

# **Strengths and Weaknesses of Players&Teams**

## **1.Introduction**

## **2.Evaluation method**

## **3.Step-By-Step Operations**

## **4.Conclusions**

## **1.Introduction**

Besides the PER, we were also trying to think of a way to find a player's Strength and Weakness Offensively. And I noticed that there is an interesting metric available in database called "PPP" (Points Per Possession).

Here is the definition of PPP:

An efficiency rating that calculates how many points on average a player or team is scoring in a specific play type or category, per possession. A sample PPP situation is if a team or player has three consecutive possessions:

- 1) A turnover
- 2) Gets fouled in the act of shooting and makes both the basket and the free throw
- 3) Makes a 3-point shot

That result is the team or player scoring 6 points on 3 possessions. The Points Per Possession for this situation would equal 2.0.

After that, I also noticed that there are some kinds of “Play Types” available in database

Here is the list of the play-type kinds and their corresponding definitions:

### ***1)Spot-Ups:***

When the possession ending event is a **catch and shoot** or **catch and drive** play. Spot-up players typically have a defender closing out on them during a defensive rotation and the spot-up player has the option of shooting the ball before the defender gets to them, letting the defender fly by and then shooting or driving, or they can use the defender's forward motion against them and drive to the basket. This situation also occurs during an off screen play. Therefore, if **there was no screen, we then log the play as a spot-up**. Other times spot-up players seem to simply get open, perhaps because their defender sagged towards the basket or simply went to sleep. In this case, the offensive player still has the option to shoot or drive.

### ***2)Transition:***

When the possession **ending event comes before the defense sets following a possession change and a transition from one end of the court to the other**. Unlike some other fast-break definitions, here “Transition” **allows for a considerable period of time to pass before the possession ends** – for example the center can trail down the floor after all the other transition options have been explored and if his defender is back guarding the paint and so is open to shoot a perimeter shot, then it is still logged as a transition. It can also include press breaks as the ball is quickly moved from the back court to the front court.

### ***3) P&R Ball Handler***

A screen is set on the ball handler’s defender out on the perimeter. The offensive player can use the screen or go away from it and as long as the play yields a possession ending event, it is tagged as a pick and roll. It is important to note that pick and rolls frequently cause the defense to rotate resulting in ball movement with spot-ups, cuts or pick and pop/pick and rolls. **These situations are**

defined in the Synergy system according to the ultimate play types that occur, but are also credited back to the ball handler as long as the defense never gets “whole” (in position to defend all 5 players).

#### ***4) Post-Up***

When an offensive player receives the ball with their **back to the basket and is less than 15' from the rim when the possession ending event occurs**. Post players can attack over either shoulder, they can back their player down off the dribble, they can turn and face up their defender and there are a variety of moves they can make in all of these situations, yet they are all logged as post-ups. We also categorize flash posts in the paint as post-ups. Post-ups are handled like pick and rolls in the sense that if a double team occurs or, less extreme, if the defense commits and a rotation ensues, the post player is given credit for the ultimate outcome (a cut or a spot-up) as long as the defense never gets “whole” (in position to defend all 5 players).

#### ***5) Cuts***

An interior play where the finisher catches a pass while moving toward, parallel to or slightly away from the basket. This will include back screen and flash cuts as well as times when the player is left open near the basket when his defender leaves him to help with a penetrating offensive player such as in a draw and kick situation.

#### ***6) Isolation***

When the possession ending event is created during a **“one on one”** matchup. The defender needs to be set and have all of his defensive options at the initiation of the play. If the defender is closing out on an offensive player such as in a spot up situation or an off screen situation and cannot get “whole” (on balance and set to defend), then it is not an Isolation play.

#### ***7) P&R Man***

When a screen is set for the ball handler, and the screen setter then receives the ball for a possession ending event. This action can include:

- Pick and rolls
  - The ball handler comes off the pick and the roll man rolls toward the basket before receiving the ball.
- Pick and pops
  - The ball handler comes off the pick and the roll man pops out away from the basket to receive the ball.
- Slips Pick
  - The roll man slips the pick prior to the ball handler using him as a screen, then receives the ball.

### ***7)Off-Screens***

Identifies **players coming off of screens (typically downs screens) going away from the basket toward the perimeter**. This includes curl, fades, and coming off straight. Selected options in this regard are typically dictated by the path the player's defender takes. For example, when a defender chases, the offensive player may curl to the middle to create space. Or when the defender cuts inside the screen, the offensive player may fade towards the corner. Flare screens are also "off screen" but differ in that the screen is set on the perimeter and the offensive player uses the screen to get separation from their defender using a path that is somewhat parallel to the basket.

### ***8) Offensive Rebounds – Put Backs***

When the rebounder attempts to score before passing the ball or establishing themselves in another play type.

### ***9) Handoffs***

The **screen setter starts with the ball and hands the ball to a player cutting close by**. This enables the player handing the ball off to effectively screen off a defender creating space for the player receiving the ball.

## **10) *Miscellaneous***

When the action doesn't fit any of the other play types. This includes, but is not limited to, last second full court shots, fouls in the backcourt, or errant passes not out of a different play type, etc.

## **2.Evaluation method**

By comparing the specific play type's PPP with the overall average PPP, we may clearly see in which kind of play a is more "efficiency" for a player, so that we may give suggestions on he should use this kind of play more in the future because he is "good at it", or try to reduce the amount of play of some kind because he is "not that good" when he choose to attack the basket in this way (Or work harder on those aspects if he insists).

I used the same logic to evaluate the teams, too.

## **3.Step-By-Step Operations**

### **3.1 Players**

#### **3.1.1 "Filter" for Players**

My goal is letting coach to be able to filter out players based on some key aspects such as by “Minutes Played”, “Points Per Game”, “School Name”, “Overall Average PPP”, “Play Type PPP”, “Element Name”, “Format Name” and so forth.

### 3.1.2 Steps for players:

1) get players’ average points and average minutes:

```
1. get avg(points),avg(minutes)

create view avg_pts_and_minutes as
select t.team_name,p.player_id,p.player_name,(tc.pts::float)/tc.gp as average_pts,(tc.Min::float)/tc.gp as average_minutes
from team_cumulative tc,team t,player p
where t.team_id = p.team_id and p.player_id = tc.player_id
```

	team_name character varying (100)	player_id integer	player_name character varying (100)	average_pts double precision	average_minutes double precision
1	Albion	1	Adam_Davis	3	11.6111111111111
2	Albion	2	Aquavius_Burks	5.8695652173913	17.3478260869565
3	Albion	3	Arshawyn_Parker	4.77777777777778	10.6666666666667
4	Albion	4	Austin_Thompson	0.4	2.6
5	Albion	5	Caden_Ebeling	5.48	14.84
6	Albion	6	Corey_Wheeler	13.1363636363636	23.6363636363636
7	Albion	7	Dylan_Bennett	2.94736842105263	14.8421052631579
8	Albion	9	Jaylen_Fordham	6.52	18.48
9	Albion	10	Juwan_Perry	5	11.9285714285714
10	Albion	11	Nathaniel_Collins	8.5	19.2
11	Albion	12	Nathan_Kellum	1.58823529411765	6.76470588235294
12	Albion	13	Ojani_Echevarria	1.5	8.16666666666667
13	Albion	14	Quinton_Armstrong	8.43478260869565	16.9130434782609
14	Albion	15	Robert_Ryan	3.56	11.6
15	Albion	16	Ryan_Lowe	7.17391304347826	14.3913043478
16	Carthage	17	Adam_Radcliffe	0.4	2.2

2) get the “overall offensive PPP” of each player

```

2. get avg(overall_offensive_ppp)
create view avg_pts_minutes_overallOffensivePPP as
select apam.*,pa.ppp as overall_average_ppp
from avg_pts_and_minutes apam,player_average pa,category c,element e,format f
where pa.player_id = apam.player_id and pa.format_id = f.format_id and f.format_name = 'Offensive'
and pa.category_id = c.category_id and c.category_name = 'Overall Offense'
and pa.element_id = e.element_id and e.element_name = 'Player'

```

	team_name character varying (100)	player_id integer	player_name character varying (100)	average_pts double precision	average_minutes double precision	overall_average_ppp double precision
1	Albion	1	Adam_Davis	3	11.6111111111111	0.841
2	Albion	2	Aquavius_Burks	5.8695652173913	17.3478260869565	0.772
3	Albion	3	Arshawn_Parker	4.7777777777778	10.6666666666667	0.905
4	Albion	4	Austin_Thompson	0.4	2.6	0.667
5	Albion	5	Caden_Ebeling	5.48	14.84	0.792
6	Albion	6	Corey_Wheeler	13.1363636363636	23.6363636363636	0.964
7	Albion	7	Dylan_Bennett	2.94736842105263	14.8421052631579	0.908
8	Albion	9	Jaylen_Fordham	6.52	18.48	0.792
9	Albion	10	Juwan_Perry	5	11.9285714285714	0.972
10	Albion	11	Nathaniel_Collins	8.5	19.2	0.941
11	Albion	12	Nathan_Kellum	1.58823529411765	6.76470588235294	0.711
12	Albion	13	Ojani_Echevarria	1.5	8.1666666666667	0.5
13	Albion	14	Quinton_Armstrong	8.43478260869565	16.9130434782609	0.961
14	Albion	15	Robert_Ryan	3.56	18.04	0.659
15	Albion	16	Ryan_Lowe	7.17391304347826	14.3913043478261	1.078

3)get the “offensive strength” of players.

```

3.offensive_strength_of_all_players
create view offensive_strength_of_all_players as
select apmo.*,e.element_name,pa.percentage_of_time,pa.ppp as type_ppp,pa.field_goal_percentage
from avg_pts_minutes_overallOffensivePPP apmo,player_average pa,format f,category c,element e
where pa.player_id = apmo.player_id and pa.format_id = f.format_id and f.format_name = 'Offensive'
and pa.category_id = c.category_id and c.category_name = 'Play Types'
and pa.element_id = e.element_id and pa.ppp >apmo.overall_average_ppp
order by apmo.player_name DESC

```

	team_name character varying (100)	player_id integer	player_name character varying (100)	average_pts double precision	average_minutes double precision	overall_average_ppp double precision	element_name character varying (100)	percentage_of_time double precision	type_ppp double precision	field_goal_percentage double precision
1	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.736	Transition	0.187	1.412	0.75
2	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.736	Spot Up	0.352	0.938	0.37
3	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.736	Hand Off	0.011	2	1
4	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.736	Offensive Rebounds (put b...	0.011	2	[null]
5	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.777	Spot Up	0.51	0.95	0.403
6	WheatonIL	212	Zac_Holman	1.09090909090909	5.36363636363636	0.765	Offensive Rebounds (put b...	0.059	2	[null]
7	WheatonIL	212	Zac_Holman	1.09090909090909	5.36363636363636	0.765	Spot Up	0.529	1.222	0.5
8	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	0.842	Transition	0.069	1.143	0.5
9	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	0.842	Off Screen	0.03	1	0.333
10	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	0.842	Post-Up	0.059	1	0.5
11	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	0.842	Spot Up	0.376	1.053	0.429
12	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	0.842	Hand Off	0.02	2.5	1
13	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	0.842	Offensive Rebounds (put b...	0.04	1	0.667
14	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.784	P&R Roll Man	0.012	1.667	0.5
15	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.784	Off Screen	0.097	0.8	0.375
16	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.784	Isolation	0.1	0.923	0.455
17	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.784	Cut	0.081	1.143	0.571
18	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.784	Spot Up	0.297	0.844	0.357
19	WheatonIL	210	Tyrel_Derrick	1.28571428571429	4.5	1.062	Spot Up	0.313	1.6	0.75
20	WheatonIL	210	Tyrel_Derrick	1.28571428571429	4.5	1.062	Isolation	0.063	2	1
21	Knox	136	Tyre_Dukes	1.4	10.2	0.568	Off Screen	0.081	0.667	0.5
22	Knox	136	Tyre_Dukes	1.4	10.2	0.568	Offensive Rebounds (put b...	0.027	1	[null]
23	Knox	136	Tyre_Dukes	1.4	10.2	0.568	Isolation	0.081	0.667	0.333

#### 4) get the “offensive weakness” of players

```
4.offensive_weakness_of_all_players
create view offensive_weakness_of_all_players as
select apmo.*,e.element_name,pa.percentage_of_time,pa.ppp as type_ppp,pa.field_goal_percentage
from avg_pts_minutes_overallOffensivePPP apmo,player_average pa,format f,category c,element e
where pa.player_id = apmo.player_id and pa.format_id = f.format_id and f.format_name = 'Offensive'
and pa.category_id = c.category_id and c.category_name = 'Play Types'
and pa.element_id = e.element_id and pa.ppp < apmo.overall_average_ppp
order by apmo.player_name DESC
```

	team_name character varying (100)	player_id integer	player_name character varying (100)	average_pts double precision	average_minutes double precision	overall_average_ppp double precision	element_name character varying (100)	percentage_of_time double precision	type_ppp double precision	field_goal_percentage double precision
1	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.736	Cut	0.077	0.714	0.4
2	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.736	Miscellaneous	0.253	0.174	[null]
3	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.736	Isolation	0.055	0	0
4	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.736	P&R Ball Handler	0.055	0	0
5	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.777	Hand Off	0.038	0.667	0.2
6	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.777	Miscellaneous	0.064	0.7	0
7	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.777	Off Screen	0.102	0.625	0.333
8	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.777	Isolation	0.153	0.458	0.2
9	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.777	Transition	0.108	0.647	0.556
10	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.777	P&R Ball Handler	0.025	0.75	0.5
11	WheatonIL	212	Zac_Holman	1.09090909090909	5.36363636363636	0.765	Isolation	0.059	0	0
12	WheatonIL	212	Zac_Holman	1.09090909090909	5.36363636363636	0.765	Transition	0.059	0	0
13	WheatonIL	212	Zac_Holman	1.09090909090909	5.36363636363636	0.765	Miscellaneous	0.118	0	[null]
14	WheatonIL	212	Zac_Holman	1.09090909090909	5.36363636363636	0.765	Off Screen	0.176	0	0
15	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	0.842	P&R Roll Man	0.119	0.5	0.273
16	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	0.842	Miscellaneous	0.079	0	[null]

#### 5) get the “overall defensive PPP” for each player.

```
5. get avg(overall_Defensive_ppp)
create view avg_pts_minutes_overallDefensivePPP as
select apam.*,pa.ppp as overall_average_ppp
from avg_pts_and_minutes apam,player_average pa,category c,element e,format f
where pa.player_id = apam.player_id and pa.format_id = f.format_id and f.format_name = 'Defensive'
and pa.category_id = c.category_id and c.category_name = 'Overall Defense'
and pa.element_id = e.element_id and e.element_name = 'Player'
```

	team_name character varying (100)	player_id integer	player_name character varying (100)	average_pts double precision	average_minutes double precision	overall_average_ppp double precision
1	Albion	1	Adam_Davis	3	11.6111111111111	0.811
2	Albion	2	Aquavius_Burks	5.8695652173913	17.3478260869565	0.991
3	Albion	3	Arshawnn_Parker	4.77777777777778	10.6666666666667	1.125
4	Albion	4	Austin_Thompson	0.4	2.6	0.4
5	Albion	5	Caden_Ebeling	5.48	14.84	0.948
6	Albion	6	Corey_Wheeler	13.1363636363636	23.6363636363636	0.872
7	Albion	7	Dylan_Bennett	2.94736842105263	14.8421052631579	0.831
8	Albion	9	Jaylen_Fordham	6.52	18.48	1.081
9	Albion	10	Juwan_Perry	5	11.9285714285714	0.786



## 6). get “Defensive Strength” for all players

```

6.Defensive_strength_of_all_players
create view Defensive_strength_of_all_players as
select apmo.*,e.element_name,pa.percentage_of_time,pa.ppp as type_ppp,pa.field_goal_percentage
from avg_pts_minutes_overallDefensivePPP apmo,player_average pa,format f,category c,element e
where pa.player_id = apmo.player_id and pa.format_id = f.format_id and f.format_name = 'Defensive'
    and pa.category_id = c.category_id and c.category_name = 'Play Types'
    and pa.element_id = e.element_id and pa.ppp < apmo.overall_average_ppp
order by apmo.player_name DESC

```

	team_name character varying (100)	player_id integer	player_name character varying (100)	average_pts double precision	average_minutes double precision	overall_average_ppp double precision	element_name character varying (100)	percentage_of_time double precision	type_ppp double precision	field_goal_percentage double precision
1	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	Isolation	0.109	0.786	0.273
2	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	P&R Ball Handler	0.297	0.789	0.458
3	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	Spot Up	0.336	0.674	0.268
4	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	Hand Off	0.039	0.8	0.5
5	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	Post-Up	0.016	0	0
6	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.787	Off Screen	0.101	0.778	0.333
7	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.787	P&R Ball Handler	0.315	0.607	0.316
8	WheatonIL	212	Zac_Holman	1.09090909090909	5.36363636363636	0.923	P&R Ball Handler	0.308	0.5	0.5
9	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	1.118	P&R Ball Handler	0.029	1	0.5
10	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	1.118	Hand Off	0.059	0.75	0.25
11	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	1.118	Isolation	0.029	0	0
12	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	1.118	Spot Up	0.353	1.042	0.429
13	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.942	P&R Roll Man	0.026	0.75	0.333
14	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.942	Post-Up	0.038	0.333	0.2

## 7) get “Defensive Weakness” for all players

```

7.Defensive_weakness_of_all_players
create view offensive_weakness_of_all_players as
select apmo.*,e.element_name,pa.percentage_of_time,pa.ppp as type_ppp,pa.field_goal_percentage
from avg_pts_minutes_overallDefensivePPP apmo,player_average pa,format f,category c,element e
where pa.player_id = apmo.player_id and pa.format_id = f.format_id and f.format_name = 'Defensive'
    and pa.category_id = c.category_id and c.category_name = 'Play Types'
    and pa.element_id = e.element_id and pa.ppp > apmo.overall_average_ppp
order by apmo.player_name DESC

```

	team_name character varying (100)	player_id integer	player_name character varying (100)	average_pts double precision	average_minutes double precision	overall_average_ppp double precision	element_name character varying (100)	percentage_of_time double precision	type_ppp double precision	field_goal_percentage double precision
1	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	Isolation	0.109	0.786	0.273
2	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	P&R Ball Handler	0.297	0.789	0.458
3	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	Spot Up	0.336	0.674	0.268
4	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	Hand Off	0.039	0.8	0.5
5	WheatonIL	211	Zack_Kvam	2.57692307692308	16.9230769230769	0.82	Post-Up	0.016	0	0
6	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.787	Off Screen	0.101	0.778	0.333
7	GustavusAdolphus	312	Zach_Bloemker	6.04761904761905	15.8095238095238	0.787	P&R Ball Handler	0.315	0.607	0.316
8	WheatonIL	212	Zac_Holman	1.09090909090909	5.36363636363636	0.923	P&R Ball Handler	0.308	0.5	0.5
9	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	1.118	P&R Ball Handler	0.029	1	0.5
10	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	1.118	Hand Off	0.059	0.75	0.25
11	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	1.118	Isolation	0.029	0	0
12	NorthPark	250	Vegard_Tangen	3.69565217391304	15.9130434782609	1.118	Spot Up	0.353	1.042	0.429
13	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.942	P&R Roll Man	0.026	0.75	0.333
14	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.942	Post-Up	0.038	0.333	0.2
15	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.942	P&R Ball Handler	0.295	0.804	0.389
16	GustavusAdolphus	311	Vannis_Smith	8.41666666666667	21.4583333333333	0.942	Off Screen	0.103	0.812	0.357

### **5) Combine strength and weakness in csv file**

Create a new field in each results' row as "type", field\_name = 'strength'

Field\_name = 'weakness'

### **6) Normalization using "Adjustment Factor"**

After getting these stats, I noticed that it is very necessary and makes more sense to "normalize" them by comparing "league" average Possesions (Offensively and Defensively) with each team's possession(Offensively and Defensively).

The normalization formula is:

***Adjusted\_PPP = Unadjusted PPP(which we got above) \*normalize\_factor***

***(normalize factor = team\_average\_possesion/league\_average\_possesion)***

We use SQL below to get the average team\_possesion and opponent\_possesion:

```
create view tm_poss as
select t.team_id,t.team_name,ta.poss,
from team_average ta,format f,category c,element e, team t where
ta.format_id = f.format_id and ta.team_id = t.team_id and ta.category_id = c.category_id and ta.element_id = e.element_id
and f.format_name = 'Offensive' and c.category_name = 'Overall Offense' and e.element_name = 'Overall School'
```

```

get Opp_poss
create view Opp_poss as
select t.team_id,t.team_name,ta.poss
from team_average ta,format f,category c,element e, team t where
ta.format_id = f.format_id and ta.team_id = t.team_id and ta.category_id = c.category_id and ta.element_id = e.element_id
and f.format_name = 'Defensive' and c.category_name = 'Overall Defense' and e.element_name = 'Overall School'

```

```

-- get team and opp poss
create view team_and_opp_poss as
select tp.team_name, tp.team_id,tp.poss as team_poss,op.poss as opp_poss
from tm_poss tp, opp_poss op
where tp.team_id = op.team_id

```

```

-- get number of games played for each team
create view team_season_performance as
select distinct t.team_name,tg.season_win,tg.season_loss from team_game tg,team t
where t.team_id = tg.team_id

```

```

-- calculate team_average_poss and opp_average_poss
create view team_average_poss
select taop.team_name,(tsp.season_win+tsp.season_loss) as number_of_games,
(taop.team_poss::float)/(tsp.season_win+tsp.season_loss) as team_poss,
(taop.opp_poss::float)/(tsp.season_win+tsp.season_loss) as opp_poss
from team_and_opp_poss taop,team_season_performance tsp
where taop.team_name = tsp.team_name

```

team_name	number_o	team_poss	opp_poss	off_adjustment_factor	def_adjustment_factor
Albion	23	90.30435	86.52173913	1.096140749	1.040381498
Carthage	25	80.44	80.44	0.976404392	0.967251566
Chicago	25	82.4	80.84	1.000195449	0.97206137
CornellCollege	14	80.71429	81.42857143	0.979733753	0.979138653
DominicanIL	25	80.68	83.04	0.979317583	0.998515292
EastWest	17	92.70588	93.52941176	1.125291282	1.124645326
Fontbonne	15	99.93333	102.6666667	1.213020209	1.234516337
Knox	17	79	81.64705882	0.958925249	0.981765857
MoodyBible	5	82.8	91.4	1.005050767	1.099040193
MSOE	26	80.34615	79.96153846	0.97526526	0.961498301
Roosevelt	34	73	74.17647059	0.886095483	0.891935696
Wabash	26	80.11538	79.26923077	0.972464115	0.95317364
WheatonIL	26	81.07692	81.92307692	0.984135552	0.985084839
Kalamazoo	25	80.08	82.6	0.972034606	0.993224507
NorthPark	25	78.6	80.88	0.954069931	0.972542351
UWPlatteville	29	76.31034	77.24137931	0.926277423	0.92878972
OlivetCollege	28	93.82143	92.21428571	1.13883211	1.10883158
Rose-Hulman	26	79.88462	81.53846154	0.96966297	0.980460028
GustavusAdolphus	25	73.36	73.32	0.890465269	0.881637057
IllinoisTech	19	82.10526	78.63157895	0.996617847	0.94550619
League_AVG		82.3839	83.1634735		

7) format the final version of CSV and visualize in Tableau

After getting those adjustment\_factors, we can merge them with the csv in which we have the unadjusted PPPs, and then use "Pandas" module in python to get the final individual "adjusted PPPs"

Merge:

```
import pandas as pd

adjustments = pd.read_csv('C:/Users/lchen/Desktop/Some_valuable_queries/Strength_and_Weakness/Player/2.0/adjustments.csv')
offense = pd.read_csv('C:/Users/lchen/Desktop/Some_valuable_queries/Strength_and_Weakness/Player/2.0/Offense.csv')
defense = pd.read_csv('C:/Users/lchen/Desktop/Some_valuable_queries/Strength_and_Weakness/Player/2.0/Defense.csv')
offense_adjust = pd.merge(adjustments, offense, on = 'team_name')
offense_adjust.to_csv('Offense_Adjusted.csv')
offense_adjust = pd.merge(adjustments, defense, on = 'team_name')
offense_adjust.to_csv('Defense_Adjusted.csv')
```

Calculate the adjusted\_PPPs:

```
import pandas as pd

offense_with_adjust_factor = pd.read_csv('C:/Users/lchen/Desktop/Some_valuable_queries/Strength_and_Weakness/Player/2.0/Offense_Adjusted.csv')
defense_with_adjust_factor = pd.read_csv('C:/Users/lchen/Desktop/Some_valuable_queries/Strength_and_Weakness/Player/2.0/Defense_Adjusted.csv')

offensive = pd.DataFrame(offense_with_adjust_factor)
defensive = pd.DataFrame(defense_with_adjust_factor)

offensive['Adjusted_Overall_Average_PPP'] = offensive['overall_average_ppp'] * offensive['off_adjustment_factor']
offensive['Adjusted_Type_PPP'] = offensive['type_ppp'] * offensive['off_adjustment_factor']
offensive.to_csv('Offensive_Adjusted_Players.csv')

defensive['Adjusted_Overall_Average_PPP'] = defensive['overall_average_ppp'] * defensive['def_adjustment_factor']
defensive['Adjusted_Type_PPP'] = defensive['type_ppp'] * defensive['def_adjustment_factor']
defensive.to_csv('Defensive_Adjusted_Players.csv')
```

Final version table:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
team_name	number_of_games	team_pos	opp_pos	off_adj	def_adj	Format	Type	player_id	player_nam	average_p	average_r	overall_av	element_r	percentage	type_ppp	field_goal	Adjusted	Adjusted	Type_PP
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	16	Ryan_Low	7.173913	14.3913	1.078	Transition	0.033	1.4	0.75	1.18164	1.534597	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	16	Ryan_Low	7.173913	14.3913	1.078	Offensive	0.248	1.342	0.742	1.18164	1.471021	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	16	Ryan_Low	7.173913	14.3913	1.078	Cut	0.098	1.4	0.75	1.18164	1.534597	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	15	Robert_Ry	3.56	18.04	0.659	Spot Up	0.523	0.812	0.352	0.722357	0.890066	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	15	Robert_Ry	3.56	18.04	0.659	Transition	0.114	1.133	0.375	0.722357	1.241927	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	15	Robert_Ry	3.56	18.04	0.659	Off Screen	0.023	0.667	0.333	0.722357	0.731126	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	15	Robert_Ry	3.56	18.04	0.659	Cut	0.023	1.667	1	0.722357	1.827267	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	14	Quinton_A	8.434783	16.91304	0.961	Transition	0.054	1.727	0.9	1.053391	1.893035	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	14	Quinton_A	8.434783	16.91304	0.961	Cut	0.123	1	0.571	1.053391	1.096141	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	14	Quinton_A	8.434783	16.91304	0.961	Offensive	0.137	1.214	0.636	1.053391	1.330715	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	14	Quinton_A	8.434783	16.91304	0.961	P&R Roll N	0.015	1	0.333	1.053391	1.096141	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	13	Ojani_Echi	1.5	8.166667	0.5	Spot Up	0.389	0.857	0.286	0.54807	0.939393	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	13	Ojani_Echi	1.5	8.166667	0.5	Transition	0.167	1	0.5	0.54807	1.096141	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	11	Nathaniel	8.5	19.2	0.941	Hand Off	0.054	1.5	0.667	1.031468	1.644211	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	11	Nathaniel	8.5	19.2	0.941	Transition	0.227	1.119	0.485	1.031468	1.226581	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	11	Nathaniel	8.5	19.2	0.941	Cut	0.016	1	0.5	1.031468	1.096141	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	11	Nathaniel	8.5	19.2	0.941	Isolation	0.032	1.167	0.667	1.031468	1.279196	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	12	Nathan_Ki	1.588235	6.764706	0.711	Cut	0.237	0.889	0.429	0.779356	0.974469	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	12	Nathan_Ki	1.588235	6.764706	0.711	Spot Up	0.053	1	0.5	0.779356	1.096141	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	12	Nathan_Ki	1.588235	6.764706	0.711	Transition	0.132	1.2	0.6	0.779356	1.315369	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	12	Nathan_Ki	1.588235	6.764706	0.711	Offensive	0.105	1	0.5	0.779356	1.096141	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	10	Juwan_Pei	5	11.92857	0.972		0.069	1.4	1	1.065449	1.534597	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	10	Juwan_Pei	5	11.92857	0.972	P&R Ball H	0.028	1.5	1	1.065449	1.644211	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	10	Juwan_Pei	5	11.92857	0.972	Transition	0.208	1.133	0.545	1.065449	1.241927	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	10	Juwan_Pei	5	11.92857	0.972	Cut	0.028	1	1	1.065449	1.096141	
Albion	23	90.30434783	86.52173913	1.096141	1.040381	Offensive	Strength	9	Jaylen_For	6.52	18.48	0.792	Off Screen	0.088	0.895	0.438	0.868143	0.981046	

Tableau visualization:

[https://public.tableau.com/profile/chenjie.li#!/vizhome/Adjusted\\_Player\\_Strengt](https://public.tableau.com/profile/chenjie.li#!/vizhome/Adjusted_Player_Strengt)  
[h Weakness/Dashboard1](#)

## 4.Conclusions

Here are some of (not all of them) the conclusions we got for IIT players specifically.

Player:

Anthony Mosley:

He should reduce the number of ISOs.

He is good at transition, probably coach should give more chances to him when in a transition.

Jake\_Bruns:

He should reduce the number of "Off Screens"

He should be given more chances of P&Rs and Transitions.

Jake Digiorio:

He should reduce the number of "Spot-Ups"

He should be given more chances of "Cuts" and "Post-Ups"

Malick Howze:

He is not good at P&R

Do more "ISO" and "Transition" is a good idea for him

Max Hisatake:

He is not very efficient in post-up

He can do more on "Cut"

## 3.2 Teams

With the same logic, I can get the similar visualizations for Teams. The only difference I used different filter : score difference, so that we will be able to filter opponents by last season's game results.

Here is the visualization of Teams:

<https://public.tableau.com/profile/chenjie.li#!/vizhome/AdjustedTeamsStrengthAndWeakness/Dashboard1>