- The number of pop-up cannot be over two

2.3.5. Player Ranking.

- Sort players by team, position, date and game with WPA stats

2.3.6. Data Searching.

- Searching option constitutes of match schedule, player and stats and player
- If option match schedule is chosen, program shows match schedule as a calendar
- If user clicks one of date, there are three cases. First one is past match, so program shows match log.

Second one is on-going match, so program directs user to the match. And the last one is coming match, so program shows every details of the match including players, referees, park, appointed first thrower, weather forecast

- If option player and stat is chosen, program shows the applicable stats by entire players, team, position, monthly separately.
- If option player is chosen, program shows every single stat of applicable player

2.3.7. Get Information real-time.

- User can choose the way one gets some information(pop-up or push window)
- Pop-up is a kind of window, so when user have it on the screen, one cannot click main program
- Information could be as follows
- Agreed Decision : User can get information about agreed decision and its details
- Cancellation in case of rain : User can get information when the match is cancelled in case of rain by getting a pop-up or push window
- Player Substitution : In case of substituting player, User can get information why the player was substituted with other, and information about that other player
- When option is pop-up, user can have additional function which is Multi-View. By doing so, user can watch several matches simultaneously
- If there have multiple pop-ups, eliminate pop-up windows sequentially after checking them

2.3.8. Error.

- Error alert

3. Development Environment

3.1. Choice of Software Development Platform

3.1.1. Which platform and why? (e.g. , Windows, Linux, Web, or etc.).

- We adopted Windows, because there are some merit when we choose Windows. First of all, the percentage of all Windows user is almost 85%. Since we want to emphasize on majority, we chose Windows. Second, because of encoding compatibility. For more convenience, its much better to share encoding method in OS, web server, database.

3.1.2. Which programming language and why?.

- again.

3.1.3. Provide a cost estimation for your built. (including any purchase of software/hardware).

- human labor - 0
Our group constitute of four members who all do this group term project voluntarily. So human labor cost is zero.
- software cost - 0
Our group will make program with open source API, which costs zero for academic purpose.
- hardware cost - 0
Our group uses our existing laptop to simulate or implement our program. There is no need to buy other hardware.

3.1.4. Provide clear information of your development environment.

(e.g., version of software, OS version, your computer resources).

- OS
Windows 10 pro(10586.218 build)
- Language Set
Korean
- Computer Mode l
MSI GT60
- Processor
Intel(R) Core(TM) i7-3600QM CPU @ 2.4GHz
- Main Memory
8GB RAM
- Internet Connection
IPTIME WiFi

3.2. Software in use

3.2.1. Any existing software or algorithm in use? (doing a similar task as your proposal; provide a proper reference if there is any).

- There is no similar software computing WPA, after Tom Tango introduced concept of WPA. But, there is several websites or spreadsheet providing each statement winning rate. For MLB, there is a site called 'The Book'. It is made by Tom Tango who designed many good index including WPA. 'Statiz', 'KBReport' are sites providing many baseball stats for KBO.

Statiz

기본 기록																			
시즌	팀명	경기	타자	타수	안타	2루타	3루타	홈런	득점	타점	볼넷	과타	실점	피홈런	볼넷	과타	실점	타점	볼넷
2016	롯데	24	114	101	27	21	4	2	8	18	12	11	2	9	12	1	2	8	9
2015	롯데	85	368	312	89	42	24	4	3	52	37	42	0	1	24	2	13	7	9
2014	롯데	128	616	541	201	136	41	17	7	135	68	59	0	8	47	2	6	1	47
2013	롯데	86	372	318	84	69	13	2	0	33	18	33	0	11	29	4	12	3	28

세부 기록																			
시즌	팀명	타자	타수	타점	볼넷	실점	실점	실점	실점	실점	실점	실점	실점	실점	실점	실점	실점	실점	실점
2016	롯데	114	0.297	0.300	9.6	10.5	0.92	0.080	-	0.083	12.63	4.52	11.29	8.46	-0.07	0.315	-2.84	0.12	0.12
2015	롯데	368	0.238	0.314	11.4	6.5	1.75	0.131	104.00	0.810	54.12	6.06	53.81	5.99	0.92	0.261	4.53	1.89	1.89
2014	롯데	616	0.370	0.395	9.4	7.6	1.26	0.177	77.37	0.985	119.87	10.17	133.34	10.92	0.62	0.434	46.33	7.53	7.53
2013	롯데	372	0.266	0.289	8.9	7.8	1.14	0.054	-	0.072	42.14	4.48	37.76	7.52	1.80	0.320	-6.80	0.94	0.94

Figure 1. Statiz

KBReport

[illegible]

Figure 2. KBReport

TheBook

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
23	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
26	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
28	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
29	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
30	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
31	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
32	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
33	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
34	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
35	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
36	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0
37	Top	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 3. TheBook

3.3. Task distribution (If you want, you can provide this later at the next phase - design)

- Which member is responsible for what?

Roles	name	task description
User	Jun Jeon	test some modules
Customer	Seung Myun Park	return feedback
Software developer	Y oung Jae Byun	develop modules
Development manager	Ji Am Chung	organize architecture

4. Specification

4.1. Data Handling

4.1.1. Crawling.

- Get every single data from baseball webpage to construct the database.
- Data means game box score which contains every statement in actual game.
- Crawling source :
<http://www.koreabaseball.com/Schedule/Game/BoxScore.aspx?leagueId=n1&seriesId=n2&gameId=yyyyymmddt1t2x&year=yyyy>
 n1 of leagueID and n2 of seriesID are arbitrary integer number, yyyyymmddt1t2x of gameId is year, month, day, team1, team2, 1 digit ordinal number, yyyy of year is year
- Crawler tries to crawl web data every 30 second.

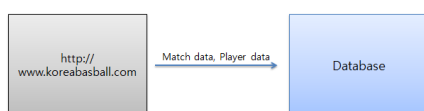


Figure 4. crawling

4.1.2. Capturing.

- Get real-time data when match is underway.



Figure 5. capturing

4.1.3. Real-Time Mirroring.

- Program should immediately renew the database according to the result of the match.

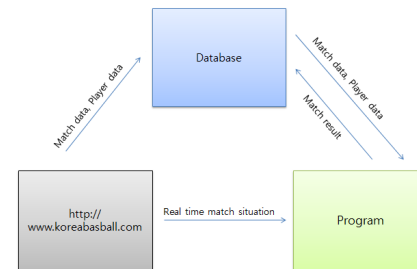


Figure 6. real-time mirroring

4.1.4. Computing.

- We can calculate Winning rate as follows.

$$Winrate = \frac{AllMatches \cap Statement \cap Win}{AllMatches \cap Statement} \quad (1)$$

4.1.5. Data Storage.

- Save every single stats data.
- Divide players into two tables. One table is for players who is in active service, the other for retired.
- Table for players who is in active service needs to be updated constantly, and the other table doesn't.

4.2. Functions

4.2.1. EXCEL Compatibilty.

- User can export data in the program that she/he wants.
- playerorstats.xls is an example of excel file dealing with datas of specific player or stats.
- gameres.jpeg is an example of image file that can be exported from a fixed form of MS Excel file of specific game result, which computes changes of KBO algorithm winning rate.

	A	B	C	D
1	시합일	2015.04.10		홈팀
2	구장	고양 대표팀 훈련 구장		어웨이팀
3				
4		1	2	
5		백션	0	0
6		NC	0	1
7				
8	백션 타자 기록			
9		1		
10		합계		
11		二	서건창	2명
12		좌	고종욱	4구
13		지	이택근	우안
14		우	대니얼	중비
15		三	김민성	삼진
16		一	채태인	
17		모	박동원	
18		유	김하성	
19		중	임병욱	
20		교	홍성갑	
21		교	유재식	
22	NC 타자 기록			
23		1		
24		합계		
25		좌	김준원	1명
26		중	이종욱	3비
27		우	나성범	삼진

Figure 7. excel input file

	A	B	C	D
1	ID	16-001-1		
2	Inning	Attacking Team	Out Count	Statement
3	1	Away	0	1
4	1	Away	1	1
5	1	Away	1	2
6	1	Away	2	3
7	1	Away	2	2
8	1	Home	0	1
9	1	Home	1	1
10	1	Home	2	1

Figure 8. excel output file

- leaguedata.xlsx is an example of fixed form of MS Excel file of specific league(fantasy or amateur) data to compute WAR stats.

4.2.2. On-Board Posting(X).

- Someone who wants to post any idea or thoughts can share their idea.
- Make another QA board so as to help beginners solve their curiosity.

4.2.3. Board Log-in & Sign-out(X).

- Log-in to or Sign-out from Board.
- User who logged-in the board can upload their post or reply to other post.

4.2.4. Stats Visualization.

- cur_state.myd is an example of mysql data file showing current state of game in a table form.
- By Generating a new pop-up, program can show user current winning average of each team.
- By Generating a new pop-up, program can show user current WPA stats of players.
- By Generating a new pop-up, program can show player's photograph.

4.3. User Interface

4.3.1. Window Minimization Window Maximization.

- Window default size : 960*540
- User who wants to conceal the program from the screen can do that by clicking window minimization button.
- User who wants to see the program widely can do that by clicking window maximization button.
- User can turn off the program by clicking x button at the top-right corner of the program.



Figure 9. Windows Minim.&Maxim.

4.3.2. Program Turn On & Turn Off.

- User can turn on the program by clicking desktop icon.

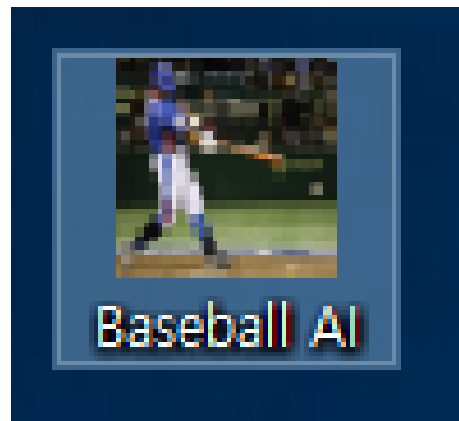


Figure 10. Program Turn On

- If user try to power on the program even if that is already turned on, terminate existing program and launch program again.
- User can turn off the program by clicking x button at the top-right corner of the program.

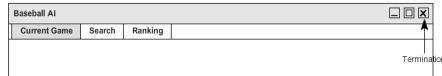


Figure 11. Program Turn Off

4.3.3. Mouse Click Event.

- Provide user with three options [To Home, Window Minimization, Termination] when user right-click any area within program.

4.3.4. Player Stat pop-up.

- When user clicks certain player, program shows his profile by generating a new pop-up.
- If player is a pitcher, pop up list of the first string who has not been on the match yet.
- If player is taking the field, pop up his profile as batter.
- Pitcher pop-up profile stats list : ERA(Earned Run Average) for applicable season, WPA, WAR, WHIP for last 5 matches, (K/BB 9), hyperlink connected to NAVER article about him.
- Batter pop-up profile stats list : BA(Batting Average), WAR, WPA, OPS for last 5 matches, BABIP for applicable season, hyperlink connected to NAVER article about him.
- The number of pop-up cannot be over two.

4.3.5. Current Game.

- Star mark indicates that pitcher(player 4) is on the mound and the batter is at bat.
- Squares on the field indicate each base. If runner is on the base, then it is colored with red.
- Circles at the bottom of the field indicate out count. Red is counted and blank is not.

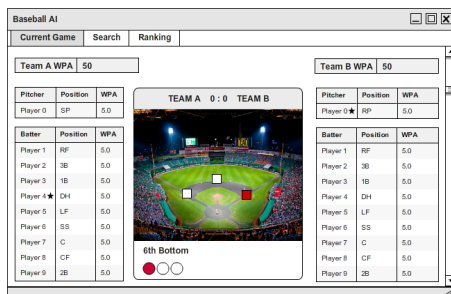


Figure 12. Current Game

4.3.6. Player Ranking.

- Sort players by team, position with WPA stats.

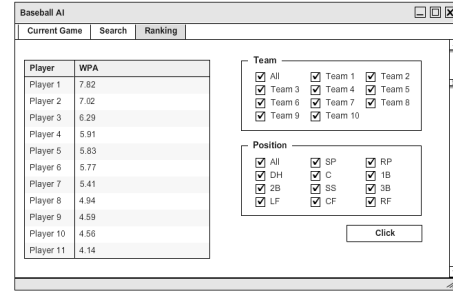


Figure 13. Player Ranking

4.3.7. Data Searching.

- Search option constitutes of Search Match/ Search Player

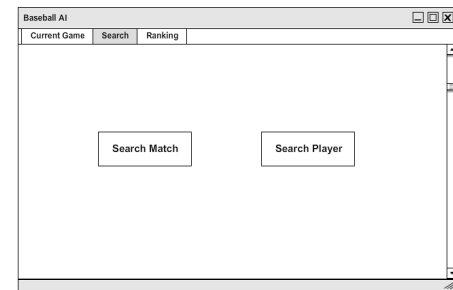


Figure 14. Search Option

- If option Search Match is chosen, program shows match schedule as a calendar.

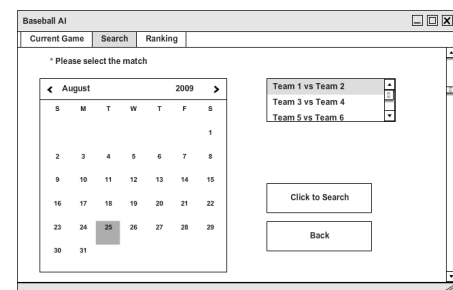


Figure 15. Search-match option

- The result is shown as follows.

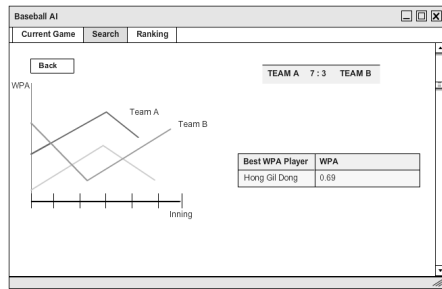


Figure 16. Search match result

- If option Search Player is chosen, input box will appear. It requires user to enter a players name.

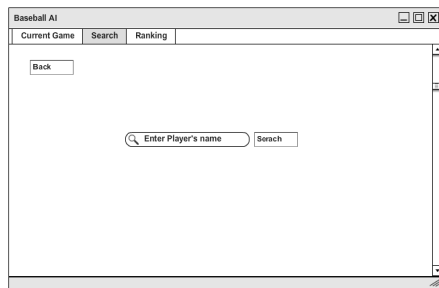


Figure 17. Search Player

- The result is shown as follows.

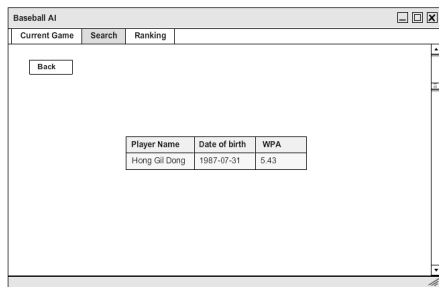


Figure 18. Search Player Result

4.3.8. Get Information Real-Time.

- User can choose the way one gets some information(pop-up or push window).
- Pop-up is a kind of window, so when user have it on the screen, one cannot click main program.
- Information could be as follows.
- Agreed Decision : User can get information about agreed decision and its details.
- Cancellation in case of rain : User can get information when the match is cancelled in case of rain by getting a pop-up or push window.

- Player Substitution : In case of substituting player, User can get information why the player was substituted with other, and information about that other player.
- When option is pop-up, user can have additional function which is multi-view. By doing so, user can watch several matches simultaneously.
- If there has multiple pop-ups, eliminate pop-up windows sequentially after checking them.
- Refresh in every 30 seconds.

4.3.9. Error.

- If program does not receive signal for 2 minutes, error message pops up with alert sound(windows alert sound).

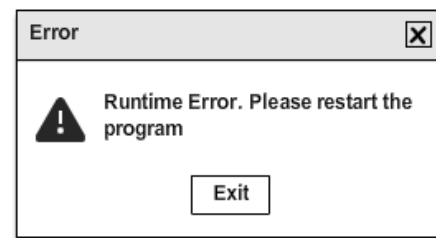


Figure 19. Error Notification

4.3.10. Database.

- We need four data tables, and each every table refers to each other.
- We also need one Season table.

	A	B	C	D
1	ID	16-001-1		
2	Inning	Attacking Team	Out Count	Statement
3	1	Away	0	1
4	1	Away	1	1
5	1	Away	1	2
6	1	Away	2	3
7	1	Away	2	2
8	1	Home	0	1
9	1	Home	1	1
10	1	Home	2	1

Figure 20. the first half match table

E	F	G	H	I
			Statement	
Score Gap	Win Rate		1	Bases Empty
0	50		2	Runner on First
0	52.2		3	Runner on Second
0	49.7		4	Runners on First and Second
0	51.5		5	Runner on Third
1-	42.5		6	Runners on First and Third
1-	44.5		7	Runners on Second and Third
1-	42.1		8	Bases Loaded
1-	40.4			

Figure 21. the second half match table

	A	B	C	D	E
1	15Season	Inning	Attacking Team	Out Count	Statement
2		1	Aw ay	0	1
3		1	Aw ay	0	2
4		1	Aw ay	0	3
5		1	Aw ay	0	4
6		1	Aw ay	0	5
7		1	Aw ay	0	6
8		1	Aw ay	0	7
9		1	Aw ay	0	8
10		1	Aw ay	1	1
11		1	Aw ay	1	2
12		1	Aw ay	1	3
13		1	Aw ay	1	

Figure 22. the first half season statement table

[illegible]

Figure 23. the second half season statement table

	A	B	C	D	E
1	PID	Name	Birth date		
2	11025	서건창	1989.08.22	16Season	1.01
3			1989.08.22	15Season	2.06
4		유희관	1986.06.01	14Season	1.05

Figure 24. player table

5. Architecture Design & Implementation(partial)

5.1. Overall architecture

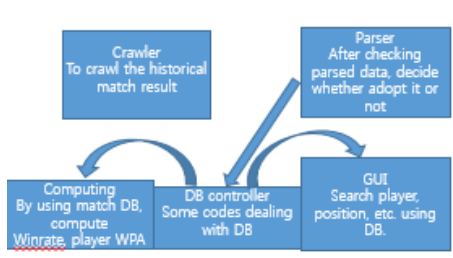


Figure 25. ModuleRelation

- Crawler
crawl the historical match result
Class1 : pastSpider
- Parser
After checking parsed data, decide whether adopt it or not.
Class1 : game_checker
Class2 : html_parse
- Computing
By using match DB, compute Winrate, player WPA.
Class1 : make_winrate
Class2 : make_player_wpa
Class3 : current_game
- DB controller
Some codes dealing with DB
class not decided yet.
- GUI Search player, position, etc. using DB.
Class1 : gui
Class2 : tabbed
Class3 : search_p
Class4 : resultplayerpanel
Class5 : search_m
Class6 : dbgen

5.2. Directory organization

Directory	File names	Module names in use	Etc.
./db/	match_log	computing	
./db/	player_wpa	GUI	
./db/	winrate	GUI	
./db/	current_match	GUI	
./	baseball_AI	main module	

5.3. module 1

Crawling :
Crawl raw box data to make past match log.
class1 pastSpider : crawl every single KBO website till when
DB is made initially.
And make match_log in db updateSpider : crawl KBO
website only for needs to be updated.
(if last db was ver. 20160528, and today is 20160531, update
for 29,30 for automatically)

5.4. module 2

Parsing :

Parse the crawled data to make some useful information.

class1 game_checker : parse crawled data to check it is valid website or not.

class2 html_parse : after game_checker adopt specific website, leaving only meaningful values to make DB

”match_log”

5.5. module 3

Computing :

Compute winrate and WPA from match log, by changing box data to statement data.

class1 make_winrate : read box data in ”match_log” and get statement data and save into ”winrate”

class2 make_player_wpa : read ”match_log” and compute the plus and minus value of winrate and save wpa values into ”player_wpa”

class3 current_game : using box data crawled by current_spider make statement data to save into ”current_game”

5.6. module 4

DB manipulator :

not decided yet clearly.

5.7. module 5

GUI :

class1 gui : Root frame that all of the contents are integrated.in

class2 Tabbed : basic format of panel which is used to declare each tab.in frame.

class3 search_p : action which occurs when Search Player button is clicked.

class4 resultplayerpanel : panel which pops up to show the result of ’Search Player’

class5 search_m : action which occurs when Search Match button is clicked.

class6 dbgen : generate or update database when such button is clicked.

6. Use Cases

6.1. Current Match

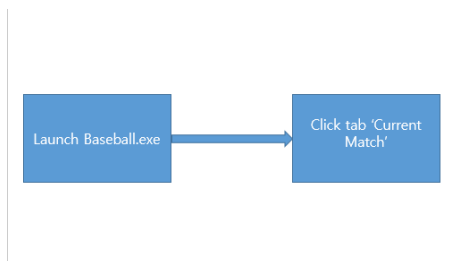


Figure 26. Current Match-flow chart



Figure 27. Current Match tab

- Show each teams team name and players -pitchers and batters- at each side of the tab. Leftside is for home team and rightside is for away team. It also shows players individual WPAs.
- On the center of the tab, brief state of the match is displayed. If runner is on the base, the base is colored with red.
- Still developing : Showing each teams score and win rate. Choose match among matches underway.

6.2. Player Search

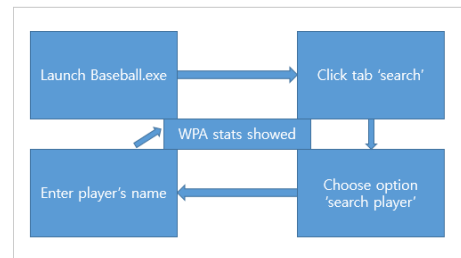


Figure 28. Player Search-flow chart

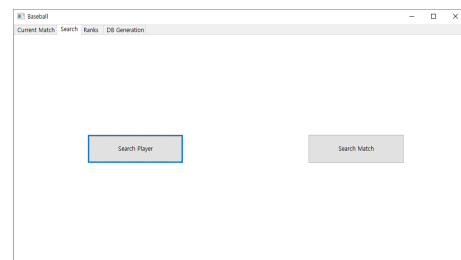


Figure 29. Search tab

- User can choose between Search Player and Search Match.

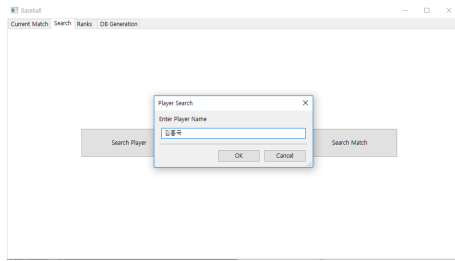


Figure 30. Player Search

- User can enter players name.

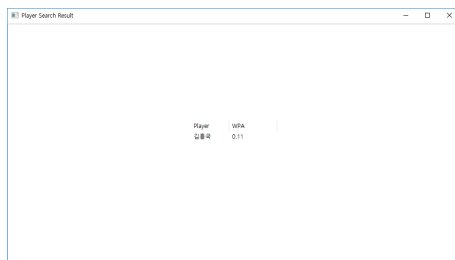


Figure 31. Player Search result

- Show the WPA and players name which user entered.

6.3. Match Search

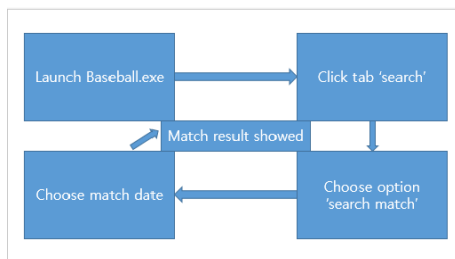


Figure 32. Match Search-flow chart

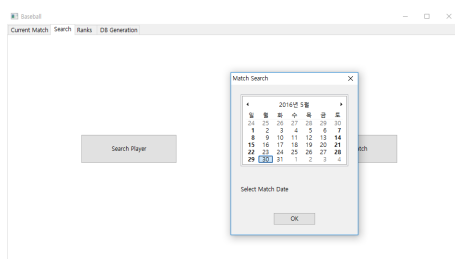


Figure 33. match search

- User can choose the date.
- Still developing:
Choose match among matches of the selected Date.
If user chooses match, show winrate of each team

by innings in line graph.
Show highest WPA player of chosen match.

6.4. DB generation

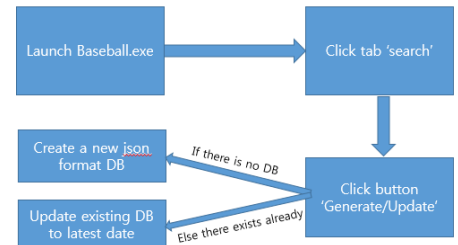


Figure 34. DB generation-flow chart

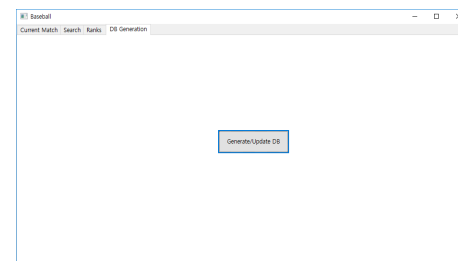


Figure 35. DB Generation/update

- User clicks Generate/Update DB button,
case 1 : If there is no DB named 'match_log', create a new json format DB.
case 2 : else there exists the file already, update it to latest date.