# pycobb

*Release 0.0.4*

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# CONTENTS


PyCobb is meant to be an easy way to access pitch data from Baseball Savant using purely Python.

CHAPTER

# ONE

# DIVE IN

## 1.1 Installation

Using PIP:

```
pip install pycobb
```

From Source:

```
git clone https://github.com/ryan-byrne/pycobb
cd pycobb
python setup.py install
```

## 1.2 Quickstart

Let's start by printing every pitch Clayton Kershaw threw in 2020.

This can be done in a python script:

```
import pycobb
pitches = pycobb.get(pitchers=['Clayton Kershaw'], years=[2020])
print(pitches)
```

Or directly from the command line:

```
pycobb -p "Clayton Kershaw" -y 2020 --print
```

## 1.3 Documentation

### 1.3.1 Python Package

pycobb.**get**(*player_type='pitcher'*, *min_results=0*, *group_by='name'*, *columns=None*, *sort_col='pitches'*, *player_event_sort='pitch_number_thisgame'*, *sort_order='desc'*, *min_pas=0*, *type='details'*, ***kwargs*)

Get Pandas DataFrame of pitch data given the specified search parameters.

**Parameters**

- **pitchers** – List of MLB IDs (int) or *Player Names* (str)

- **batters** – List of MLB IDs (int) or *Player Names* (str)
- **pitch_types** – List of 'Pitch Types'_ (str)
- **years** – List of years (int) to be searched
- **columns** – List of specified *Columns* to return in Pandas DataFrame
- **date_range** – List of two dates to be searched between (i.e. `["2020-08-01", "2020-09-01"]`)
- **pa_result** – List of *PA Results*
- **game_type** – List of *Game Types*
- **pitch_result** – List of *Pitch Results*
- **gameday_zone** – List of *Gameday Zones* (int between 1-14)
- **stadium** – List of Stadium Codes (str), found from *Teams*
- **batted_ball_location** – List of Batted Ball Locations (int from 1-9)
- **attack_zone** – List of *Attack Zones* (int)
- **batted_ball_direction** – List of Batted Ball Directions (str, options:Pull, Straightaway, Opposite)
- **count** – List of *Counts* (str)
- **situation** – List of *Situations* (str)
- **player_type** – List of Player Type (str) (i.e. Pitcher, Batter, or fielder_6 (for SS))
- **outs** – (int) 0, 1, or 2 (obviously)
- **opponent** – *Teams* Abbreviation for the opposing team of the Pitcher `American+League` or `National+League`
- **pitcher_throws** – `'R'` or `'L'` (str)
- **batter_stands** – `'R'` or `'L'` (str)
- **quality_of_contact** – (int) from 1-6 indicating *Quality of Contact*
- **if_alignment** – List of Codes (int) from 1-3 indicating *IF Alignment*
- **team** – *Teams* Abbreviation for the team of the Pitcher. Can also be `American+League` or `National+League`
- **position** – Position (str) (i.e. IF, OF, SP, RP, or Fielder Number)
- **of_alignment** – List of Codes (int) from 1-4 indicating *OF Alignment*
- **runners_on** – Code (int) from 1-9 indicating *Runners On*
- **home_or_away** – `'Home'` or `'Away'` of Pitcher's team
- **flags** – *Special Flags* (str) for the pitch
- **batted_ball_type** – List of Batted Ball Types (options: fly ball, popup, line drive, ground ball)
- **inning** – Integer… duh

Python Usage:

```
>>> import pycobb
>>> pycobb.get(pitchers=["Clayton+Kershaw"], years=["2020"], pitch_types=['CH'])
  pitch_type   game_date  release_speed  release_pos_x  ...  of_fielding_alignment␣
↪spin_axis  delta_home_win_exp  delta_run_exp
0          CH  2020-10-15           87.4           1.44  ...               Standard ␣
↪     219                 0.0          0.051

1          CH  2020-10-15           86.7           1.42  ...               Standard ␣
↪     218                 0.0         -0.050
2          CH  2020-08-08           87.8           1.79  ...               Standard ␣
↪     143                 0.0          0.020
3          CH  2020-08-08           86.0           1.66  ...               Standard ␣
↪     142                 0.0          0.020

[4 rows x 92 columns]
```

CLI Usage:

```
> pycobb get -p Clayton+Kershaw -y 2020 -t CH
```

pycobb.**get_player_ids**(*player_info*)

Returns a list of MLB IDs given specified player information.

**Parameters** **player_info** – List or dictionary

Usage:

```
>>> import pycobb
>>> search = {"name_first":"Ty","name_last":"Cobb"}
>>> pycobb.get_player_ids(search)
112431
```

pycobb.**update**(*save=True*)

Update local players.csv file using data from the Chadwick Baseball Bureau

**Parameters** **save** – (optional) Chose to save the update locally

Usage:

```
>>> import pycobb
>>> pycobb.update()
```

### 1.3.2 Command Line Interface

Get Pitch Data from Baseball Savant directly from the command line

Usage:

```
> pycobb -h
```

Positional Arguments:

```
{run,update,test}     Command to be Run
```

Optional Arguments:

```
-h, --help            show this help message and exit
-s SAVE, --save SAVE  save data to a specified file path
-d DATE_RANGE DATE_RANGE
                      range of dates to be searched i.e. 2021-05-03 2021-05-08
-p PITCHERS [PITCHERS ...]
                      list of pitchers to search (MLB ID or name). ex: -p 124692 506433␣
↪or -p Cy+Young Yu+Darvish

-b BATTERS [BATTERS ...]
                    list of batters to search (MLB ID or name): ex: -b 112431 116539 or -
↪b Ty+Cobb Derek+Jeter
-t PITCH_TYPES [PITCH_TYPES ...]
                      list of pitch types. e.g. -t FT CU
-y YEARS [YEARS ...]  values or range of years
-c COLUMNS [COLUMNS ...]

                      Columns to return
--team TEAM           Team code of pitcher
--opp OPPONENT        Team code of pitcher opponent
--print               Print the dataframe when complete
--plot xaxis yaxis    Plot the values of two columns
```

### 1.3.3 Columns

| Column | Description | Type |
|---|---|---|
| pitch_type | The type of pitch derived from Statcast. | str |
| game_date | Date of the Game. | str |
| release_speed | Pitch velocities from 2008-16 are via Pitch F/X and adjusted to roughly out-of-hand release point. | float |
| release_pos_x | Horizontal Release Position of the ball measured in feet from the catcher's perspective. | float |
| release_pos_z | Vertical Release Position of the ball measured in feet from the catcher's perspective. | float |

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Table 1 – continued from previous page

| Column | Description | Type |
|---|---|---|
| player_name | Player's name tied to the event of the search. | str |
| batter | MLB Player Id tied to the play event. | float |
| pitcher | MLB Player Id tied to the play event. | float |
| events | Event of the resulting Plate Appearance. | str |
| description | Description of the resulting pitch. | str |
| spin_dir | • Deprecated field from the old tracking system. | float |
| spin_rate_deprecated | • Deprecated field from the old tracking system. Replaced by release_spin | float |
| break_angle_deprecated | • Deprecated field from the old tracking system. | float |
| break_length_deprecated | • Deprecated field from the old tracking system. | float |
| zone | Zone location of the ball when it crosses the plate from the catcher's perspective. | Int64 |
| des | Plate appearance description from game day. | str |
| game_type | Type of Game. E = Exhibition | str |
| stand | Side of the plate batter is standing. | str |
| p_throws | Hand pitcher throws with. | str |
| home_team | Abbreviation of home team. | str |
| away_team | Abbreviation of away team. | str |
| type | Short hand of pitch result. | str |
| hit_location | Position of first fielder to touch the ball. | Int64 |
| bb_type | Batted ball type | str |
| balls | Pre-pitch number of balls in count. | Int64 |
| strikes | Pre-pitch number of strikes in count. | Int64 |
| game_year | Year game took place. | Int64 |
| pfx_x | Horizontal movement in feet from the catcher's perspective. | float |
| pfx_z | Vertical movement in feet from the catcher's perpsective. | float |
| plate_x | Horizontal position of the ball when it crosses home plate from the catcher's perspective. | float |

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Table 1 – continued from previous page

| Column | Description | Type |
|---|---|---|
| plate_z | Vertical position of the ball when it crosses home plate from the catcher's perspective. | float |
| on_3b | Pre-pitch MLB Player Id of Runner on 3B. | Int64 |
| on_2b | Pre-pitch MLB Player Id of Runner on 2B. | Int64 |
| on_1b | Pre-pitch MLB Player Id of Runner on 1B. | Int64 |
| outs_when_up | Pre-pitch number of outs. | Int64 |
| inning | Pre-pitch inning number. | Int64 |
| inning_topbot | Pre-pitch top or bottom of inning. | str |
| hc_x | Hit coordinate X of batted ball. | float |
| hc_y | Hit coordinate Y of batted ball. | float |
| tfs_deprecated | • Deprecated field from old tracking system. | float |
| tfs_zulu_deprecated | • Deprecated field from old tracking system. | float |
| fielder_2 | MLB Player Id for catcher. | Int64 |
| vx0 | The velocity of the pitch in feet per second in x-dimension determined at y=50 feet. | float |
| vy0 | The velocity of the pitch in feet per second in y-dimension determined at y=50 feet. | float |
| vz0 | The velocity of the pitch in feet per second in z-dimension determined at y=50 feet. | float |
| ax | The acceleration of the pitch in feet per second per second in x-dimension determined at y=50 feet. | float |
| ay | The acceleration of the pitch in feet per second per second in y-dimension determined at y=50 feet. | float |
| az | The acceleration of the pitch in feet per second per second in z-dimension determined at y=50 feet | float |
| sz_top | Top of the batter's strike zone set by the operator when the ball is halfway to the plate. | float |
| sz_bot | Bottom of the batter's strike zone set by the operator when the ball is halfway to the plate. | float |
| hit_distance | Projected hit distance of the batted ball. | float |

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Table 1 – continued from previous page

| Column | Description | Type |
|---|---|---|
| hit_distance_sc | Projected hit distance of the batted ball. | float |
| launch_speed | Exit velocity of the batted ball as tracked by Statcast. | float |
| launch_angle | Launch angle of the batted ball as tracked by Statcast. | float |
| effective_speed | Derived speed based on the the extension of the pitcher's release. | float |
| release_spin | Spin rate of pitch tracked by Statcast. | float |
| release_spin_rate | Spin rate of pitch tracked by Statcast. | float |
| release_extension | Release extension of pitch in feet as tracked by Statcast. | float |
| game_pk | Unique Id for Game. | Int64 |
| fielder_3 | MLB Player Id for 1B. | Int64 |
| fielder_4 | MLB Player Id for 2B. | Int64 |
| fielder_5 | MLB Player Id for 3B. | Int64 |
| fielder_6 | MLB Player Id for SS. | Int64 |
| fielder_7 | MLB Player Id for LF. | Int64 |
| fielder_8 | MLB Player Id for CF. | Int64 |
| fielder_9 | MLB Player Id for RF. | Int64 |
| release_pos_y | Release position of pitch measured in feet from the catcher's perspective. | float |
| estimated_ba_using_speedangle | Estimated Batting Avg based on launch angle and exit velocity. | float |
| estimated_woba_using_speedangle | Estimated wOBA based on launch angle and exit velocity. | float |
| woba_value | wOBA value based on result of play. | float |
| woba_denom | wOBA denominator based on result of play. | float |
| babip_value | BABIP value based on result of play. | float |
| iso_value | ISO value based on result of play. | float |
| launch_speed_angle | Launch speed/angle zone based on launch angle and exit velocity. | float |
| at_bat_number | Plate appearance number of the game. | Int64 |
| pitch_number | Total pitch number of the plate appearance. | Int64 |
| pitch_name | The name of the pitch derived from the Statcast Data. | str |
| home_score | Pre-pitch home score | Int64 |
| away_score | Pre-pitch away score | Int64 |
| bat_score | Pre-pitch bat team score | Int64 |
| fld_score | Pre-pitch field team score | Int64 |
| post_home_score | Post-pitch home score | Int64 |
| post_away_score | Post-pitch away score | Int64 |
| post_bat_score | Post-pitch bat team score | Int64 |
| post_fld_score | Post-pitch fielding team score | Int64 |
| if_fielding_alignment | Infield fielding alignment at the time of the pitch. | str |

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Table 1 – continued from previous page

| Column | Description | Type |
|---|---|---|
| of_fielding_alignment | Outfield fielding alignment at the time of the pitch. | str |
| spin_axis | The Spin Axis in the 2D X-Z plane in degrees from 0 to 360 | Int64 |
| delta_home_win_exp | The change in Win Expectancy before the Plate Appearance and after the Plate Appearance | float |
| delta_run_exp | The change in Run Expectancy before the Pitch and after the Pitch | float |

### 1.3.4 Glossary

#### Player Names

Players can be specified using their MLB ID (i.e. `477132`) or their full name as a string, separated by either a '+' or a space (i.e. `"Clayton Kershaw"` or "Clayton+Kershaw")

#### Pitch Types

| Pitch Code | Pitch Name |
|---|---|
| FF | 4-Seam Fastball |
| FT | 2-Seam Fastball |
| FC | Cutter |
| SI | Sinker |
| FS | Splitter |
| SL | Slider |
| CH | Changeup |
| CU | Curveball |
| KC | Knuckle Curve |
| CS | Slow Curve |
| KN | Knuckleball |
| FO | Forkball |
| EP | Eephus |
| SC | Screwball |
| IN | Intentional Ball |
| PO | Pitch Out |
| AB | Automatic Ball |
| UN | Unkown |

### PA Results

| Options |
|---|
| single |
| double |
| triple |
| home_run |
| field_out |
| strikeout |
| strikeout_double_play |
| walk |
| double_play |
| field_error |
| grounded_into_double_play |
| fielders_choice |
| fielders_choice_out |
| batter_interference |
| catcher_interf |
| caught_stealing_2b |
| caught_stealing_3b |
| caught_stealing_home |
| force_out |
| hit_by_pitch |
| intent_walk |
| sac_bunt |
| sac_bunt_double_play |
| sac_fly |
| sac_fly_double_play |
| triple_play |

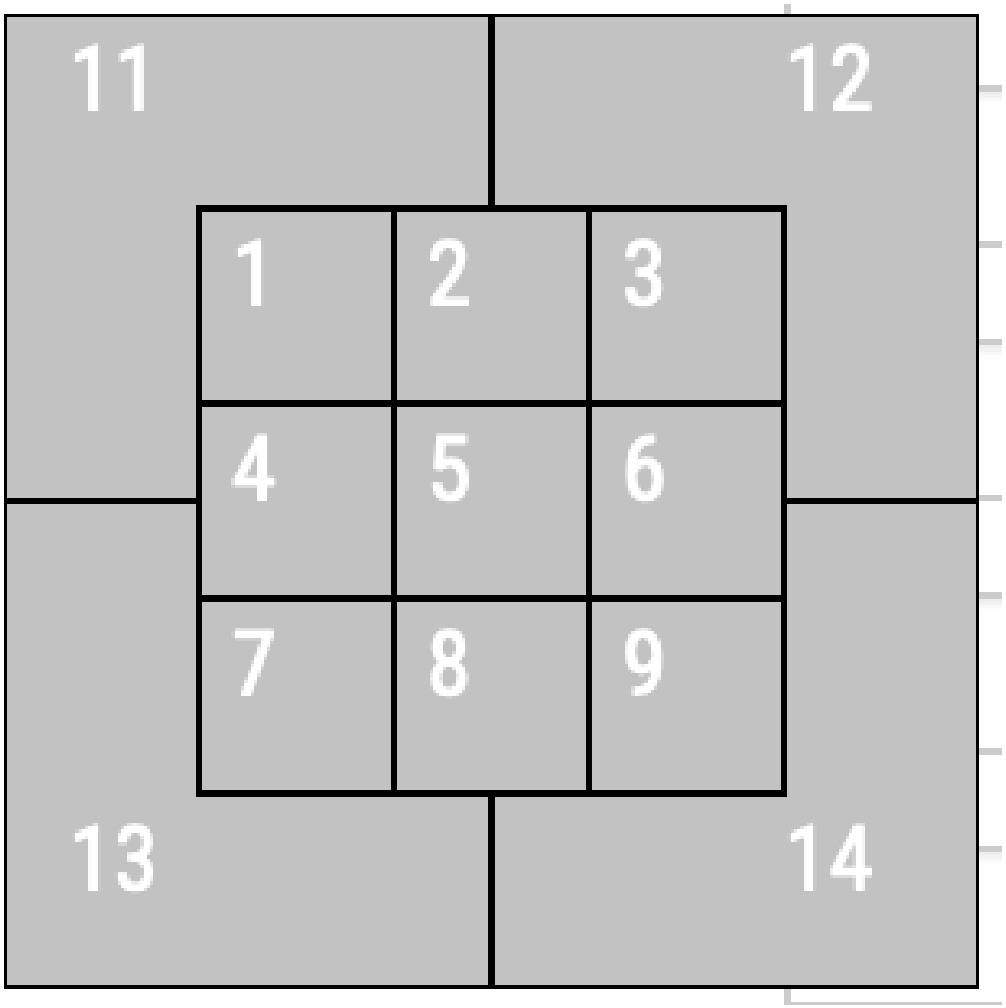
### Game Types

| Code | Name |
|---|---|
| R | Regular Season |
| PO | Playoffs |
| F | Wildcard |
| D | Division Series |
| L | League Championship |
| W | World Series |
| S | Spring Training |

### Pitch Results

| Options |
| --- |
| automatic ball |
| ball |
| blocked ball |
| called strike |
| foul |
| foul bunt |
| foul pitchout |
| pitchout |
| hit by pitch |
| intent ball |
| hit into play no out |
| hit into play score |
| pitchout hit into play score |
| missed bunt |
| foul tip |
| swinging strike |
| swinging strike blocked |

### Gameday Zones




### Teams

| Team Name | Abbreviation | Stadium Name | Stadium Code |
|---|---|---|---|
| Arizona Diamondbacks | ARI | Chase Field | 15 |
| Atlanta Braves | ATL | Truist Park | 4705 |
| | ATL-2016 | Turner Field | 16 |
| Baltimore Orioles | BAL | Oriole Park | 2 |
| Boston Red Sox | BOS | Fenway Park | 3 |
| Chicago Cubs | CHC | Wrigley Field | 17 |
| Cincinatti Reds | CIN | GABP | 2602 |
| Cleveland Indians | CLE | Progressive Field | 5 |
| Colorado Rockies | COL | Coors Field | 19 |
| Chicago White Sox | CWS | Guaranteed Rate Fld | 4 |
| Detroit Tigers | DET | Comerica Park | 2394 |
| Florida Marlins | FLA-2011 | Hard Rock Stadium | 20 |
| Houston Astros | HOU | Minute Maid Park | 2392 |

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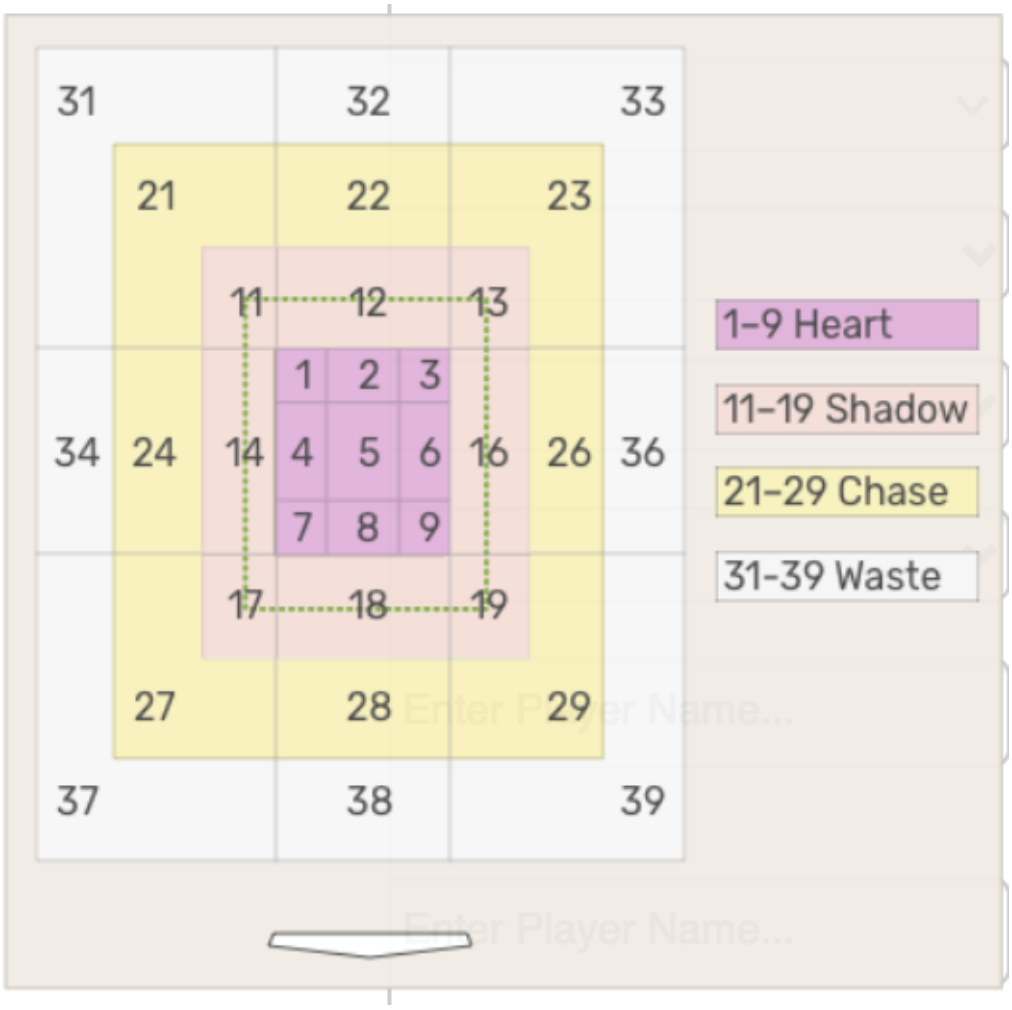
Table 2 – continued from previous page

| Team Name | Abbreviation | Stadium Name | Stadium Code |
|---|---|---|---|
| Kansas City Royals | KC | Kauffman Stadium | 7 |
| Los Angeles Dodgers | LAD | Dodger Stadium | 22 |
| Los Angeles Angels | LAA | Angel Stadium | 1 |
| Miami Marlins | MIA | Marlins Park | 4169 |
| Mikwaukee Brewers | MIL | Miller Park | 32 |
| Minnesota Twins | MIN | Target Field | 3312 |
| | MIN-2009 | Metrodome | 8 |
| New York Mets | NYM | Citi Field | 3289 |
| | NYM-2008 | Shea Stadium | 25 |
| New York Yankees | NYY | Yankee Stadium | 3313 |
| | NYY-2008 | Yankee Stadium | 9 |
| Oakland Athletics | OAK | Oakland Coliseum | 10 |
| Philadelphia Phillies | PHI | Citizens Bank Park | 2681 |
| Pittsburgh Pirates | PIT | PNC Park | 31 |
| Sand Diego Padres | SD | Petco Park | 2680 |
| Seattle Mariners | SEA | T-Mobile Park | 680 |
| San Franscisco Giants | SF | Oracle Park | 2395 |
| St. Louis Cardinals | STL | Busch Stadium | 2889 |
| Tampa Bay Rays | TB | Tropicana Field | 12 |
| Texas Rangers | TEX | Globe Life Field | 5325 |
| | TEX-2019 | Globe Life Park | 13 |
| Toronto Blue Jays | TOR | Rogers Centre | 14 |
| Washington Nationals | WSH | Nationals Park | 3309 |

### Attack Zones



### Counts

| Options |
|---|
| 00 |
| 01 |
| 02 |
| 10 |
| 11 |
| 12 |
| 20 |
| 21 |
| 22 |
| 30 |
| 31 |
| 32 |
| ahead |
| even |
| behind |
| 2strikes |
| 3balls |

### Situations

| Options |
|---|
| Go Ahead run at plate |
| Go Ahead run on base |
| Tying run at plate |
| Tying run on base |
| Tying run on deck |

### Quality of Contact

| Code | Description |
|---|---|
| 6 | Barrel |
| 5 | Solid Contact |
| 4 | Flare/Burner |
| 3 | Poorly/Under |
| 2 | Poorly/Topped |
| 1 | Poorly/Weak |

### IF Alignment

| Code | Description |
|---|---|
| 1 | Standard |
| 2 | Strategic |
| 3 | Shift |

### OF Alignment

| Code | Description |
|---|---|
| 1 | Standard |
| 2 | Strategic |
| 3 | 3 OF to one side of 2B |
| 4 | 4th Outfielder |

### Runners On

| Code | Description |
|---|---|
| 1 | No Runners |
| 2 | RISP |
| 3 | Runner On Base |
| 4 | Runner On 1st |
| 5 | Runner On 2nd |
| 6 | Runner On 3rd |
| 7 | Runner Not On 1st |
| 8 | Runner Not On 2nd |
| 9 | Runner Not On 3rd |

### Special Flags

| Options |
|---|
| touch1 is putout |
| touch1 is assist |
| touch1 is deflection |
| touch1 is error |
| is hit into play basehit |
| is hit into play hardhit |
| is bunt |
| is last pitch |
| is launch angle sweetspot |
| is nonpitcher pitcher |
| is remove bunts |
| is starter batter |
| is non starter batter |

CHAPTER

TWO

# INDICES AND TABLES

- genindex
- modindex
- search

# PYTHON MODULE INDEX

p

# INDEX