



Softball Pitcher Efficiency

Scott Steinberg and Gautam Goel



Client Goals

Coaches Monica Harrison and Lindsay Mapes call pitches during each game

- Our goal is to use pitch-by-pitch data from past seasons (2019/2020) to provide insight into pitcher performance during specific scenarios
- Doing so will allow for quicker in-game decisions, improving effectiveness and efficiency of pitching

Background

- Main Pitch Types
- Each column displays variations that are used by our pitchers
- Pitch Out - an outside pitch to prevent a possible steal attempt
- Shake Off - the pitcher ignored the coach's call and threw something else

Pitch Type	Inside	Outside	Low	High	Curve
Change	Change Inside	Change Outside			
Curve		Curve Outside			
Drop	Drop Inside	Drop Outside			Drop Curve
Fastball	Fastball Inside	Fastball Outside	Fastball Low	Fastball High	
Rise	Rise Inside	Rise Outside			
Screw		Screw Outside			
Pitch Out					
Shake Off					



Data Collection



Pitching Evaluation Charts

- Summary of pitch distribution for a pitcher during a game
- Created by pitchers postgame from pitching charts

Pitching Evaluation

Pitcher Name: _____ Date: 4/20 Opponent: Brandeis game 3

Game Management:

Number of Batters Faced: 10 At Bats: 33

Number of Pitches: 95

How Many Strikes: 55 How Many Balls: 40

First Pitch Strikes: 19 First Pitch Balls: 14

How Many 0-2 Hits: 0 How Many 1-2 Hits: 1

Strike Outs: 3 Walks: 3 Hits: 8 HBP: 1

Curve Ball – Total: 24 For a Strike: 13 For a Ball: 11 Strike %: 54

Screw Ball – Total: 14 For a Strike: 8 For a Ball: 6 Strike %: 57

Drop Curve – Total: 16 For a Strike: 11 For a Ball: 5 Strike %: 69

Drop Inside – Total: 25 For a Strike: 18 For a Ball: 7 Strike %: 72

Drop Outside – Total: — For a Strike: — For a Ball: — Strike %: —

Change Up – Total: 13 For a Strike: 3 For a Ball: 10 Strike %: 24

Rise Ball – Total: — For a Strike: — For a Ball: — Strike %: —

FastBall – Total: 3 For a Strike: 2 For a Ball: 1 Strike %: 66.6

Inning	1	2	3	4	5	6	7	8	9	Totals
Lead off Out	x	x	✓	✓	x	✓	x			
1, 2, 3 Inning	✓	x	✓	x	x	x	x			

Mental Toughness:

Retire Next Batter Following a Hit: 6 / 8

Retire Next Batter Following a BB: 2 / 3

Retire Next Batter Following a Error: 1 / 1

Leadoff BB Scored: 1 / 2 4 Pitch BB: 1

Retire First Batter in Relief: Y / N

- Created in real-time during each game
- Track each pitch thrown to each batter and subsequent outcomes of each at-bat

- Created in real-time during each game
- Track each pitch thrown to each batter and subsequent outcomes of each at-bat

[illegible]

Pitching Charts (2020)

- Same purpose as 2019 charts
- Tracked slightly differently

Carnegie Mellon University Softball

Date: 3-11-20 Opponent: P. State B

Pitcher: _____

☐ Line Drive
☐ Ground Ball
☐ Fly Ball

Total Pitches: _____
 Total Strikes: _____
 First Pitch Strikes: _____
 Batters Faced: _____

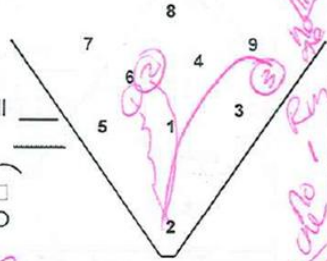
Key: F → Fastball C → Curveball R → Riseball
 S → Screwball D → Dropball Ch → Change
 Shade → Dead Red

#	RA	BB	FO-6	IB-6	3
9	S	C	S	S	S
4	HBP	GB-3	LD-3	FO-6	
8	FL 5/6	IB	FO-9	IB-7	
12	FL 5/6	IB	FO-9	IB-7	
7	FL 5/6	IB	FO-9	IB-7	
21	FL 5/6	IB	FO-9	IB-7	
11	FL 5/6	IB	FO-9	IB-7	
19	FL 5/6	IB	FO-9	IB-7	
3	FL 5/6	IB	FO-9	IB-7	

Data Entry

Opponent vs Brande

Notes: 12

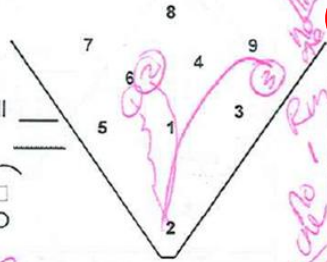


S ^c									
	S	(10)	6	3	(1)				
C									
	(5)	sals	Ld	Hyl	(1)				
(C)	F9	(2)							
(C)	H8								

Pitch #	Batter	Pitcher	Bats	Inning	Runs	Outs	Balls	Strikes	1st	2nd	3rd	Pitch	Result
1	Name	Name	R	1	0	0	0	0	0	0	0	Screw	Ball
2	Name	Name	R	1	0	0	1	0	0	0	0	Curve	Ball
3	Name	Name	R	1	0	0	2	0	0	0	0	Screw	Strike
4	Name	Name	R	1	0	0	2	1	0	0	0	Change	Ground Out

Opponent vs Brande

Notes: 12



~~(S) C~~

Pitch #	Batter	Pitcher	Bats	Inning	Runs	Outs	Balls	Strikes	1st	2nd	3rd	Pitch	Result
1	Name	Name	R	1	0	0	0	0	0	0	0	Screw	Ball
2	Name	Name	R	1	0	0							
3	Name	Name	R	1	0	0							
4	Name	Name	R	1	0	0							

Entry of Pitching Charts

Number _____

Key

Ground Ball _____

Line Drive _____

Fly Ball _____

Hit Hard ☐

Hit Weak ☐

Notes: R

Opponent vs DRANDU

8

7

6

5

4

3

2

1

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

Pitch #	Batter	Pitcher	Bats	Inning	Runs	Outs	Balls	Strikes	1st	2nd	3rd	Pitch	Result
1	Name	Name	R	1	0	0	0	0	0	0	0	Screw	Ball
2	Name	Name	R	1	0	0	1	0	0	0	0	Curve	Ball
3	Name	Name	R	1	0	0							
4	Name	Name	R	1	0	0							

Number_

Key

Line Drive

Fly Ball —

Hit Hard ☐

Hit Weak ○

Notes: 12

Handwritten notes on a grid background:

- Top row: S C
- Second row: S (circled) 10-3 (1)
- Third row: C
- Fourth row: (5) 50 x 100 x 100 (1)
- Fifth row: (C) F9 (2)
- Sixth row: (5) 100
- Seventh row: (C) 100

A red line is drawn from the circled 'S' in the second row, extending diagonally down to the bottom right corner of the grid.

Pitch #	Batter	Pitcher	Bats	Inning	Runs	Outs	Balls	Strikes	1st	2nd	3rd	Pitch	Result
1	Name	Name	R	1	0	0	0	0	0	0	0	Screw	Ball
2	Name	Name	R	1	0	0	1	0	0	0	0	Curve	Ball
3	Name	Name	R	1	0	0	2	0	0	0	0	Screw	Strike
4	Name	Name	R	1	0	0							

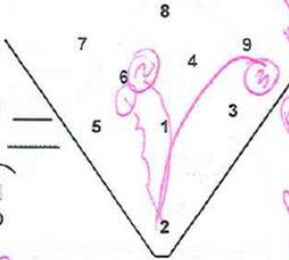
Entry of Pitching Charts

Number _____

Opponent vs DRAGON

Key
 Ground Ball ———
 Line Drive ———
 Fly Ball ()
 Hit Hard □
 Hit Weak ○

Notes: R



Handwritten notes on the chart:
 1st Inning
 2nd Inning
 3rd Inning
 4th Inning
 5th Inning
 6th Inning
 7th Inning
 8th Inning
 9th Inning
 10th Inning
 11th Inning
 12th Inning
 13th Inning
 14th Inning
 15th Inning
 16th Inning
 17th Inning
 18th Inning
 19th Inning
 20th Inning
 21st Inning
 22nd Inning
 23rd Inning
 24th Inning
 25th Inning
 26th Inning
 27th Inning
 28th Inning
 29th Inning
 30th Inning
 31st Inning
 32nd Inning
 33rd Inning
 34th Inning
 35th Inning
 36th Inning
 37th Inning
 38th Inning
 39th Inning
 40th Inning
 41st Inning
 42nd Inning
 43rd Inning
 44th Inning
 45th Inning
 46th Inning
 47th Inning
 48th Inning
 49th Inning
 50th Inning
 51st Inning
 52nd Inning
 53rd Inning
 54th Inning
 55th Inning
 56th Inning
 57th Inning
 58th Inning
 59th Inning
 60th Inning
 61st Inning
 62nd Inning
 63rd Inning
 64th Inning
 65th Inning
 66th Inning
 67th Inning
 68th Inning
 69th Inning
 70th Inning
 71st Inning
 72nd Inning
 73rd Inning
 74th Inning
 75th Inning
 76th Inning
 77th Inning
 78th Inning
 79th Inning
 80th Inning
 81st Inning
 82nd Inning
 83rd Inning
 84th Inning
 85th Inning
 86th Inning
 87th Inning
 88th Inning
 89th Inning
 90th Inning
 91st Inning
 92nd Inning
 93rd Inning
 94th Inning
 95th Inning
 96th Inning
 97th Inning
 98th Inning
 99th Inning
 100th Inning

Pitch #	Batter	Pitcher	Bats	Inning	Runs	Outs	Balls	Strikes	1st	2nd	3rd	Pitch	Result
1	Name	Name	R	1	0	0	0	0	0	0	0	Screw	Ball
2	Name	Name	R	1	0	0	1	0	0	0	0	Curve	Ball
3	Name	Name	R	1	0	0	2	0	0	0	0	Screw	Strike
4	Name	Name	R	1	0	0	2	1	0	0	0	Change	Ground Out

Pitch #	Bats	Inning	Runs	Outs	Balls	Strikes	1st	2nd	3rd	Pitch	Result
1	R	1	0	0	0	0	0	0	0	Curve	Ball
2	R	1	0	0	1	0	0	0	0	Screw	Strike
3	R	1	0	0	1	1	0	0	0	Rise	Ball
4	R	1	0	0	2	1	0	0	0	Screw	Foul
5	R	1	0	0	2	2	0	0	0	Change	Ball
6	R	1	0	0	3	2	0	0	0	Screw	HBP
7	R	1	0	0	0	0	1	0	0	Curve	Ball
8	R	1	0	0	1	0	1	0	0	Screw	Sac Bunt
9	R	1	0	1	0	0	0	1	0	Screw	Strike
10	R	1	0	1	0	1	0	1	0	Rise	Ball
11	R	1	0	1	1	1	0	1	0	Change	Strike
12	R	1	0	1	1	2	0	1	0	Screw	Foul
13	R	1	0	1	1	2	0	1	0	Rise	Swinging K
14	R	1	0	2	0	0	0	1	0	Curve	Ball
15	R	1	0	2	1	0	0	1	0	Screw	Ball
16	R	1	0	2	2	0	0	1	0	Screw	Foul
17	R	1	0	2	2	1	0	1	0	Rise	Foul
18	R	1	0	2	2	2	0	1	0	Rise	Fly Out
19	R	2	0	0	0	0	0	0	0	Screw	Strike
20	R	2	0	0	0	1	0	0	0	Curve	Ball
21	R	2	0	0	1	1	0	0	0	Rise	Pop Out
22	R	2	0	1	0	0	0	0	0	Screw	Ball
23	R	2	0	1	1	0	0	0	0	Change	Ball
24	R	2	0	1	2	0	0	0	0	Screw	Strike



Data Analysis

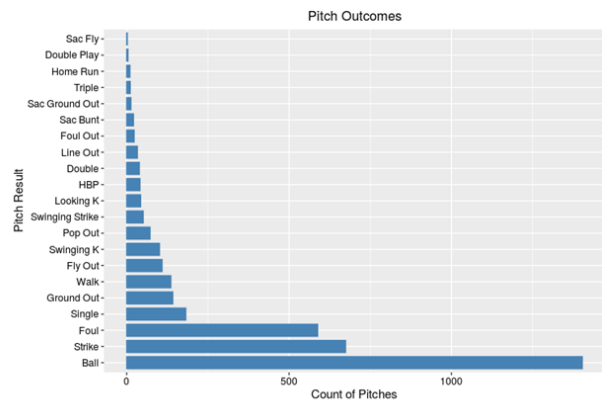


Data Product

- Created formula driven spreadsheet to allow for easy data entry and continuous integration into larger data set
- Created R Shiny App to allow for customizable visualizations of data

Pitch Outcomes

Pitch Types



Select a Pitcher

+

Game Selection

+

Graph Conditions

+

Game Situations

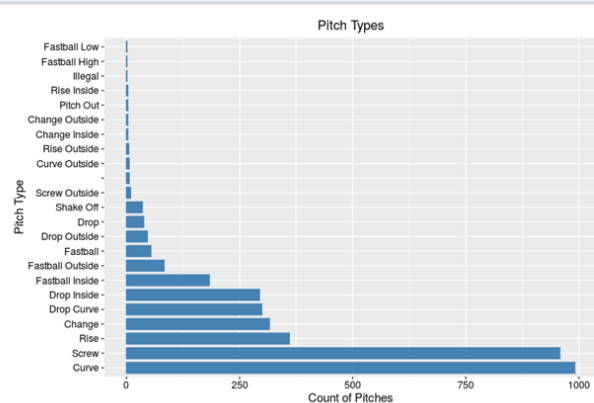
+

Base Runners

+

Pitch Outcomes

Pitch Types



Select a Pitcher

+

Game Selection

+

Graph Conditions

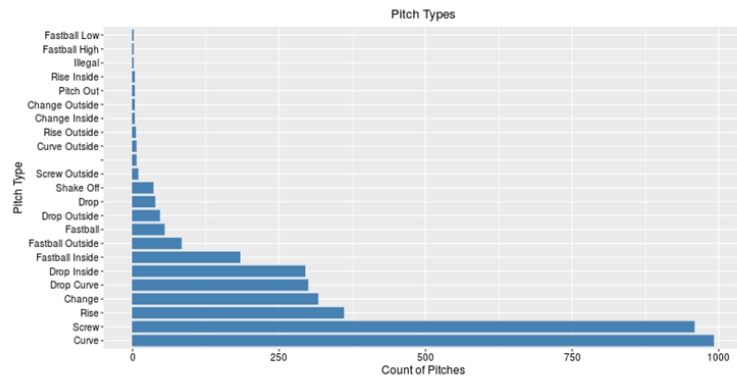
+

Game Situations

+

Base Runners

+



Game Situations

Count:

Outs:

Inning:

Select a Pitcher



Game Selection



Select an opponent:

All



Year:

Games:

Graph Conditions



Condition on:

None

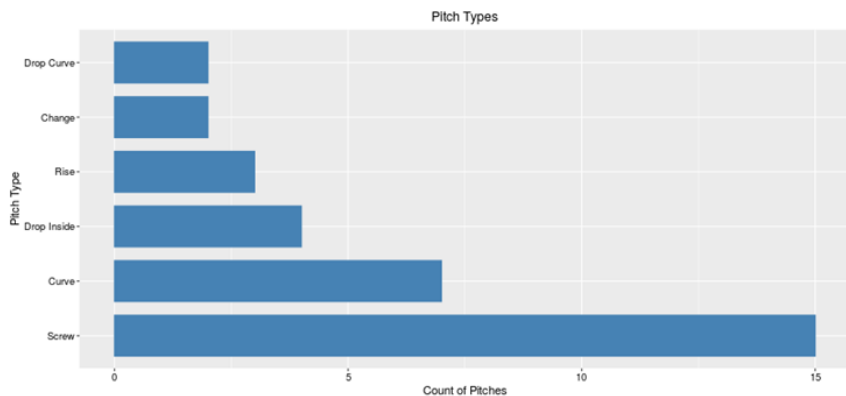


Base Runners



Runners on:

- ☐ No Runners
- ☐ RISP
- ☐ Runner On Base
- ☐ Runner On 1st
- ☐ Runner On 2nd
- ☐ Runner On 3rd
- ☐ Runner Not On 1st
- ☐ Runner Not On 2nd
- ☐ Runner Not On 3rd



Game Situations

Count:

3-2

Outs:

Inning:

Select a Pitcher

Game Selection

Select an opponent:

Brandeis

Year:

2019

Games:

Graph Conditions

Base Runners

Runners on:

- ☐ No Runners
- ☐ RISP
- ☐ Runner On Base
- ☐ Runner On 1st
- ☐ Runner On 2nd
- ☐ Runner On 3rd
- ☐ Runner Not On 1st
- ☐ Runner Not On 2nd
- ☐ Runner Not On 3rd