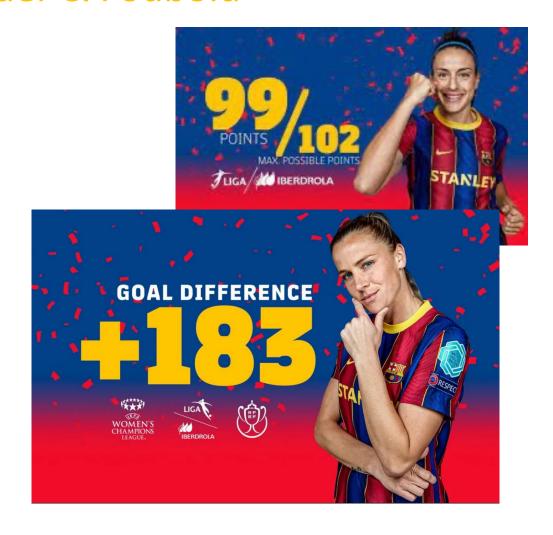


# SPORTS ANALYTICS

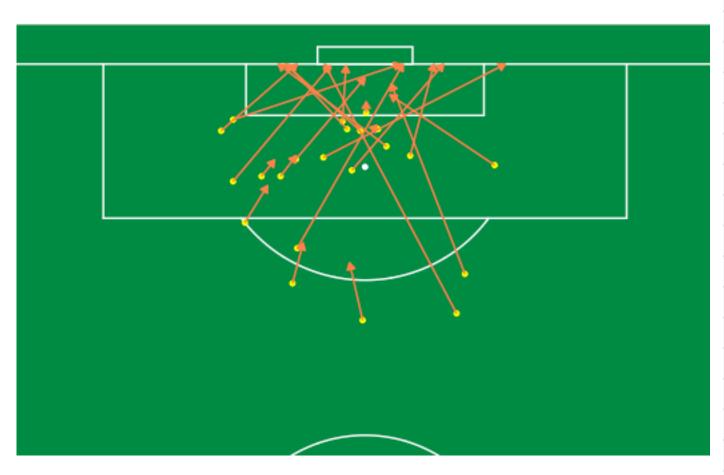
Brøndby AS



| • | PRIMERA DIVISIÓN FEMENINA TABLE |                 |    |          |    |  |  |  |  |
|---|---------------------------------|-----------------|----|----------|----|--|--|--|--|
|   | #                               | Team            | MP | <u>D</u> | P  |  |  |  |  |
|   | 1                               | Barcelona       | 27 | +138     | 81 |  |  |  |  |
|   | 2                               | Real Sociedad   | 27 | +20      | 59 |  |  |  |  |
|   | 3                               | Atlético Madrid | 27 | +37      | 53 |  |  |  |  |
|   | 4                               | Real Madrid     | 27 | +8       | 53 |  |  |  |  |
|   | 5                               | Granadilla Ten  | 27 | +2       | 53 |  |  |  |  |

```
shots <- data.frame(x = c(90, 85, 82, 78, 83, 74, 94, 91),
y = c(43, 40, 52, 56, 44, 71, 60, 54))
```

Plot all shots in one game

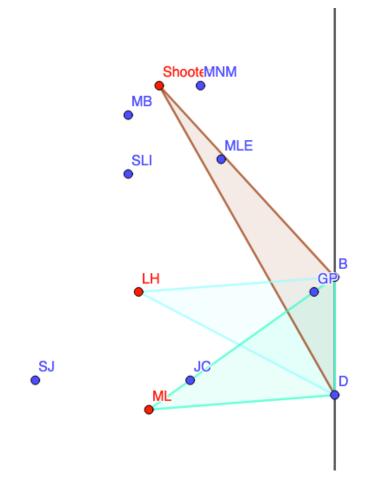


| *  | location <sup>‡</sup> | shot.end_location   | ÷ |
|----|-----------------------|---------------------|---|
| 1  | c(113.3, 41.9)        | c(119.8, 41.6, 1.6) |   |
| 2  | c(112.2, 40.4)        | c(120, 46.7, 1.6)   |   |
| 3  | c(110.4, 38.2)        | c(120, 47.3, 1.3)   |   |
| 4  | c(106.3, 51.1)        | c(119.8, 42.9, 1.3) |   |
| 5  | c(112.2, 52.1)        | c(120, 45.7, 0.2)   |   |
| 6  | c(98.5, 45.7)         | c(120, 36.8, 1.2)   |   |
| 7  | c(112.4, 41.5)        | c(120, 46.6, 1.5)   |   |
| 8  | c(90.1, 40.2)         | c(96.8, 41.3)       |   |
| 9  | c(107.6, 41.1)        | c(120, 33.4, 1.9)   |   |
| 10 | c(109.3, 36.2)        | c(120, 34.2, 1.6)   |   |
| 11 | c(90.9, 32.3)         | c(120, 43.4, 5.9)   |   |
| 12 | c(95.5, 31.6)         | c(117.7, 37.8, 1.4) |   |
| 13 | c(114.3, 39.9)        | c(115.6, 39.9, 0.3) |   |
| 14 | c(101.5, 50.1)        | c(105.8, 48.2, 0)   |   |
| 15 | c(94.4, 46.1)         | c(99.1, 45.2)       |   |
| 16 | c(112.4, 38.9)        | c(112.6, 39.6)      |   |

Find all non-teammates

For each teammate

compute number of nont in triangle



| ^  | location       | shot.end_location | shot.freeze_frame.location | shot.freez |
|----|----------------|-------------------|----------------------------|------------|
| 1  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(98.5, 58.2)              | TRUE       |
| 2  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(118.4, 42.8)             | FALSE      |
| 3  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(111.8, 42.9)             | TRUE       |
| 4  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(109.1, 43.8)             | FALSE      |
| 5  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(106.9, 61.6)             | FALSE      |
| 6  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(110.3, 52.5)             | FALSE      |
| 7  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(112, 49.6)               | FALSE      |
| 8  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(97.4, 56.1)              | FALSE      |
| 9  | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(106.9, 44.4)             | TRUE       |
| 10 | c(112.2, 52.1) | c(120, 45.7, 0.2) | c(115.3, 51.6)             | FALSE      |

| _ | location <sup>‡</sup> | shot.end_location $^{\circ}$ |
|---|-----------------------|------------------------------|
| 1 | c(112.2, 52.1)        | c(120, 45.7, 0.2)            |

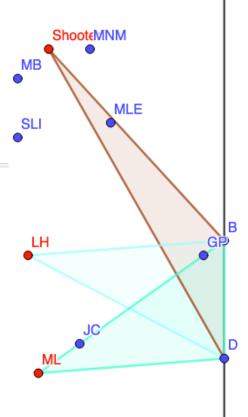
| _ | location <sup>‡</sup> | shot.end_location |
|---|-----------------------|-------------------|
| 1 | 112.2                 | 120.0             |
| 2 | 52.1                  | 120.0             |
| 3 | 112.2                 | 45.7              |
| 4 | 52.1                  | 45.7              |

Find all non-teammates

For each teammate

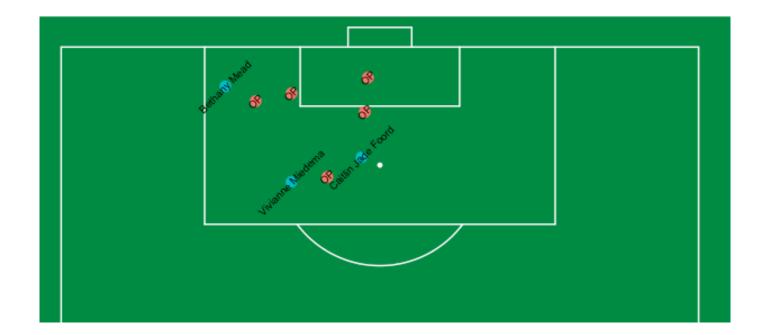
compute number of nont in triangle

| • | location <sup>‡</sup> | player\$id <sup>‡</sup> | player\$name                   | position\$id <sup>‡</sup> | position\$name            | teammate |
|---|-----------------------|-------------------------|--------------------------------|---------------------------|---------------------------|----------|
| 1 | c(116, 59.4)          | 15619                   | Bethany Mead                   | 12                        | Right Midfield            | TRUE     |
| 2 | c(108.8, 42.3)        | 11338                   | Caitlin Jade Foord             | 19                        | Center Attacking Midfield | TRUE     |
| 3 | c(116.9, 41.5)        | 42787                   | Mackenzie Arnold               | 1                         | Goalkeeper                | FALSE    |
| 4 | c(115.3, 51.1)        | 31157                   | Hawa Cissoko                   | 5                         | Left Center Back          | FALSE    |
| 5 | c(114.5, 55.6)        | 15724                   | Mayumi Pacheco                 | 8                         | Left Wing Back            | FALSE    |
| 6 | c(113.4, 41.9)        | 34232                   | Grace Fisk                     | 4                         | Center Back               | FALSE    |
| 7 | c(106.8, 46.6)        | 10124                   | Dagný Brynjarsdóttir           | 21                        | Left Wing                 | FALSE    |
| 8 | c(110.6, 37)          | 18151                   | Gilly Louise Scarlett Flaherty | 3                         | Right Center Back         | FALSE    |



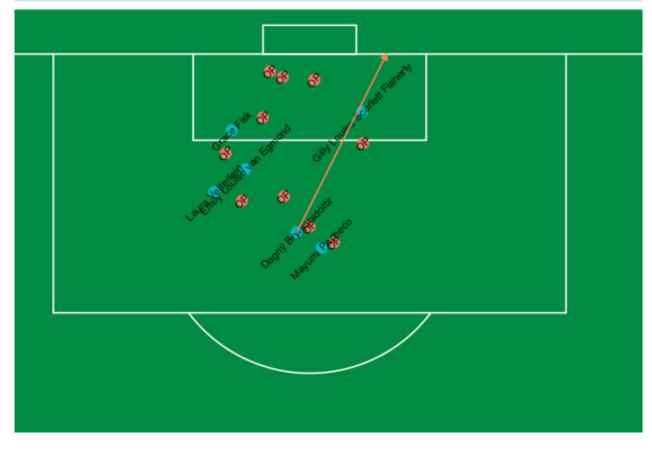
| _ | team.name ‡ | player.name <sup>‡</sup> | position.id <sup>‡</sup> | shot.end_location   | shot.outcome.name $^{\circ}$ | shot.freeze_frame |
|---|-------------|--------------------------|--------------------------|---------------------|------------------------------|-------------------|
| 1 | Arsenal WFC | Vivianne Miedema         | 23                       | c(119.8, 42.9, 1.3) | Saved                        | 1 variable        |

|   | location       | piayerşid | piayer\$name                   | positionaia | position\$name            | teammate |
|---|----------------|-----------|--------------------------------|-------------|---------------------------|----------|
| 1 | c(116, 59.4)   | 15619     | Bethany Mead                   | 12          | Right Midfield            | TRUE     |
| 2 | c(108.8, 42.3) | 11338     | Caitlin Jade Foord             | 19          | Center Attacking Midfield | TRUE     |
| 3 | c(116.9, 41.5) | 42787     | Mackenzie Arnold               | 1           | Goalkeeper                | FALSE    |
| 4 | c(115.3, 51.1) | 31157     | Hawa Cissoko                   | 5           | Left Center Back          | FALSE    |
| 5 | c(114.5, 55.6) | 15724     | Mayumi Pacheco                 | 8           | Left Wing Back            | FALSE    |
| 6 | c(113.4, 41.9) | 34232     | Grace Fisk                     | 4           | Center Back               | FALSE    |
| 7 | c(106.8, 46.6) | 10124     | Dagný Brynjarsdóttir           | 21          | Left Wing                 | FALSE    |
| 8 | c(110.6, 37)   | 18151     | Gilly Louise Scarlett Flaherty | 3           | Right Center Back         | FALSE    |



| * | team.name           | player.name <sup>‡</sup> | location <sup>‡</sup> | ${\bf shot.end\_location}  ^{\scriptsize \scriptsize \scriptsize$ | shot.outcome.name | shot.freeze_frame | ÷ |
|---|---------------------|--------------------------|-----------------------|---|-------------------|-------------------|---|
| 1 | West Ham United LFC | Dagný Brynjarsdóttir     | c(107.6, 41.1)        | c(120, 33.4, 1.9)   | Off T             | 1 variable        |   |

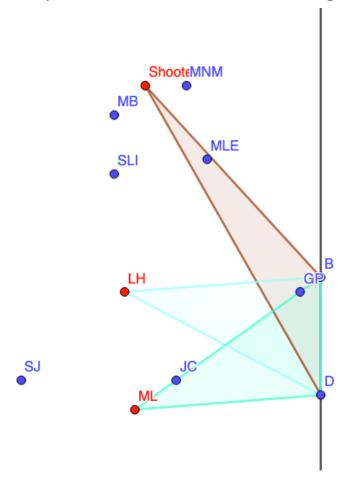
| _  | <b>x</b> | <b>y</b> | name                           | team <sup>‡</sup> | shooter |
|----|----------|----------|--------------------------------|-------------------|---------|
| 1  | 107.6    | 41.1     | Dagný Brynjarsdóttir           | TRUE              |         |
| 2  | 106.9    | 37.9     | OP                             | FALSE             | 2       |
| 3  | 118.4    | 42.3     | OP                             | FALSE             | 2       |
| 4  | 109.8    | 45.8     | OP                             | FALSE             | 2       |
| 5  | 113.1    | 47.2     | OP                             | FALSE             | 2       |
| 6  | 115.6    | 44.0     | OP                             | FALSE             | 2       |
| 7  | 118.8    | 43.4     | OP                             | FALSE             | 2       |
| 8  | 110.1    | 42.2     | OP                             | FALSE             | 2       |
| 9  | 113.8    | 35.4     | OP                             | FALSE             | 2       |
| 10 | 118.2    | 39.6     | OP                             | FALSE             | 2       |
| 11 | 108.0    | 40.0     | OP                             | FALSE             | 2       |
| 12 | 112.0    | 45.5     | Emily Louise van Egmond        | TRUE              | 2       |
| 13 | 110.4    | 48.2     | Laura Vetterlein               | TRUE              | 2       |
| 14 | 116.0    | 35.5     | Gilly Louise Scarlett Flaherty | TRUE              | 2       |
| 15 | 114.7    | 46.7     | Grace Fisk                     | TRUE              | 2       |
| 16 | 106.5    | 39.0     | Mayumi Pacheco                 | TRUE              | 2       |



Find all non-teammates

For each teammate

compute number of nont in triangle



```
freeze_frame: [
   location: [ 102, 35 ],
   player: { id: 15547, name: 'Melissa Lawley' },
   position: { id: 24, name: 'Left Center Forward' },
   teammate: true
   location: [ 101, 43 ],
   player: { id: 15555, name: 'Lauren Hemp' },
   position: { id: 22, name: 'Right Center Forward' },
   teammate: true
   location: [ 118, 43 ],
   player: { id: 4640, name: 'Rut Hedvig Lindahl' },
   position: { id: 1, name: 'Goalkeeper' },
   teammate: false
   location: [ 109, 52 ],
   player: { id: 4633, name: 'Magdalena Lilly Eriksson' },
   position: { id: 5, name: 'Left Center Back' },
   teammate: false
   location: [ 100, 51 ],
   player: { id: 15549, name: 'Sophie Louise Ingle' },
   position: { id: 9, name: 'Right Defensive Midfield' },
   teammate: false
   location: [ 100, 55 ],
   player: { id: 4642, name: 'Millie Bright' },
   position: { id: 3, name: 'Right Center Back' },
   teammate: false
   location: [ 91, 37 ],
   player: { id: 4647, name: 'So-Yun Ji' },
   position: { id: 19, name: 'Center Attacking Midfield' },
   teammate: false
   location: [ 107, 57 ],
   player: { id: 10395, name: 'Maren Nævdal Mjelde' },
   position: { id: 11, name: 'Left Defensive Midfield' },
   teammate: false
   location: [ 106, 37 ],
   player: { id: 19422, name: 'Jessica Carter' },
   position: { id: 2, name: 'Right Back' },
   teammate: false
```

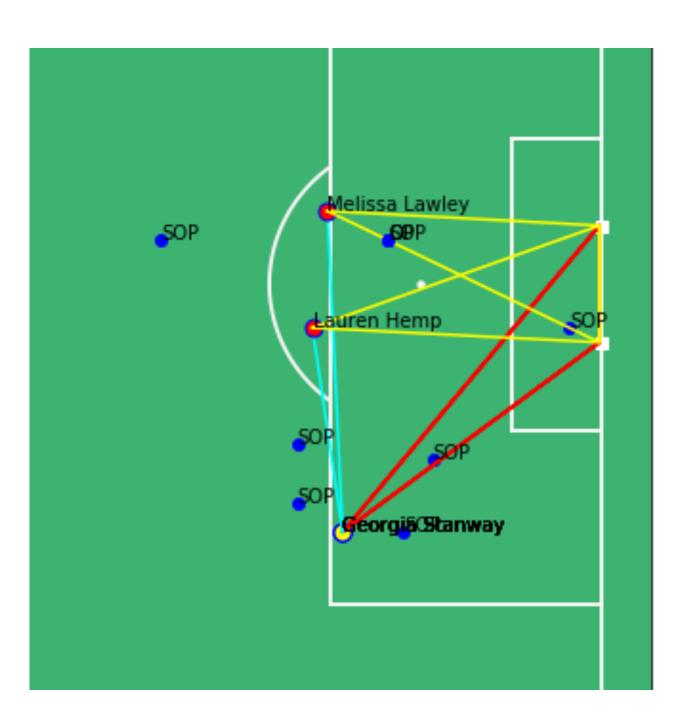
# Kvinder & Fodbold Freeze-Frame

- Number of players in tri
- Distance of pass to teamplayer
- Distance to passline from opponent
- Teamplayer xG
  - Distance, angle

#### This frame:

```
If for all team-others
shooter tri < other tri
AND
Other gdist < (shooter + tol)
AND
Passdist Shooter-Other-ratio > 0.2
Then
should have been a pass
```

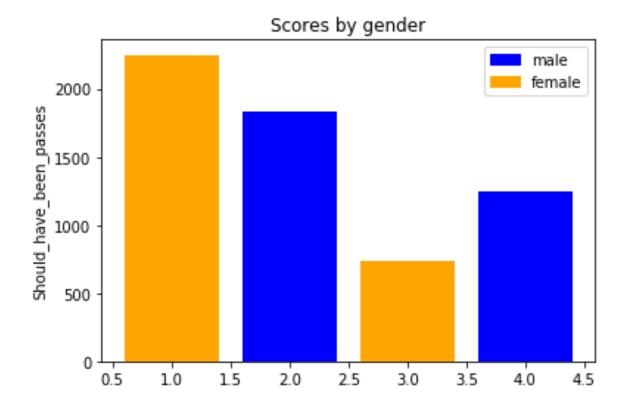
**Conlusion**: Should have been a pass



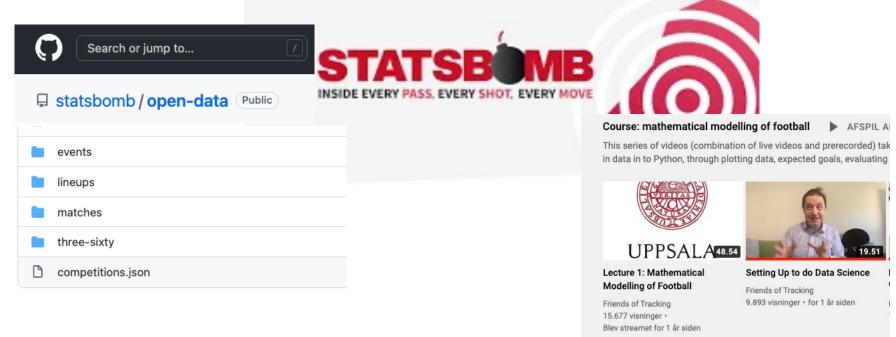
# Bias ..

```
find({"type.name":"Shot", "gender":"female",
  "position.id" : {"$in":striker_player}})

find({"type.name":"Shot", "gender":"male",
  "position.id" : {"$in":def_player}})
```

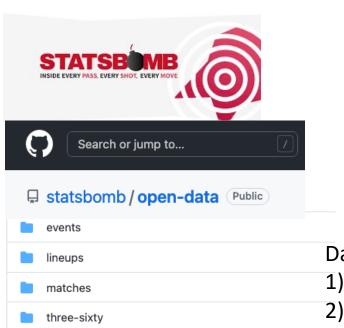


# Statsbomb

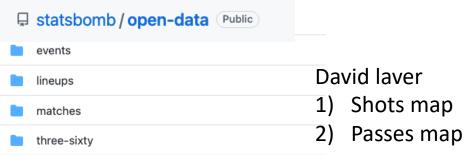


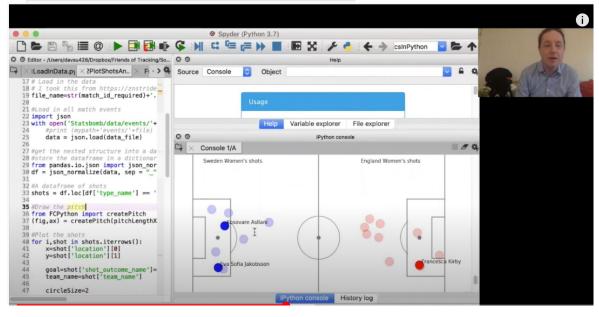
☐ Friends-of-Tracking-Data-FoTD / SoccermaticsForPython Public





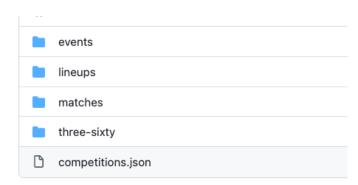
Sample event from 69301.json with 3291 events



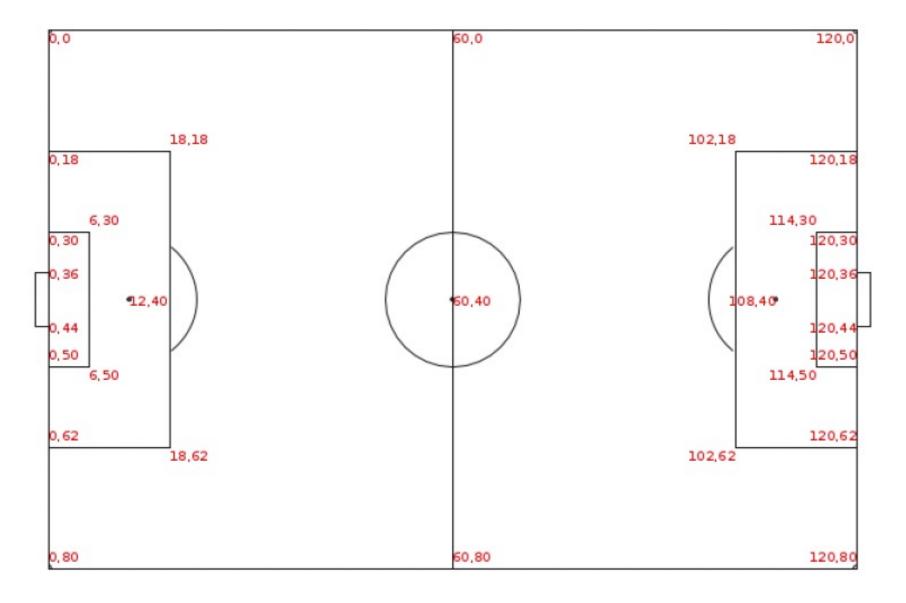


```
495 }, {
      id : ecec23b8-f03d-4bee-80df-9fabec558187,
      index: 9.
498
      period: 1,
      timestamp: 00:00:05.143,
      minute: 0,
501
      second: 5,
502
      type : {
503
        id: 30.
504
        name: Pass
505
506
      possession: 2.
      possession_team : {
508
        id: 865,
509
        name : England Women's
510
511
      play_pattern : {
512
        id: 9,
513
        name : From Kick Off
514
515
      team : {
516
        id: 865,
517
        name : England Women's
518
519
      player : {
520
        id: 4641.
521
        name: Francesca Kirby
522
      },
523
      position : {
524
        id: 15,
        name : Left Center Midfield
525
526
      location : [ 82.6, 37.6 ],
      duration : 1.173625,
529
      related_events : [ ebb46045-f1ab-4c25-88b8-fc7ea165b52d ],
530
      pass : {
531
       recipient : {
532
          id: 10178,
533
          name : Lucy Bronze
534
535
        length: 21.317833,
536
        angle: 1.7691119,
537
        height : {
538
          id : 1,
539
          name: Ground Pass
540
        end_location : [ 78.4, 58.5 ],
541
542
        body_part : {
543
         id: 40.
544
          name : Right Foot
545
546 _ }
```

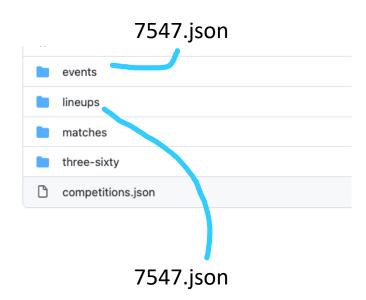


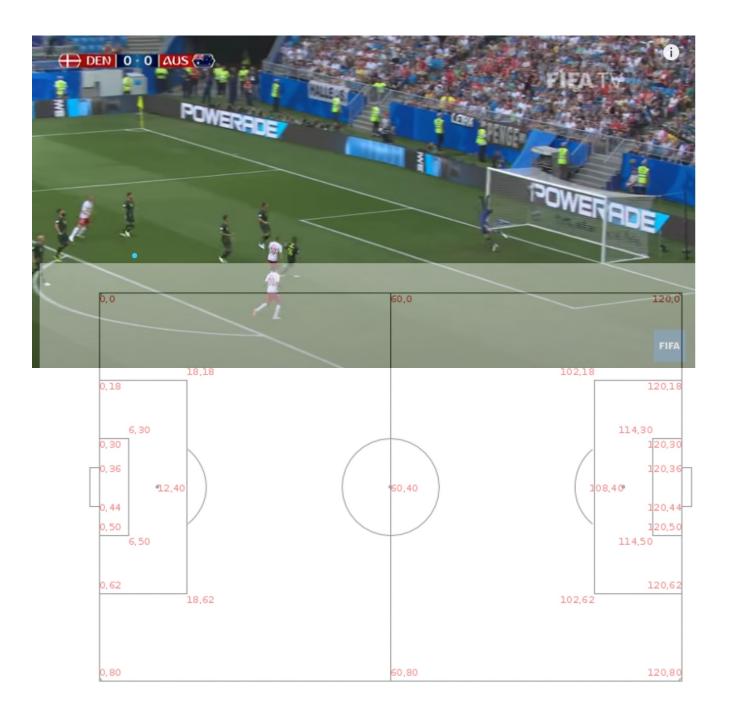














events

lineups

matches

three-sixty

```
id : b54f83ed-8ddb-4864-9b0b-ccc1f4f95da0.
                  index : 214,
                  period : 1,
                  timestamp: 00:06:07.640,
                  second: 7,
                  type : {
                    id: 16.
                    name : Shot
                  possession: 12,
                  possession team : {
                                                               DEN 0 0 AUS
                   id: 776,
                    name : Denmark
                  play_pattern : {
                    id: 4,
                    name : From Throw In
                  team : {
                    name : Denmark
                  player : {
                    id: 3043.
                    name : Christian Dannemann Eriksen
                  position : {
                    id: 19.
                    name : Center Attacking Midfield
                  duration: 0.6.
                  related_events : [ ef2b6ad0-caf8-47c8-b086-d252fc7834aa
competitions.
                    statsbomb_xg : 0.20277502,
                    end_location : [ 120.0, 37.8, 2.5 ],
                    key pass id: 9eac306c-fadb-4bf3-bcc2-592e03882bd5,
                    first time : true,
                    technique : {
                     id: 93.
                      name : Normal
                    type : {
                     id: 87,
                      name : Open Play
                      name : Goal
                    body part : {
                      id: 38,
                      name : Left Foot
```

events — vim ego.json — 104×60

```
id : ef2b6ad0-caf8-47c8-b086-d252fc7834aa,
index : 215,
period: 1,
timestamp : 00:06:08.240,
minute: 6,
second: 8,
type : {
 id: 23,
 name : Goal Keeper
possession team
 id: 3240,
related events : [ b54f83ed-8ddb-4864-9b0b-ccc1f4f95da0 ],
goalkeeper : {
 technique : {
   id: 45,
   name : Diving
 type : {
   id : 26,
   name : Goal Conceded
 outcome : {
   id: 55,
   name: No Touch
 position : {
   name : Set
```

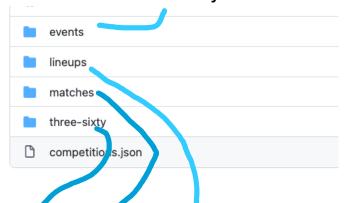


Three-sixty folderen rummer trackingdata for 51 kampe.

Desværre ikke for DK's kampe. 3788753 er Rusland vs Finland



#### 3788753.json har ca 3800 events



3788753.json opstillingen for de to hold

55/43.json has a record for matchid 3788753 (and 49 other games)

3788753.json has the tracking of that match



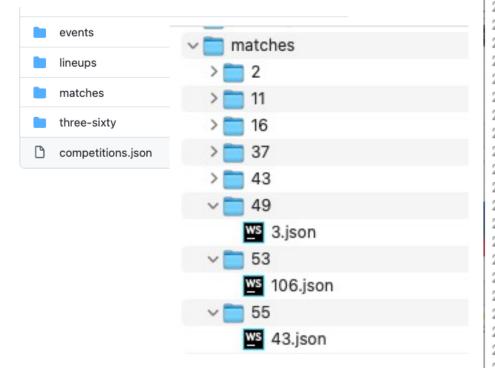
| events            |
|-------------------|
| lineups           |
| matches           |
| three-sixty       |
| competitions.json |
|                   |

#### Lineups

```
=> jq '.[1].lineup[9]' 3788753.json
"player_id": 15416,
"player_name": "Jukka Raitala",
"player_nickname": null,
"jersey_number": 22,
"country": {
  "id": 77,
  "name": "Finland"
},
"cards": [],
"positions": [
    "position_id": 7,
    "position": "Right Wing Back",
    "from": "00:00",
    "to": "74:26",
    "from_period": 1,
    "to_period": 2,
    "start_reason": "Starting XI",
    "end_reason": "Substitution - Off (Tactical)"
```



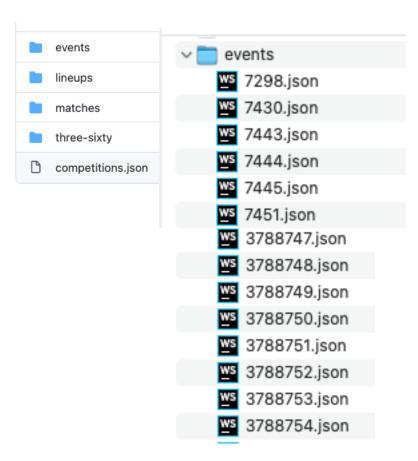
#### Filen 43.json med 51 kampe



```
2295
2296 }, {
2297
       match_id: 3788753,
2298
       match_date : 2021-06-16,
       kick_off: 15:00:00.000,
2299
       competition : {
2300
2301
         competition_id : 55,
2302
         country_name : Europe,
2303
         competition_name : UEFA Euro
2304
       season : {
2305
2306
         season_id : 43,
2307
         season_name : 2020
2308
       },
2309
       home_team : {
                                     2000
                                             macon_wook . . . .
2310
         home_team_id : 1835,
                                     2361
                                            competition_stage : {
2311
         home_team_name : Finland,
                                     2362
                                              id : 10,
2312
         home_team_gender : male,
                                     2363
                                               name : Group Stage
2313
         home_team_group : Group B,
                                     2364
2314
         country : {
                                             stadium : {
                                     2365
2315
           id : 77,
                                     2366
                                               id: 4726,
2316
           name : Finland
                                     2367
                                               name : Saint-Petersburg Stadium,
2317
                                     2368
                                               country : {
2318
         managers : [ {
                                     2369
                                                 id : 188
2319
           id : 3622,
                                     2370
                                                 name : Russia
           name : Markku Kanerva,
2320
                                     2371
           nickname : null,
2321
2322
           dob: 1964-05-24,
                                     2372
                                     2373
                                            referee : {
2323
           country : {
2324
             id : 77,
                                     2374
                                               id : 293,
2325
             name : Finland
                                     2375
                                               name : Danny Desmond Makkelie,
2326
                                     2376
                                               country : {
2327
                                     2377
                                                 id : 160,
2328
                                     2378
                                                 name : Netherlands
2329
       away_team : {
                                     2379
2330
         away_team_id : 796,
                                     2380
2331
         away_team_name : Russia,
                                     2381
2332
         away_team_gender : male,
         "away_team_group" : "Group B",
2334
         country . {
```



#### 3788753.json indeholder 3806 events for kampen Rusland – Finland.



```
1 "Tactical Shift"
   2 "50/50"
   2 "Referee Ball-Drop"
   2 "Starting XI"
   3 "Player Off"
   3 "Player On"
   4 "Half End"
   4 "Half Start"
    "Substitution"
  14 "Injury Stoppage"
  19 "Dispossessed"
  20 "Dribbled Past"
  25 "Shot"
  26 "Interception"
  26 "Miscontrol"
  27 "Foul Won"
  28 "Foul Committed"
  28 "Goal Keeper"
  34 "Block"
  34 "Dribble"
  67 "Clearance"
  86 "Duel"
 108 "Ball Recovery"
 355 "Pressure"
 841 "Carry"
1001 "Ball Receipt*"
1038 "Pass"
```

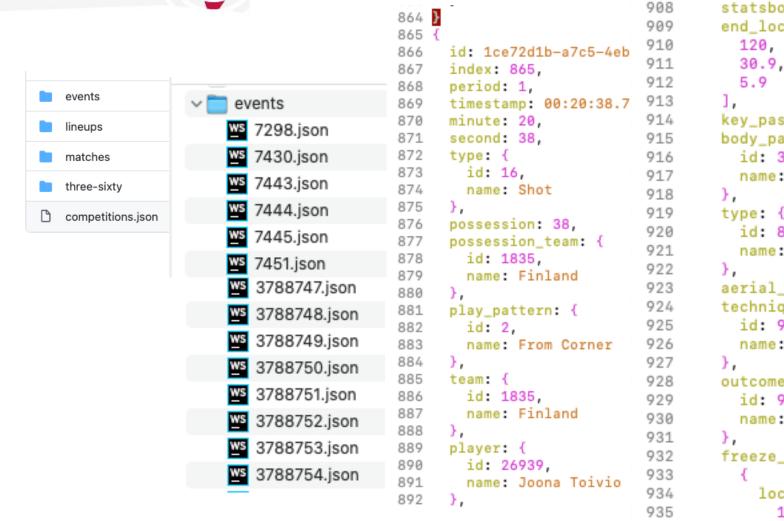


#### 3788753.json – eksempel på skud-event.

907

936

937



```
shot: {
  statsbomb_xg: 0.014892562,
  end_location: [
    30.9,
  key_pass_id: e8a6376e-ba9d-49d
  body_part: {
    id: 37,
    name: Head _ _____
                 1158
                1159
                              location: [
  type: {
                1160
    id: 87
                                111.7,
                                36.2
    name: Open
               1161
                1162
  aerial_won:
                1163
                              player: {
                1164
  technique: {
                                id: 38196,
                                name: Daniel O''Shaughnessy
                1165
    id: 93.
    name: Norma 1166
                1167
                              position: {
                1168
  outcome: {
                                id: 5.
    id: 98.
                1169
                                name: Left Center Back
                1170
    name: Off
                1171
                              teammate: true
  freeze_frame: 1172
                1173
      location: 1174
        112.7,
                1175
        42
                1176
                       id: 7aa54ce6-106a-4e26-9fb1-77aa0d7
```