
DeepSport: A Shiny App for sports video analysis

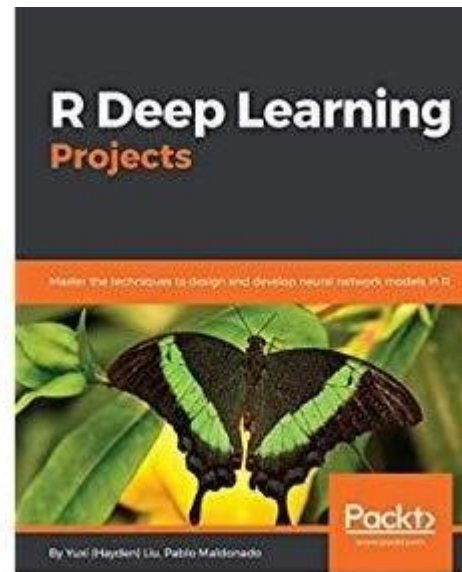
— Pablo Maldonado, Ph.D. —

Who am I?

- Math PhD turned data scientist circa 2014.
 - Training and consultancy in data science.
 - Building data science teams from scratch.
 - Create initial prototypes and set up data strategy for high-impact use cases.
- Visiting Lecturer, Ukrainian Catholic University in Lviv.



Author/Co-Author



The Problem



Constraints (aka The Real Problem)

- Relatively small amount of annotated data (around 15 videos, 2 hours each).
- Around 200 pitches per game.
- Budget/processing constraints → no deep learning.

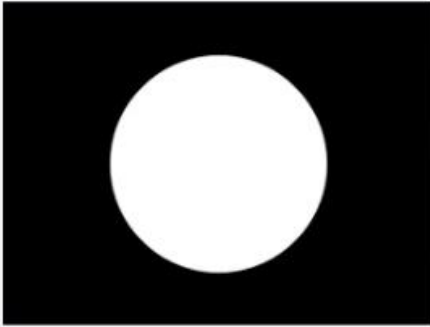


Our Approach

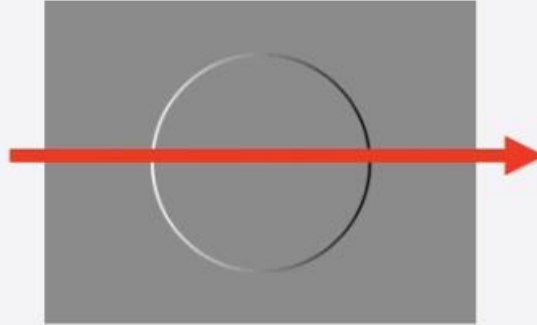
- Frame-by-frame detection.
- Label propagation.
- Validation.

Histogram of Oriented Gradients – HOG (2005)

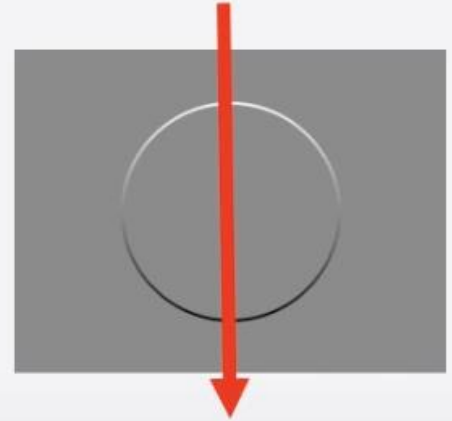
ORIGINAL IMAGE



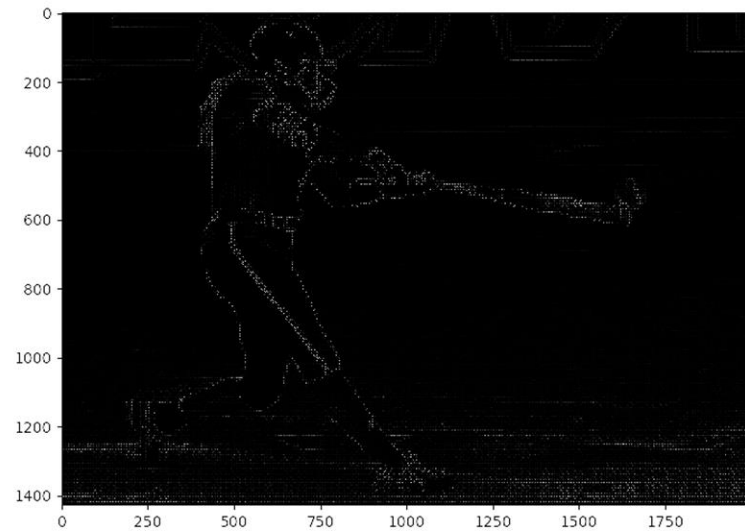
HORIZONTAL GRADIENT



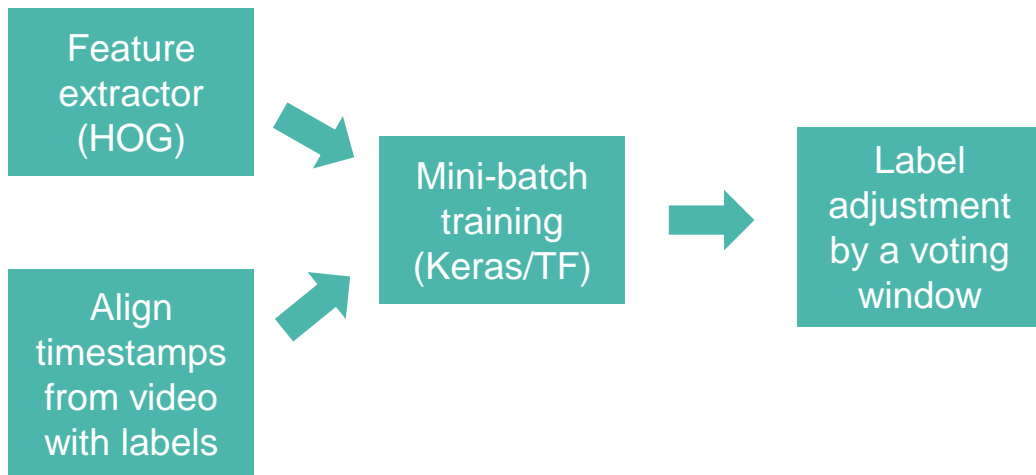
VERTICAL GRADIENT



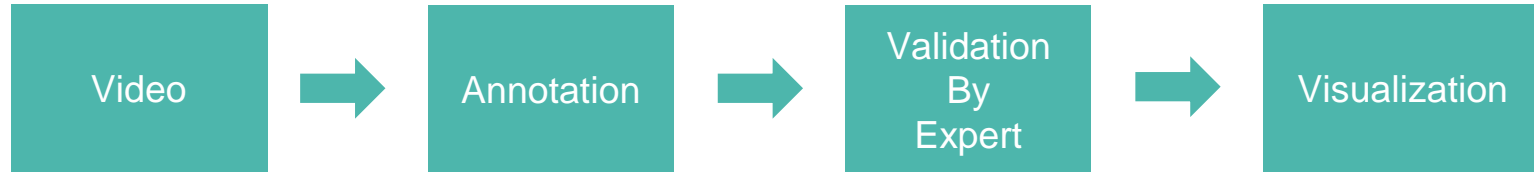
HOG



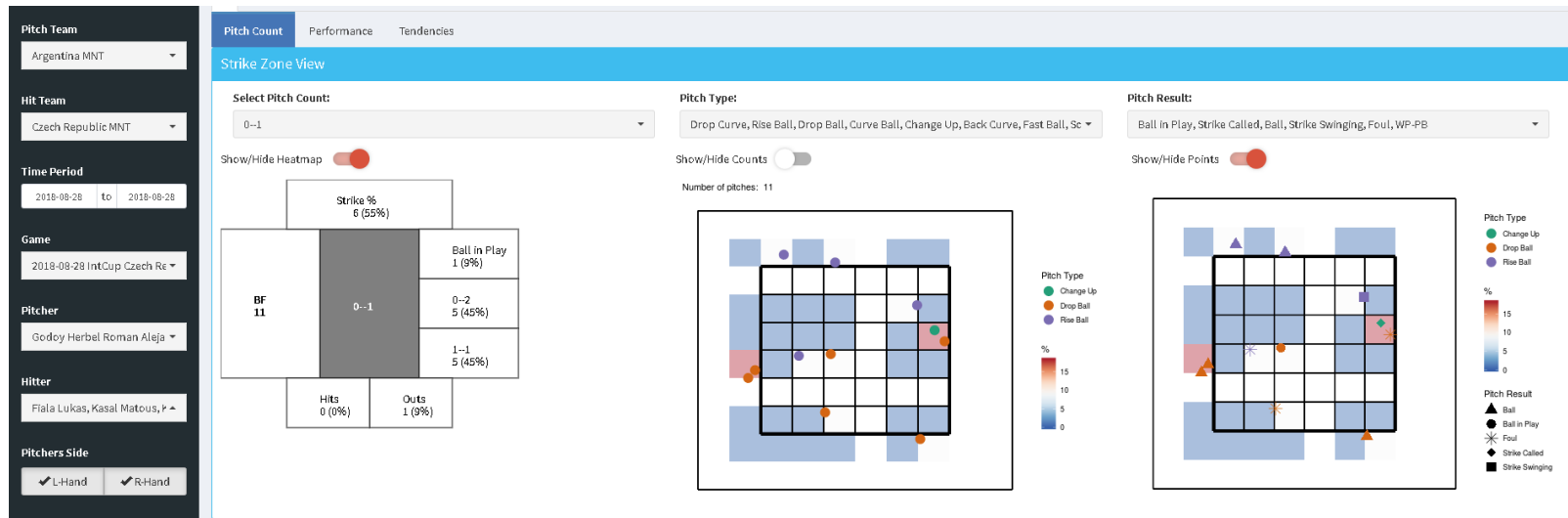
Solution Architecture - Training



Solution Architecture – Deployment



The App



Spray Chart View

Hit Result:

Single, Double, Triple, Home Run, Fielders Choice, ROE, Sacrifice Fly, Sacrifice Bunt

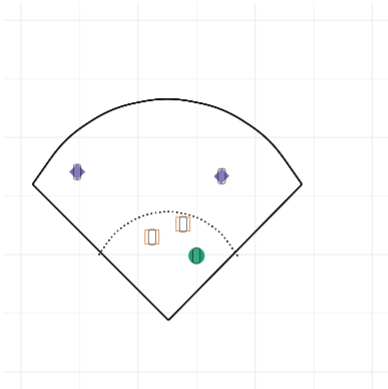
Hitting Position:

, Bunt, Bunt Attempt, Slap, Slap Attempt

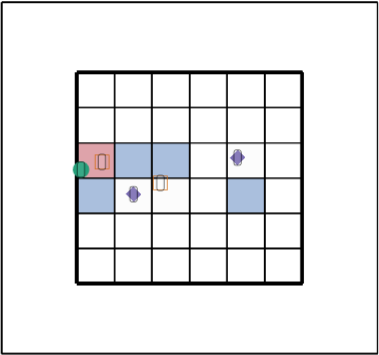
Show/Hide Well Hits

Well Hit Balls

Count



Hit Result
● Fly Out
□ Ground Out
◆ Single



Hit Result
● Fly Out
□ Ground Out
◆ Single
%
40
30
20
10
0

Statistics

Strike Details	Count	%
Ball	22	32.35
Ball in Play	5	7.35
Foul	10	14.71
Strike Called	14	20.59
Strike Swinging	17	25
Total	68	100

Pitch Type	Count	%
Change Up	4	5.88
Curve Ball	1	1.47
Drop Ball	40	58.82
Rise Ball	23	33.82
Total	68	99.99

Hits	Count	%
Single	2	100
Total	2	100

Outs	Count	%
Fly Out	1	33.33
Ground Out	2	66.67
Total	3	100

Why R?

- Easy to deploy a web app (Shiny).
- Quick dashboard prototyping with R2D3 and tidyverse.
- Possibility of importing trained models with the Keras/Tensorflow APIs.

Future work

- Try with proprietary data 😊
- Use of recurrent neural networks?
 - Anecdotic evidence of poor benefits when compared to cost/required data.