

Player Statistics Scraping

There are a couple of possible data sources for NBA data. The easiest to scrape is basketball-reference.com, but there are multiple issues with their data. The first issue, in my opinion, is they use estimated possessions to calculate their per-possession statistics, whereas NBA.com stats are calculated with actual possession counts. Secondly, nba.com has more statistics, including tracking statistics.

The downside of NBA.com is that it is not an HTML website. It is completely dynamic, meaning I need to use Selenium to scrape the content.

My general model for the NBA.com website is in 'NBA Project Organization.csv'

General Scraping and Creating Methodology

This was not decided until December, 2022, so I have some edits to make. Assuming they are all done correctly, this will be able to be run through.

It will go:

- Download all data into files / folders (initial scrape)
- Scrape games occurred
- Check Games Occured List against data in folders
- Scrape data where missing
- Append data
- Create Aggregate Files with appended data

To Scrape

- NBA Player Data
 - General
 - Clutch
 - Playtype (Offense)
 - Playtype (Defense)
 - Tracking
 - Defensive Dashboard
 - Shot Dashboard
 - General
 - Shotclock
 - Dribbles
 - Touch Time
 - Closest Defender
 - Box Scores
 - Box Scores (Advanced)
 - Shooting
 - Opponent Shooting
 - Hustle
 - Box Outs

```
In [ ]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import matplotlib.ticker as mtick
import sqlite3
import seaborn as sns
from matplotlib.offsetbox import OffsetImage, AnnotationBbox
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
from bs4 import BeautifulSoup
from selenium.webdriver.common.by import By
from selenium.webdriver.support.ui import WebDriverWait
from selenium.webdriver.support import expected_conditions as EC
import time
import requests
import shutil
import datetime
from scipy.stats import norm
import os
import winsound
```

```
In [ ]: home_folder = 'C:\\\\Users\\\\Travis\\\\OneDrive\\\\Data Science\\\\Personal_Projects\\\\Sports'
os.chdir(home_folder)
```

Scraping Player Statistics

Note: Shooting and Opponent Shooting folders have been placed in "Shot Dashboard", because it seemed to make some sense.

Define Functions

```
In [ ]: driver = webdriver.Chrome()
```

```
In [ ]: def replace_name_values(filename):
        # replace values with dashes for compatibility
        filename = filename.replace('%', '_')
        filename = filename.replace('=', '_')
        filename = filename.replace('?', '_')
        filename = filename.replace('&', '_')
        filename = filename.replace('20Season_', '')
        filename = filename.replace('20Season', '')
        return filename
```

```
In [ ]: def grab_player_data(url_list, file_folder):  
    # Scrape Season-Level player data from the url_list  
  
    i = 0  
    for u in url_list:  
  
        driver.get(u)  
        time.sleep(2)  
  
        # if the page does not load, go to the next in the list  
        try:  
            xpath = '//*[@id="__next"]/div[2]/div[2]/div[3]/section[2]/'  
            elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.XPATH, xpath)))  
        except:  
            print(f'{u} did not load. Moving to next url.')  
            continue  
  
        # click "all pages"  
        xpath_all = '//*[@id="__next"]/div[2]/div[2]/div[3]/section[2]/div/  
        elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.XPATH, xpath_all)))  
  
        driver.find_element(by=By.XPATH, value=xpath_all).click()  
        src = driver.page_source  
        parser = BeautifulSoup(src, "lxml")  
        table = parser.find("table", attrs = {"class":"Crom_table__plizz"})  
        headers = table.findAll('th')  
        headerlist = [h.text.strip() for h in headers[0:]]  
        row_names = table.findAll('a')  
        row_list = [b.text.strip() for b in row_names[0:]]  
        rows = table.findAll('tr')[0:]  
        player_stats = [[td.getText().strip() for td in rows[i].findAll('td')] for i in range(len(rows))]  
        tot_cols = len(player_stats[1])  
        headerlist = headerlist[:tot_cols]  
        stats = pd.DataFrame(player_stats, columns = headerlist)  
  
        # assign filename  
        filename = file_folder + str(u[34:]).replace('/', '_') + '.csv'  
        filename = replace_name_values(filename)  
        pd.DataFrame.to_csv(stats, filename)  
        i += 1  
        lu = len(url_list)  
        # close driver  
        print(f'{filename} Completed Successfully! {i} / {lu} Complete!')  
  
winsound.Beep(523, 500)
```

```
In [ ]: p = 'data/player/general/'  
        files = os.listdir(p)  
        # find the year in the filename  
        files = pd.DataFrame(files, columns = ['filename'])  
        files
```

Out[]: **filename**

```
In [ ]: # add column that scrapes the numbers from the filename
files['year'] = files['filename'].str.extract('(\d+)', expand = True)
files['year'] = files['year'].astype(int)
files
```

```
Out[ ]: filename year
```

```
In [ ]: def append_the_data(folder, data_prefix, filename_selector):
    # Appending data together via folder and/or file name

    path = folder
    p = os.listdir(path)
    pf = pd.DataFrame(p)

    # filter for files that contain the filename_selector
    pf_reg = pf.loc[pf[0].astype(str).str.contains(filename_selector)]
```



```
    appended_data = []
    for file in pf_reg[0]:
        data = pd.read_csv(folder + '/' + file)
        # if "Season" a column, drop it
        if 'Season' in data.columns:
            data = data.drop(columns = ['Season'])

        data['season'] = file[(file.find('20')):(file.find('20'))+4]
        data['season_type'] = np.where('Regular' in file, 'Regular', 'Playoffs')
        # add prefix to columns
        data = data.add_prefix(data_prefix)
        data.columns = data.columns.str.lower()
        appended_data.append(data)

    appended_data = pd.concat(appended_data)
    return appended_data
```

```
In [ ]: def replace_name_values2(filename):
    # replace values with dashes for compatibility
    filename = filename.replace('%', '_')
    filename = filename.replace('=', '_')
    filename = filename.replace('?', '_')
    filename = filename.replace('&', '_')
    filename = filename.replace('20Season_', '')
    filename = filename.replace('_20Season', '')
    filename = filename.replace('SeasonType_', '')
    filename = filename.replace('sort_gdate_dir_-1_', '')
    filename = filename.replace('SeasonYear_', '')
    return filename
```



```
In [ ]: def grab_player_playtype_defense(url_list, file_folder):
    driver = webdriver.Chrome()
    i = 0
    for u in url_list:
        driver.get(u)
        time.sleep(1)

        # go to defense page
        try:
            xpath_defense = '//*[@id="__next"]/div[2]/div[2]/div[3]/sec
            elem = WebDriverWait(driver, 30).until(EC.presence_of_eleme

        except:
            print(f'{u} did not load. Moving to next url.')
            continue

        driver.find_element(by=By.XPATH, value=xpath_defense).click()

        # select all
        # if the page does not load, go to the next in the list
        try:
            xpath = '//*[@id="__next"]/div[2]/div[2]/div[3]/section[2]/
            elem = WebDriverWait(driver, 30).until(EC.presence_of_eleme
        except:
            print(f'{u} did not load. Moving to next url.')
            continue

        driver.find_element(by=By.XPATH, value=xpath).click()
        src = driver.page_source
        parser = BeautifulSoup(src, "lxml")
        table = parser.find("table", attrs = {"class":"Crom_table_p1izz"})
        headers = table.findAll('th')
        headerlist = [h.text.strip() for h in headers[0:]]
        row_names = table.findAll('a')                                     # find r
        row_list = [b.text.strip() for b in row_names[0:]]
        rows = table.findAll('tr')[0:]
        player_stats = [[td.getText().strip() for td in rows[i].findAll('td
        tot_cols = len(player_stats[1])                                #set the
        headerlist = headerlist[:tot_cols]
        stats = pd.DataFrame(player_stats, columns = headerlist)
        filename = file_folder + str(u[34:]).replace('/', '_') + '.csv'
        filename = replace_name_values2(filename)
        filename = filename.replace('SeasonYear_', '')
        pd.DataFrame.to_csv(stats, filename)
        i += 1
        lu = len(url_list)
        print(f'{filename} Completed Successfully! {i} / {lu} Complete!')
        winsound.Beep(523, 500)
```

```
In [ ]: def get_shot_dashboard(url_list, file_folder, option_numbers,option_names):
    driver = webdriver.Chrome()
    i = 0
    # get first option
    for u in url_list:
        for option in option_numbers:
            driver.get(u)
            time.sleep(1)
            # get option xpath
            op = option + 1
            xpath_option = '/html/body/main/div/div[2]/div/div[1]/div[4'
            elem = WebDriverWait(driver, 30).until(EC.presence_of_element_locat
            driver.find_element(by=By.XPATH, value=xpath_option).click()
            # all pages
            xpath_all = '/html/body/main/div/div[2]/div/div/nba-stat-table/
            elem = WebDriverWait(driver, 30).until(EC.presence_of_element_locat
            driver.find_element(by=By.XPATH, value=xpath_all).click()
            src = driver.page_source
            parser = BeautifulSoup(src, "lxml")
            table = parser.find("div", attrs = {"class":"nba-stat-table__overfl
            headers = table.findAll('th')
            headerlist = [h.text.strip() for h in headers[0:]]
            row_names = table.findAll('a')                                     # find r
            row_list = [b.text.strip() for b in row_names[0:]]
            rows = table.findAll('tr')[0:]
            player_stats = [[td.getText().strip() for td in rows[i].findAll('td
            tot_cols = len(player_stats[2])                                         #set the
            headerlist = headerlist[:tot_cols]
            stats = pd.DataFrame(player_stats, columns = headerlist)
            filename = file_folder + str(u[34:]).replace('/', '_') + 'op_' + st
            filename = replace_name_values(filename)
            pd.DataFrame.to_csv(stats, filename)
            i += 1
            lu = len(url_list)
            print(f'{filename} Completed Successfully! {i} / {lu} Complete!')
```

In []: # There are lots of triple-to-sextuple merges to perform on the data.

```
def quad_merge(df1,df2,df3,df4, prefix1, prefix2, prefix3, prefix4):
    merge_cols1 = [(prefix1 + 'player'), (prefix1 + 'season'), (prefix1 + 'season_t')
    merge_cols2 = [(prefix2 + 'player'), (prefix2 + 'season'), (prefix2 + 'season_t')
    merge_cols3 = [(prefix3 + 'player'), (prefix3 + 'season'), (prefix3 + 'season_t')
    merge_cols4 = [(prefix4 + 'player'), (prefix4 + 'season'), (prefix4 + 'season_t')
    df = pd.merge(df1,df2, left_on=merge_cols1, right_on = merge_cols2, how='left')
    df = pd.merge(df,df3, left_on=merge_cols1, right_on = merge_cols3, how='left')
    df = pd.merge(df,df4, left_on=merge_cols1, right_on = merge_cols4, how='left')
    return df

def quintuple_merge(df1, df2, df3, df4, df5, prefix1, prefix2, prefix3, prefix4, pr
    merge_cols1 = [(prefix1 + 'player'), (prefix1 + 'season'), (prefix1 + 'season_t'
    merge_cols2 = [(prefix2 + 'player'), (prefix2 + 'season'), (prefix2 + 'season_t'
    merge_cols3 = [(prefix3 + 'player'), (prefix3 + 'season'), (prefix3 + 'season_t'
    merge_cols4 = [(prefix4 + 'player'), (prefix4 + 'season'), (prefix4 + 'season_t'
    merge_cols5 = [(prefix5 + 'player'), (prefix5 + 'season'), (prefix5 + 'season_t'
    df = pd.merge(df1,df2, left_on=merge_cols1, right_on = merge_cols2, how='left')
    df = pd.merge(df,df3, left_on=merge_cols1, right_on = merge_cols3, how='left')
    df = pd.merge(df,df4, left_on=merge_cols1, right_on = merge_cols4, how='left')
    df = pd.merge(df,df5, left_on=merge_cols1, right_on = merge_cols5, how='left')
    return df

def sextuple_merge(df1, df2, df3, df4, df5, df6, prefix1, prefix2, prefix3, prefix4
    merge_cols1 = [(prefix1 + 'player'), (prefix1 + 'season'), (prefix1 + 'season_t'
    merge_cols2 = [(prefix2 + 'player'), (prefix2 + 'season'), (prefix2 + 'season_t'
    merge_cols3 = [(prefix3 + 'player'), (prefix3 + 'season'), (prefix3 + 'season_t'
    merge_cols4 = [(prefix4 + 'player'), (prefix4 + 'season'), (prefix4 + 'season_t'
    merge_cols5 = [(prefix5 + 'player'), (prefix5 + 'season'), (prefix5 + 'season_t'
    merge_cols6 = [(prefix6 + 'player'), (prefix6 + 'season'), (prefix6 + 'season_t'
    df = pd.merge(df1,df2, left_on=merge_cols1, right_on = merge_cols2, how='left')
    df = pd.merge(df,df3, left_on=merge_cols1, right_on = merge_cols3, how='left')
    df = pd.merge(df,df4, left_on=merge_cols1, right_on = merge_cols4, how='left')
    df = pd.merge(df,df5, left_on=merge_cols1, right_on = merge_cols5, how='left')
    df = pd.merge(df,df6, left_on=merge_cols1, right_on = merge_cols6, how='left')
    return df

def triple_merge(df1, df2, df3, prefix1, prefix2, prefix3):
    merge_cols1 = [(prefix1 + 'player'), (prefix1 + 'season'), (prefix1 + 'season_t'
    merge_cols2 = [(prefix2 + 'player'), (prefix2 + 'season'), (prefix2 + 'season_t'
    merge_cols3 = [(prefix3 + 'player'), (prefix3 + 'season'), (prefix3 + 'season_t'
    df = pd.merge(df1,df2, left_on=merge_cols1, right_on = merge_cols2, how='left')
    df = pd.merge(df,df3, left_on=merge_cols1, right_on = merge_cols3, how='left')
    return df

def double_merge(df1, df2, prefix1, prefix2):
    merge_cols1 = [(prefix1 + 'player'), (prefix1 + 'season'), (prefix1 + 'season_t'
    merge_cols2 = [(prefix2 + 'player'), (prefix2 + 'season'), (prefix2 + 'season_t'
    df = pd.merge(df1,df2, left_on=merge_cols1, right_on = merge_cols2, how='left')
    return df

def single_merge(df1, prefix1):
    merge_cols1 = [(prefix1 + 'player'), (prefix1 + 'season'), (prefix1 + 'season_t'
    df = pd.merge(df1,df1, left_on=merge_cols1, right_on = merge_cols1, how='left')
    return df
```

Season-Level Player Stats (Complete 12.20)

This grabs season-level (or playoff-level) player data. I.e., one-season aggregate.

```
In [ ]: # This gets a list of all the urls for the player general stats for PREVIOUS YEARS

years = ['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17',
         '2015-16', '2014-15', '2013-14', '2012-13', '2011-12']
stat_types = ['traditional', 'advanced', 'misc', 'scoring', 'usage', 'opponent', 'de
season_types = ['Playoffs', 'Regular%20Season']

player_general_urls = []

for year in years:
    for stattype in stat_types:
        for s_types in season_types:
            url = 'https://www.nba.com/stats/players/' + stattype + '?SeasonType=' + s
            player_general_urls.append(url)
```

```
In [ ]: # add the 2022-23 season to the list of urls
year = '2022-23'
season_type = 'Regular%20Season'
for stattype in stat_types:
    url = 'https://www.nba.com/stats/players/' + stattype + '?SeasonType=' + season_t
    player_general_urls.append(url)
```

```
In [ ]: # translate urls to naming convention
def trans_urls(url):
    new_url = str(url)[34:].replace('/', '_')
    filename = replace_name_values(new_url)
    return filename
```

```
In [ ]: pg_url = pd.DataFrame(player_general_urls, columns = ['url'])
```

```
In [ ]: # apply lambda function to get filename
pg_url['filename'] = pg_url.apply(lambda row: trans_urls(row['url']), axis=1)
pg_url.head(2)
```

```
Out[ ]:          url                filename
0 https://www.nba.com/stats/players/traditional?... traditional_Playoffs_Season_2021-22
1 https://www.nba.com/stats/players/traditional?... traditional-Regular_Season_2021-22
```

```
In [ ]: # Get files in folder
folder = os.listdir('data/player/general')
folder = [x.replace('.csv', '') for x in folder]
```

```
In [ ]: # get list of files that need to be downloaded, the files that are not in the folder
to_download = pg_url[~pg_url['filename'].isin(folder)]
to_download
```

```
Out[ ]: url filename
37 https://www.nba.com/stats/players/usage?Season... usage_Regular_Season_2019-20
```

In []:	driver = webdriver.Chrome()
In []:	# if there are files to download, download them # turn url to list to_download_list = to_download['url'].tolist() if len(to_download_list) > 0: grab_player_data(to_download_list, 'data/player/general/') else: print('No files to download')
	data/player/general/usage_Regular_Season_2019-20.csv Completed Successfully! 1 / 1 Complete!
	Append Data
In []:	trad_data = append_the_data('data/player/general', 'trad_', 'traditional') print(f' data shape: {trad_data.shape}') trad_data.head(3)
	data shape: (8489, 33)
Out[]:	trad_unnamed: trad_unnamed: 0 1 trad_player trad_team trad_age trad_gp trad_w trad_l trad_
	0 0 NaN NaN NaN NaN NaN NaN NaN
	1 1 1.0 LeBron James MIA 27.0 23.0 16.0 7.0
	2 2 2.0 Kobe Bryant LAL 33.0 12.0 5.0 7.0
	3 rows × 33 columns
In []:	trad_data.to_csv('data/player/aggregates/player_general_traditional_seasonview.csv')
In []:	adv_data = append_the_data('data/player/general', 'adv_', 'advanced') print(f' data shape: {adv_data.shape}')
	data shape: (8489, 27)
In []:	adv_data.to_csv('data/player/aggregates/player_general_advanced_seasonview.csv')
	Defense stats
In []:	def_data = append_the_data('data/player/general', 'def_', 'defense')
In []:	def_data.to_csv('data/player/aggregates/player_general_defense_aggregates.csv')

Scoring Stats

```
In [ ]: scoring_data = append_the_data('data/player/general', 'scor_', 'scoring')
```

```
In [ ]: scoring_data.to_csv('data/player/aggregates/player_general_scoring_aggregates.csv')
```

Usage Stats

```
In [ ]: usage_data = append_the_data('data/player/general', 'usage_', 'usage')
usage_data.to_csv('data/player/aggregates/player_general_usage_aggregates.csv')
```

Opponent Stats

```
In [ ]: opponent_data = append_the_data('data/player/general', 'opp_', 'opponent')
opponent_data.to_csv('data/player/aggregates/player_general_opponent_aggregates.csv')
```

Misc stats

```
In [ ]: misc_data = append_the_data('data/player/general', 'misc_', 'misc')
misc_data.to_csv('data/player/aggregates/player_general_misc_aggregates.csv')
```

Merge All General Stats in one File

```
In [ ]: trad_data
```

Out[]:

	trad_unnamed: 0	trad_unnamed: 1	trad_player	trad_team	trad_age	trad_gp	trad_w	trad_l	trad_t
0	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	1	1.0	LeBron James	MIA	27.0	23.0	16.0	7.0	7.0
2	2	2.0	Kobe Bryant	LAL	33.0	12.0	5.0	7.0	7.0
3	3	3.0	Kevin Durant	OKC	23.0	20.0	13.0	7.0	7.0
4	4	4.0	Carmelo Anthony	NYK	28.0	5.0	1.0	4.0	4.0
...
485	485	476.0	Marko Simonovic	CHI	23.0	1.0	0.0	1.0	1.0
486	486	476.0	Michael Foster Jr.	PHI	19.0	1.0	1.0	0.0	0.0
487	487	476.0	Trevelin Queen	IND	25.0	2.0	1.0	1.0	1.0
488	488	476.0	Trevor Keels	NYK	19.0	1.0	1.0	0.0	0.0
489	489	476.0	Vernon Carey Jr.	WAS	21.0	3.0	2.0	1.0	1.0

8489 rows × 33 columns

```
In [ ]: trad_data['trad_season'] = trad_data['trad_season'].astype(np.int64)
```

```
In [ ]: adv_data.adv_season = adv_data.adv_season.astype(np.int64)
```

```
In [ ]: # merge advanced and traditional data
all_gen_data = pd.merge(adv_data, trad_data.drop_duplicates(subset = ['trad_player',
left_on= ['adv_player', 'adv_season', 'adv_season_type'],
right_on= ['trad_player', 'trad_season', 'trad_season_type'],
how = 'left'))
```

```
In [ ]: def_data['def_season'] = def_data['def_season'].astype(np.int64)
```

```
In [ ]: # merge defense data with adv&trad data
all_gen_data = pd.merge(all_gen_data, def_data.drop_duplicates(subset = ['def_player',
left_on= ['adv_player', 'adv_season', 'adv_season_type'],
right_on= ['def_player', 'def_season', 'def_season_type'],
how = 'left'))
```

```
In [ ]: scoring_data['scor_season'] = scoring_data['scor_season'].astype(np.int64)
```

```
In [ ]: # merge scoring data with adv&trad&def data

all_gen_data = pd.merge(all_gen_data, scoring_data.drop_duplicates(subset = ['scor_left_on= ['adv_player','adv_season', 'adv_season_type'],
right_on= ['scor_player','scor_season', 'scor_season_type'],
how = 'left')
```

```
In [ ]: usage_data['usage_season'] = usage_data['usage_season'].astype(np.int64)
```

```
In [ ]: # merge usage data with adv&trad&def&scoring data

all_gen_data = pd.merge(all_gen_data, usage_data.drop_duplicates(subset = ['usage_p
left_on= ['adv_player','adv_season', 'adv_season_type'],
right_on= ['usage_player','usage_season', 'usage_season_type'],
how = 'left')
```

```
In [ ]: all_gen_data.to_csv('data/player/aggregates/player_general_all_aggregates_seasonvie
```

Player - Clutch Through 2021 Season (Complete 12.22)

```
In [ ]: # make clutch folder
if os.path.isdir('data/player/clutch') is False:
    os.mkdir('data/player/clutch')
```

```
In [ ]: # URLs
traditional_clutch = 'https://www.nba.com/stats/players/clutch-traditional/?Season=
advanced_clutch = 'https://www.nba.com/stats/players/clutch-advanced/?Season='
misc_clutch = 'https://www.nba.com/stats/players/clutch-misc/?Season='
scoring_clutch = 'https://www.nba.com/stats/players/clutch-scoring/?Season='
usage_clutch = 'https://www.nba.com/stats/players/clutch-usage/?Season='

clutch_stats = [traditional_clutch, advanced_clutch, misc_clutch, scoring_clutch, u
seasonz = ['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17', '2015-16']

clutch_urls = []
for s in seasonz:
    for c in clutch_stats:
        clutch_urls.append(c + s + '&SeasonType=Regular%20Season')

clutch_urls_playoffs = []
for s in seasonz:
    for c in clutch_stats:
        clutch_urls_playoffs.append(c + s + '&SeasonType=Playoffs')

In [ ]: def clutch_url_to_filename(url):
    l = len('https://www.nba.com/stats/players/')
    url = url[l:]
    filename = replace_name_values2(url)
    filename = filename.replace('/', '_')
    return filename
```

```
In [ ]: # check urls against downloaded files
clutch_urls = pd.DataFrame(clutch_urls, columns = ['url'])
clutch_urls['filename'] = clutch_urls.apply(lambda row: clutch_url_to_filename(row['url']), axis=1)
# get rid of the .csv

clutch_urls.head(3)
```

```
Out[ ]:          url           filename
0 https://www.nba.com/stats/players/clutch-traditional_Season_2021-22-Regular
1 https://www.nba.com/stats/players/clutch-advanced_Season_2021-22-Regular
2 https://www.nba.com/stats/players/clutch-misc_Season_2021-22-Regular
```

```
In [ ]: files_in_folder = os.listdir('data/player/clutch/regular_season')

# remove .csv
files_in_folder = [f[:-4] for f in files_in_folder]
```

```
In [ ]: # get the files that are not in the clutch folder
missing = clutch_urls[~clutch_urls['filename'].isin(files_in_folder)]
missing
```

```
Out[ ]: url  filename
```

```
In [ ]: if len(missing) > 0:
    driver=webdriver.Chrome()
    grab_player_clutch_stats(missing, 'data/player/clutch')
else:
    print('no missing files')
```

```
no missing files
```

```
In [ ]: # check if data/player/clutch/regular_season exists
if os.path.isdir('data/player/clutch/regular_season') is False:
    os.mkdir('data/player/clutch/regular_season')

    # check if data/player/clutch/playoffs exists
if os.path.isdir('data/player/clutch/playoffs') is False:
    os.mkdir('data/player/clutch/playoffs')
```

```
In [ ]: # move files to regular season folder or playoffs folder

for f in 'data/player/clutch':
    if '.csv' in f:
        if 'Playoffs' in f:
            os.rename('data/player/clutch/' + f + '.csv', 'data/player/clutch/playoffs/' + f + '.csv')
        else:
            os.rename('data/player/clutch/' + f + '.csv', 'data/player/clutch/regular_season/' + f + '.csv')
```

```
In [ ]: # append clutch advanced data
c_adv_reg = append_the_data('data/player/clutch/regular_season', 'c_adv_', 'advanced')
c_adv_reg.to_csv('data/player/aggregates/clutch_advanced_regular_season.csv')

c_adv_playoffs = append_the_data('data/player/clutch/playoffs', 'c_adv_', 'advanced')
c_adv_playoffs.to_csv('data/player/aggregates/clutch_advanced_playoffs.csv')

# merge these dataframes
clutch_advanced = pd.concat([c_adv_reg, c_adv_playoffs])
clutch_advanced.to_csv('data/player/aggregates/clutch_advanced_AllSeasons.csv')

# append clutch traditional data
c_trad_reg = append_the_data('data/player/clutch/regular_season', 'c_trad_', 'traditional')
c_trad_reg.to_csv('data/player/aggregates/clutch_traditional_regular_season.csv')

c_trad_playoffs = append_the_data('data/player/clutch/playoffs', 'c_trad_', 'traditional')
c_trad_playoffs.to_csv('data/player/aggregates/clutch_traditional_playoffs.csv')

# merge these dataframes
clutch_traditional = pd.concat([c_trad_reg, c_trad_playoffs])
clutch_traditional.to_csv('data/player/aggregates/clutch_traditional_AllSeasons.csv')

#append clutch misc data
c_misc_reg = append_the_data('data/player/clutch/regular_season', 'c_misc_', 'misc')
c_misc_reg.to_csv('data/player/aggregates/clutch_misc_regular_season.csv')

c_misc_playoffs = append_the_data('data/player/clutch/playoffs', 'c_misc_', 'misc')
c_misc_playoffs.to_csv('data/player/aggregates/clutch_misc_playoffs.csv')

# merge these dataframes
clutch_misc = pd.concat([c_misc_reg, c_misc_playoffs])
clutch_misc.to_csv('data/player/aggregates/clutch_misc_AllSeasons.csv')

# append clutch scoring data

c_scoring_reg = append_the_data('data/player/clutch/regular_season', 'c_scoring_', 'scoring')
c_scoring_reg.to_csv('data/player/aggregates/clutch_scoring_regular_season.csv')

c_scoring_playoffs = append_the_data('data/player/clutch/playoffs', 'c_scoring_', 'scoring')
c_scoring_playoffs.to_csv('data/player/aggregates/clutch_scoring_playoffs.csv')

# merge these dataframes
clutch_scoring = pd.concat([c_scoring_reg, c_scoring_playoffs])
clutch_scoring.to_csv('data/player/aggregates/clutch_scoring_AllSeasons.csv')

# append clutch usage data
c_usage_reg = append_the_data('data/player/clutch/regular_season', 'c_usage_', 'usage')
c_usage_reg.to_csv('data/player/aggregates/clutch_usage_regular_season.csv')

c_usage_playoffs = append_the_data('data/player/clutch/playoffs', 'c_usage_', 'usage')
c_usage_playoffs.to_csv('data/player/aggregates/clutch_usage_playoffs.csv')

# merge these dataframes
clutch_usage = pd.concat([c_usage_reg, c_usage_playoffs])
clutch_usage.to_csv('data/player/aggregates/clutch_usage_AllSeasons.csv')
```

```
In [ ]: # append all clutch data
adv = pd.read_csv('data/player/aggregates/clutch_advanced_AllSeasons.csv')
trad = pd.read_csv('data/player/aggregates/clutch_traditional_AllSeasons.csv')
misc = pd.read_csv('data/player/aggregates/clutch_misc_AllSeasons.csv')
scoring = pd.read_csv('data/player/aggregates/clutch_scoring_AllSeasons.csv')
usage = pd.read_csv('data/player/aggregates/clutch_usage_AllSeasons.csv')
```

```
In [ ]: print(f' Advanced is {adv.shape}, Traditional is {trad.shape}, Misc is {misc.shape}')
Advanced is (5294, 27), Traditional is (5156, 34), Misc is (5294, 24), Scoring is
(5294, 27), Usage is (5294, 30)
```

```
In [ ]: all_clutch = pd.merge(adv, trad.drop_duplicates(subset = ['c_trad_player', 'c_trad_'
left_on= ['c_adv_player', 'c_adv_se'
right_on= ['c_trad_player', 'c_trad'
how= 'left'))
```

```
In [ ]: all_clutch = pd.merge(all_clutch, misc.drop_duplicates(subset = ['c_misc_player', '
left_on= ['c_adv_player', 'c_adv_se'
right_on= ['c_misc_player', 'c_misc'
how= 'left'))
all_clutch = pd.merge(all_clutch, scoring.drop_duplicates(subset = ['c_scoring_play'
left_on= ['c_adv_player', 'c_adv_se'
right_on= ['c_scoring_player', 'c_s
how= 'left'))
all_clutch = pd.merge(all_clutch, usage.drop_duplicates(subset = ['c_usage_player', '
left_on= ['c_adv_player', 'c_adv_se'
right_on= ['c_usage_player', 'c_usa
how= 'left'))
all_clutch.to_csv('data/player/aggregates/ALL_Clutch.csv')
```

```
C:\Users\Travis\AppData\Local\Temp\ipykernel_40784\4123100872.py:5: FutureWarning:
Passing 'suffixes' which cause duplicate columns {'Unnamed: 0_x'} in the result is
deprecated and will raise a MergeError in a future version.
    all_clutch = pd.merge(all_clutch, scoring.drop_duplicates(subset = ['c_scoring_pl
ayer', 'c_scoring_season', 'c_scoring_season_type']),
```

Player - Playtype - Offense (Complete 12.22)

Complete through 2021 season

```
In [ ]: years = ['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17', '2015-16'
playtypes = ['isolation', 'transition', 'ball-handler', 'roll-man',
            'playtype-post-up', 'spot-up', 'hand-off', 'cut',
            'off-screen', 'putbacks', 'misc']
season_types = ['Playoffs', 'Regular%20Season']

playtype_urlz = []

for year in years:
    for play in playtypes:
        for s_types in season_types:
            url = 'https://www.nba.com/stats/players/' + play + '?SeasonType=' + s_t
            playtype_urlz.append(str(url))

# delete any misc playoff urls, as they do not work
playtype_urlz.remove('https://www.nba.com/stats/players/misc?SeasonType=Playoffs&Se')
playtype_urlz.remove('https://www.nba.com/stats/players/misc?SeasonType=Playoffs&Se')
playtype_urlz.remove('https://www.nba.com/stats/players/misc?SeasonType=Playoffs&Se')
playtype_urlz.remove('https://www.nba.com/stats/players/misc?SeasonType=Playoffs&Se')
playtype_urlz.remove('https://www.nba.com/stats/players/misc?SeasonType=Playoffs&Se')
playtype_urlz.remove('https://www.nba.com/stats/players/misc?SeasonType=Playoffs&Se')
playtype_urlz.remove('https://www.nba.com/stats/players/misc?SeasonType=Playoffs&Se')

len(playtype_urlz)
```

```
Out[ ]: 147
```

```
In [ ]: to_download = pd.DataFrame(playtype_urlz, columns = ['url'])
```

```
In [ ]: def trans_urls(url):
    new_url = str(url)[34:].replace('/', '_')
    filename = replace_name_values2(new_url)
    filename = filename.replace('SeasonYear_', '')
    return filename
```

```
In [ ]: # create a new column with the filename  
to_download['filename'] = to_download.apply(lambda row: trans_urls(row['url']), axis=1)  
to_download
```

Out[]:

	url	filename
0	https://www.nba.com/stats/players/isolation?Se...	isolation_Playoffs_2021-22
1	https://www.nba.com/stats/players/isolation?Se...	isolation-Regular_2021-22
2	https://www.nba.com/stats/players/transition?S...	transition_Playoffs_2021-22
3	https://www.nba.com/stats/players/transition?S...	transition-Regular_2021-22
4	https://www.nba.com/stats/players/ball-handler...	ball-handler_Playoffs_2021-22
...
142	https://www.nba.com/stats/players/off-screen?S...	off-screen_Playoffs_2015-16
143	https://www.nba.com/stats/players/off-screen?S...	off-screen-Regular_2015-16
144	https://www.nba.com/stats/players/putbacks?Sea...	putbacks_Playoffs_2015-16
145	https://www.nba.com/stats/players/putbacks?Sea...	putbacks-Regular_2015-16
146	https://www.nba.com/stats/players/misc?SeasonT...	misc-Regular_2015-16

147 rows × 2 columns

```
In [ ]: # get list of all downloaded files  
downloaded_files = os.listdir('data/player/playtype')  
downloaded_files = [x.replace('.csv', '') for x in downloaded_files]
```

```
In [ ]: # get list of files not yet downloaded  
to_download = to_download[~to_download['filename'].isin(downloaded_files)]  
to_download_list = to_download.url.to_list()
```

```
In [ ]: to_download_list
```

```
Out[ ]: ['https://www.nba.com/stats/players/isolation?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/isolation?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/transition?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/transition?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/spot-up?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/spot-up?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/hand-off?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/hand-off?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/cut?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/cut?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/off-screen?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/off-screen?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/putbacks?SeasonType=Playoffs&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/putbacks?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/misc?SeasonType=Regular%20Season&SeasonYear=2021-22',
 'https://www.nba.com/stats/players/isolation?SeasonType=Playoffs&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/isolation?SeasonType=Regular%20Season&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/transition?SeasonType=Playoffs&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/transition?SeasonType=Regular%20Season&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Playoffs&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Regular%20Season&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Playoffs&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Regular%20Season&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Playoffs&SeasonYear=2020-21',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Regular%20Season&SeasonYear=2020-21']
```

'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Regular%20Season&SeasonYear=2020-21',
'https://www.nba.com/stats/players/spot-up?SeasonType=Playoffs&SeasonYear=2020-21',
'https://www.nba.com/stats/players/spot-up?SeasonType=Regular%20Season&SeasonYear=2020-21',
'https://www.nba.com/stats/players/hand-off?SeasonType=Playoffs&SeasonYear=2020-21',
'https://www.nba.com/stats/players/hand-off?SeasonType=Regular%20Season&SeasonYear=2020-21',
'https://www.nba.com/stats/players/cut?SeasonType=Playoffs&SeasonYear=2020-21',
'https://www.nba.com/stats/players/cut?SeasonType=Regular%20Season&SeasonYear=2020-21',
'https://www.nba.com/stats/players/off-screen?SeasonType=Playoffs&SeasonYear=2020-21',
'https://www.nba.com/stats/players/off-screen?SeasonType=Regular%20Season&SeasonYear=2020-21',
'https://www.nba.com/stats/players/putbacks?SeasonType=Playoffs&SeasonYear=2020-21',
'https://www.nba.com/stats/players/putbacks?SeasonType=Regular%20Season&SeasonYear=2020-21',
'https://www.nba.com/stats/players/misc?SeasonType=Regular%20Season&SeasonYear=2020-21',
'https://www.nba.com/stats/players/isolation?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/isolation?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/transition?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/transition?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/ball-handler?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/ball-handler?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/roll-man?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/roll-man?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/spot-up?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/spot-up?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/hand-off?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/hand-off?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/cut?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/cut?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/off-screen?SeasonType=Playoffs&SeasonYear=2019-20',
'https://www.nba.com/stats/players/off-screen?SeasonType=Regular%20Season&SeasonYear=2019-20',
'https://www.nba.com/stats/players/putbacks?SeasonType=Playoffs&SeasonYear=2019-20'

',
 'https://www.nba.com/stats/players/putbacks?SeasonType=Regular%20Season&SeasonYear=2019-20',
 'https://www.nba.com/stats/players/misc?SeasonType=Regular%20Season&SeasonYear=2019-20',
 'https://www.nba.com/stats/players/isolation?SeasonType=Playoffs&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/isolation?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/transition?SeasonType=Playoffs&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/transition?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Playoffs&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Playoffs&SeasonYear=2018-19',
 ',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Playoffs&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/spot-up?SeasonType=Playoffs&SeasonYear=2018-19',
 ',
 'https://www.nba.com/stats/players/spot-up?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/hand-off?SeasonType=Playoffs&SeasonYear=2018-19',
 ',
 'https://www.nba.com/stats/players/hand-off?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/cut?SeasonType=Playoffs&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/cut?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/off-screen?SeasonType=Playoffs&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/off-screen?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/putbacks?SeasonType=Playoffs&SeasonYear=2018-19',
 ',
 'https://www.nba.com/stats/players/putbacks?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/misc?SeasonType=Regular%20Season&SeasonYear=2018-19',
 'https://www.nba.com/stats/players/isolation?SeasonType=Playoffs&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/isolation?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/transition?SeasonType=Playoffs&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/transition?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Playoffs&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Playoffs&SeasonYear=2017-18'

',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Playoffs&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/spot-up?SeasonType=Playoffs&SeasonYear=2017-18',
 ',
 'https://www.nba.com/stats/players/spot-up?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/hand-off?SeasonType=Playoffs&SeasonYear=2017-18',
 ',
 'https://www.nba.com/stats/players/hand-off?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/cut?SeasonType=Playoffs&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/cut?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/off-screen?SeasonType=Playoffs&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/off-screen?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/putbacks?SeasonType=Playoffs&SeasonYear=2017-18',
 ',
 'https://www.nba.com/stats/players/putbacks?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/misc?SeasonType=Regular%20Season&SeasonYear=2017-18',
 'https://www.nba.com/stats/players/isolation?SeasonType=Playoffs&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/isolation?SeasonType=Regular%20Season&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/transition?SeasonType=Playoffs&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/transition?SeasonType=Regular%20Season&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Playoffs&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/ball-handler?SeasonType=Regular%20Season&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Playoffs&SeasonYear=2016-17',
 ',
 'https://www.nba.com/stats/players/roll-man?SeasonType=Regular%20Season&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Playoffs&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Regular%20Season&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/spot-up?SeasonType=Playoffs&SeasonYear=2016-17',
 ',
 'https://www.nba.com/stats/players/spot-up?SeasonType=Regular%20Season&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/hand-off?SeasonType=Playoffs&SeasonYear=2016-17',
 ',
 'https://www.nba.com/stats/players/hand-off?SeasonType=Regular%20Season&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/cut?SeasonType=Playoffs&SeasonYear=2016-17',
 'https://www.nba.com/stats/players/cut?SeasonType=Regular%20Season&SeasonYear=2016-17'

```
'https://www.nba.com/stats/players/off-screen?SeasonType=Playoffs&SeasonYear=2016-17',
'https://www.nba.com/stats/players/off-screen?SeasonType=Regular%20Season&SeasonYear=2016-17',
'https://www.nba.com/stats/players/putbacks?SeasonType=Playoffs&SeasonYear=2016-17',
',
'https://www.nba.com/stats/players/putbacks?SeasonType=Regular%20Season&SeasonYear=2016-17',
'https://www.nba.com/stats/players/misc?SeasonType=Regular%20Season&SeasonYear=2016-17',
'https://www.nba.com/stats/players/isolation?SeasonType=Playoffs&SeasonYear=2015-16',
'https://www.nba.com/stats/players/isolation?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/transition?SeasonType=Playoffs&SeasonYear=2015-16',
'https://www.nba.com/stats/players/transition?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/ball-handler?SeasonType=Playoffs&SeasonYear=2015-16',
'https://www.nba.com/stats/players/ball-handler?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/roll-man?SeasonType=Playoffs&SeasonYear=2015-16',
',
'https://www.nba.com/stats/players/roll-man?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Playoffs&SeasonYear=2015-16',
'https://www.nba.com/stats/players/playtype-post-up?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/spot-up?SeasonType=Playoffs&SeasonYear=2015-16',
',
'https://www.nba.com/stats/players/spot-up?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/hand-off?SeasonType=Playoffs&SeasonYear=2015-16',
',
'https://www.nba.com/stats/players/hand-off?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/cut?SeasonType=Playoffs&SeasonYear=2015-16',
'https://www.nba.com/stats/players/cut?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/off-screen?SeasonType=Playoffs&SeasonYear=2015-16',
'https://www.nba.com/stats/players/off-screen?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/putbacks?SeasonType=Playoffs&SeasonYear=2015-16',
',
'https://www.nba.com/stats/players/putbacks?SeasonType=Regular%20Season&SeasonYear=2015-16',
'https://www.nba.com/stats/players/misc?SeasonType=Regular%20Season&SeasonYear=2015-16']
```

```
In [ ]: len(to_download_list)
```

```
Out[ ]: 147
```

```
In [ ]: driver = webdriver.Chrome()
grab_playtype(to_download_list, 'data/player/playtype/')
```

data/player/playtype/isolation_Playoffs_2021-22.csv Completed Successfully! 1 / 147 Complete!
data/player/playtype/isolation-Regular_2021-22.csv Completed Successfully! 2 / 147 Complete!
data/player/playtype/transition_Playoffs_2021-22.csv Completed Successfully! 3 / 147 Complete!
data/player/playtype/transition-Regular_2021-22.csv Completed Successfully! 4 / 147 Complete!
data/player/playtype/ball-handler_Playoffs_2021-22.csv Completed Successfully! 5 / 147 Complete!
data/player/playtype/ball-handler-Regular_2021-22.csv Completed Successfully! 6 / 147 Complete!
data/player/playtype/roll-man_Playoffs_2021-22.csv Completed Successfully! 7 / 147 Complete!
data/player/playtype/roll-man-Regular_2021-22.csv Completed Successfully! 8 / 147 Complete!
data/player/playtype/playtype-post-up_Playoffs_2021-22.csv Completed Successfully! 9 / 147 Complete!
data/player/playtype/playtype-post-up-Regular_2021-22.csv Completed Successfully! 10 / 147 Complete!
data/player/playtype/spot-up_Playoffs_2021-22.csv Completed Successfully! 11 / 147 Complete!
data/player/playtype/spot-up-Regular_2021-22.csv Completed Successfully! 12 / 147 Complete!
data/player/playtype/hand-off_Playoffs_2021-22.csv Completed Successfully! 13 / 147 Complete!
data/player/playtype/hand-off-Regular_2021-22.csv Completed Successfully! 14 / 147 Complete!
data/player/playtype/cut_Playoffs_2021-22.csv Completed Successfully! 15 / 147 Complete!
data/player/playtype/cut-Regular_2021-22.csv Completed Successfully! 16 / 147 Complete!
data/player/playtype/off-screen_Playoffs_2021-22.csv Completed Successfully! 17 / 147 Complete!
data/player/playtype/off-screen-Regular_2021-22.csv Completed Successfully! 18 / 147 Complete!
data/player/playtype/putbacks_Playoffs_2021-22.csv Completed Successfully! 19 / 147 Complete!
data/player/playtype/putbacks-Regular_2021-22.csv Completed Successfully! 20 / 147 Complete!
data/player/playtype/misc-Regular_2021-22.csv Completed Successfully! 21 / 147 Complete!
data/player/playtype/isolation_Playoffs_2020-21.csv Completed Successfully! 22 / 147 Complete!
data/player/playtype/isolation-Regular_2020-21.csv Completed Successfully! 23 / 147 Complete!
data/player/playtype/transition_Playoffs_2020-21.csv Completed Successfully! 24 / 147 Complete!
data/player/playtype/transition-Regular_2020-21.csv Completed Successfully! 25 / 147 Complete!
data/player/playtype/ball-handler_Playoffs_2020-21.csv Completed Successfully! 26 / 147 Complete!
data/player/playtype/ball-handler-Regular_2020-21.csv Completed Successfully! 27 / 147 Complete!
data/player/playtype/roll-man_Playoffs_2020-21.csv Completed Successfully! 28 / 147 Complete!
data/player/playtype/roll-man-Regular_2020-21.csv Completed Successfully! 29 / 147 Complete!
data/player/playtype/playtype-post-up_Playoffs_2020-21.csv Completed Successfully!

30 / 147 Complete!
data/player/playtype/playtype-post-up_Regular_2020-21.csv Completed Successfully! 31 / 147 Complete!
data/player/playtype/spot-up_Playoffs_2020-21.csv Completed Successfully! 32 / 147 Complete!
data/player/playtype/spot-up_Regular_2020-21.csv Completed Successfully! 33 / 147 Complete!
data/player/playtype/hand-off_Playoffs_2020-21.csv Completed Successfully! 34 / 147 Complete!
data/player/playtype/hand-off_Regular_2020-21.csv Completed Successfully! 35 / 147 Complete!
data/player/playtype/cut_Playoffs_2020-21.csv Completed Successfully! 36 / 147 Complete!
data/player/playtype/cut_Regular_2020-21.csv Completed Successfully! 37 / 147 Complete!
data/player/playtype/off-screen_Playoffs_2020-21.csv Completed Successfully! 38 / 147 Complete!
data/player/playtype/off-screen_Regular_2020-21.csv Completed Successfully! 39 / 147 Complete!
data/player/playtype/putbacks_Playoffs_2020-21.csv Completed Successfully! 40 / 147 Complete!
data/player/playtype/putbacks_Regular_2020-21.csv Completed Successfully! 41 / 147 Complete!
data/player/playtype/misc_Regular_2020-21.csv Completed Successfully! 42 / 147 Complete!
data/player/playtype/isolation_Playoffs_2019-20.csv Completed Successfully! 43 / 147 Complete!
data/player/playtype/isolation_Regular_2019-20.csv Completed Successfully! 44 / 147 Complete!
data/player/playtype/transition_Playoffs_2019-20.csv Completed Successfully! 45 / 147 Complete!
data/player/playtype/transition_Regular_2019-20.csv Completed Successfully! 46 / 147 Complete!
data/player/playtype/ball-handler_Playoffs_2019-20.csv Completed Successfully! 47 / 147 Complete!
data/player/playtype/ball-handler_Regular_2019-20.csv Completed Successfully! 48 / 147 Complete!
data/player/playtype/roll-man_Playoffs_2019-20.csv Completed Successfully! 49 / 147 Complete!
data/player/playtype/roll-man_Regular_2019-20.csv Completed Successfully! 50 / 147 Complete!
data/player/playtype/playtype-post-up_Playoffs_2019-20.csv Completed Successfully! 51 / 147 Complete!
data/player/playtype/playtype-post-up_Regular_2019-20.csv Completed Successfully! 52 / 147 Complete!
data/player/playtype/spot-up_Playoffs_2019-20.csv Completed Successfully! 53 / 147 Complete!
data/player/playtype/spot-up_Regular_2019-20.csv Completed Successfully! 54 / 147 Complete!
data/player/playtype/hand-off_Playoffs_2019-20.csv Completed Successfully! 55 / 147 Complete!
data/player/playtype/hand-off_Regular_2019-20.csv Completed Successfully! 56 / 147 Complete!
data/player/playtype/cut_Playoffs_2019-20.csv Completed Successfully! 57 / 147 Complete!
data/player/playtype/cut_Regular_2019-20.csv Completed Successfully! 58 / 147 Complete!
data/player/playtype/off-screen_Playoffs_2019-20.csv Completed Successfully! 59 / 147 Complete!

data/player/playtype/off-screen_Regular_2019-20.csv Completed Successfully! 60 / 147 Complete!
data/player/playtype/putbacks_Playoffs_2019-20.csv Completed Successfully! 61 / 147 Complete!
data/player/playtype/putbacks_Regular_2019-20.csv Completed Successfully! 62 / 147 Complete!
data/player/playtype/misc_Regular_2019-20.csv Completed Successfully! 63 / 147 Complete!
data/player/playtype/isolation_Playoffs_2018-19.csv Completed Successfully! 64 / 147 Complete!
data/player/playtype/isolation_Regular_2018-19.csv Completed Successfully! 65 / 147 Complete!
data/player/playtype/transition_Playoffs_2018-19.csv Completed Successfully! 66 / 147 Complete!
data/player/playtype/transition_Regular_2018-19.csv Completed Successfully! 67 / 147 Complete!
data/player/playtype/ball-handler_Playoffs_2018-19.csv Completed Successfully! 68 / 147 Complete!
data/player/playtype/ball-handler_Regular_2018-19.csv Completed Successfully! 69 / 147 Complete!
data/player/playtype/roll-man_Playoffs_2018-19.csv Completed Successfully! 70 / 147 Complete!
data/player/playtype/roll-man_Regular_2018-19.csv Completed Successfully! 71 / 147 Complete!
data/player/playtype/playtype-post-up_Playoffs_2018-19.csv Completed Successfully! 72 / 147 Complete!
data/player/playtype/playtype-post-up_Regular_2018-19.csv Completed Successfully! 73 / 147 Complete!
data/player/playtype/spot-up_Playoffs_2018-19.csv Completed Successfully! 74 / 147 Complete!
data/player/playtype/spot-up_Regular_2018-19.csv Completed Successfully! 75 / 147 Complete!
data/player/playtype/hand-off_Playoffs_2018-19.csv Completed Successfully! 76 / 147 Complete!
data/player/playtype/hand-off_Regular_2018-19.csv Completed Successfully! 77 / 147 Complete!
data/player/playtype/cut_Playoffs_2018-19.csv Completed Successfully! 78 / 147 Complete!
data/player/playtype/cut_Regular_2018-19.csv Completed Successfully! 79 / 147 Complete!
data/player/playtype/off-screen_Playoffs_2018-19.csv Completed Successfully! 80 / 147 Complete!
data/player/playtype/off-screen_Regular_2018-19.csv Completed Successfully! 81 / 147 Complete!
data/player/playtype/putbacks_Playoffs_2018-19.csv Completed Successfully! 82 / 147 Complete!
data/player/playtype/putbacks_Regular_2018-19.csv Completed Successfully! 83 / 147 Complete!
data/player/playtype/misc_Regular_2018-19.csv Completed Successfully! 84 / 147 Complete!
data/player/playtype/isolation_Playoffs_2017-18.csv Completed Successfully! 85 / 147 Complete!
data/player/playtype/isolation_Regular_2017-18.csv Completed Successfully! 86 / 147 Complete!
data/player/playtype/transition_Playoffs_2017-18.csv Completed Successfully! 87 / 147 Complete!
data/player/playtype/transition_Regular_2017-18.csv Completed Successfully! 88 / 147 Complete!
data/player/playtype/ball-handler_Playoffs_2017-18.csv Completed Successfully! 89 /

147 Complete!
data/player/playtype/ball-handler_Regular_2017-18.csv Completed Successfully! 90 / 147 Complete!
data/player/playtype/roll-man_Playoffs_2017-18.csv Completed Successfully! 91 / 147 Complete!
data/player/playtype/roll-man_Regular_2017-18.csv Completed Successfully! 92 / 147 Complete!
data/player/playtype/playtype-post-up_Playoffs_2017-18.csv Completed Successfully! 93 / 147 Complete!
data/player/playtype/playtype-post-up_Regular_2017-18.csv Completed Successfully! 94 / 147 Complete!
data/player/playtype/spot-up_Playoffs_2017-18.csv Completed Successfully! 95 / 147 Complete!
data/player/playtype/spot-up_Regular_2017-18.csv Completed Successfully! 96 / 147 Complete!
data/player/playtype/hand-off_Playoffs_2017-18.csv Completed Successfully! 97 / 147 Complete!
data/player/playtype/hand-off_Regular_2017-18.csv Completed Successfully! 98 / 147 Complete!
data/player/playtype/cut_Playoffs_2017-18.csv Completed Successfully! 99 / 147 Complete!
data/player/playtype/cut_Regular_2017-18.csv Completed Successfully! 100 / 147 Complete!
data/player/playtype/off-screen_Playoffs_2017-18.csv Completed Successfully! 101 / 147 Complete!
data/player/playtype/off-screen_Regular_2017-18.csv Completed Successfully! 102 / 147 Complete!
data/player/playtype/putbacks_Playoffs_2017-18.csv Completed Successfully! 103 / 147 Complete!
data/player/playtype/putbacks_Regular_2017-18.csv Completed Successfully! 104 / 147 Complete!
data/player/playtype/misc_Regular_2017-18.csv Completed Successfully! 105 / 147 Complete!
data/player/playtype/isolation_Playoffs_2016-17.csv Completed Successfully! 106 / 147 Complete!
data/player/playtype/isolation_Regular_2016-17.csv Completed Successfully! 107 / 147 Complete!
data/player/playtype/transition_Playoffs_2016-17.csv Completed Successfully! 108 / 147 Complete!
data/player/playtype/transition_Regular_2016-17.csv Completed Successfully! 109 / 147 Complete!
data/player/playtype/ball-handler_Playoffs_2016-17.csv Completed Successfully! 110 / 147 Complete!
data/player/playtype/ball-handler_Regular_2016-17.csv Completed Successfully! 111 / 147 Complete!
data/player/playtype/roll-man_Playoffs_2016-17.csv Completed Successfully! 112 / 147 Complete!
data/player/playtype/roll-man_Regular_2016-17.csv Completed Successfully! 113 / 147 Complete!
data/player/playtype/playtype-post-up_Playoffs_2016-17.csv Completed Successfully! 114 / 147 Complete!
data/player/playtype/playtype-post-up_Regular_2016-17.csv Completed Successfully! 115 / 147 Complete!
data/player/playtype/spot-up_Playoffs_2016-17.csv Completed Successfully! 116 / 147 Complete!
data/player/playtype/spot-up_Regular_2016-17.csv Completed Successfully! 117 / 147 Complete!
data/player/playtype/hand-off_Playoffs_2016-17.csv Completed Successfully! 118 / 147 Complete!

data/player/playtype/hand-off_Regular_2016-17.csv Completed Successfully! 119 / 147 Complete!
data/player/playtype/cut_Playoffs_2016-17.csv Completed Successfully! 120 / 147 Complete!
data/player/playtype/cut-Regular_2016-17.csv Completed Successfully! 121 / 147 Complete!
data/player/playtype/off-screen_Playoffs_2016-17.csv Completed Successfully! 122 / 147 Complete!
data/player/playtype/off-screen-Regular_2016-17.csv Completed Successfully! 123 / 147 Complete!
data/player/playtype/putbacks_Playoffs_2016-17.csv Completed Successfully! 124 / 147 Complete!
data/player/playtype/putbacks-Regular_2016-17.csv Completed Successfully! 125 / 147 Complete!
data/player/playtype/misc-Regular_2016-17.csv Completed Successfully! 126 / 147 Complete!
data/player/playtype/isolation_Playoffs_2015-16.csv Completed Successfully! 127 / 147 Complete!
data/player/playtype/isolation-Regular_2015-16.csv Completed Successfully! 128 / 147 Complete!
data/player/playtype/transition_Playoffs_2015-16.csv Completed Successfully! 129 / 147 Complete!
data/player/playtype/transition-Regular_2015-16.csv Completed Successfully! 130 / 147 Complete!
data/player/playtype/ball-handler_Playoffs_2015-16.csv Completed Successfully! 131 / 147 Complete!
data/player/playtype/ball-handler-Regular_2015-16.csv Completed Successfully! 132 / 147 Complete!
data/player/playtype/roll-man_Playoffs_2015-16.csv Completed Successfully! 133 / 147 Complete!
data/player/playtype/roll-man-Regular_2015-16.csv Completed Successfully! 134 / 147 Complete!
data/player/playtype/playtype-post-up_Playoffs_2015-16.csv Completed Successfully! 135 / 147 Complete!
data/player/playtype/playtype-post-up-Regular_2015-16.csv Completed Successfully! 136 / 147 Complete!
data/player/playtype/spot-up_Playoffs_2015-16.csv Completed Successfully! 137 / 147 Complete!
data/player/playtype/spot-up-Regular_2015-16.csv Completed Successfully! 138 / 147 Complete!
data/player/playtype/hand-off_Playoffs_2015-16.csv Completed Successfully! 139 / 147 Complete!
data/player/playtype/hand-off-Regular_2015-16.csv Completed Successfully! 140 / 147 Complete!
data/player/playtype/cut_Playoffs_2015-16.csv Completed Successfully! 141 / 147 Complete!
data/player/playtype/cut-Regular_2015-16.csv Completed Successfully! 142 / 147 Complete!
data/player/playtype/off-screen_Playoffs_2015-16.csv Completed Successfully! 143 / 147 Complete!
data/player/playtype/off-screen-Regular_2015-16.csv Completed Successfully! 144 / 147 Complete!
data/player/playtype/putbacks_Playoffs_2015-16.csv Completed Successfully! 145 / 147 Complete!
data/player/playtype/putbacks-Regular_2015-16.csv Completed Successfully! 146 / 147 Complete!
data/player/playtype/misc-Regular_2015-16.csv Completed Successfully! 147 / 147 Complete!

```
In [ ]: # move files to proper respective folders
for file in os.listdir('data/player/playtype/'):
    if 'Playoffs' in file:
        shutil.move('data/player/playtype/' + file, 'data/player/playtype/playoffs/')
    elif 'Regular' in file:
        shutil.move('data/player/playtype/' + file, 'data/player/playtype/regular_s
```

```
In [ ]: # agg each sub-category
ball_handler_reg = append_the_data('data/player/playtype/regular_season/', 'playtype')
ball_handler_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype')
ball_handler = pd.concat([ball_handler_reg, ball_handler_playoffs], axis = 0)

ball_handler_reg.to_csv('data/player/aggregates/Playtype_Offense_Ball_Handler_Regular_Season.csv')
ball_handler_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Ball_Handler_Playoffs.csv')
ball_handler.to_csv('data/player/aggregates/Playtype_Offense_Ball_Handler_ALL.csv')

cutter_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_cut')
cutter_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_cut')
cutter = pd.concat([cutter_reg, cutter_playoffs], axis = 0)

cutter_reg.to_csv('data/player/aggregates/Playtype_Offense_Cutter-Regular_Season.csv')
cutter_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Cutter_Playoffs.csv')
cutter.to_csv('data/player/aggregates/Playtype_Offense_Cutter_ALL.csv')

hand_off_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_handoff')
hand_off_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_handoff')
hand_off = pd.concat([hand_off_reg, hand_off_playoffs], axis = 0)

hand_off_reg.to_csv('data/player/aggregates/Playtype_Offense_Hand_Off-Regular_Season.csv')
hand_off_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Hand_Off_Playoffs.csv')
hand_off.to_csv('data/player/aggregates/Playtype_Offense_Hand_Off_ALL.csv')

iso_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_isolation')
iso_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_isolation')
iso = pd.concat([iso_reg, iso_playoffs], axis = 0)

iso_reg.to_csv('data/player/aggregates/Playtype_Offense_Isolation-Regular_Season.csv')
iso_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Isolation_Playoffs.csv')
iso.to_csv('data/player/aggregates/Playtype_Offense_Isolation_ALL.csv')

# Note: NO PLAYOFF MISC
misc_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_misc')
misc = misc_reg

misc_reg.to_csv('data/player/aggregates/Playtype_Offense_Misc-Regular_Season.csv')
misc.to_csv('data/player/aggregates/Playtype_Offense_Misc_ALL.csv')

off_screen_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_offscreen')
off_screen_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_offscreen')
off_screen = pd.concat([off_screen_reg, off_screen_playoffs], axis = 0)

off_screen_reg.to_csv('data/player/aggregates/Playtype_Offense_Off_Screen-Regular_Season.csv')
off_screen_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Off_Screen_Playoffs.csv')
off_screen.to_csv('data/player/aggregates/Playtype_Offense_Off_Screen_ALL.csv')

postup_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_postup')
postup_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_postup')
postup = pd.concat([postup_reg, postup_playoffs], axis = 0)

postup_reg.to_csv('data/player/aggregates/Playtype_Offense_Post_Up-Regular_Season.csv')
postup_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Post_Up_Playoffs.csv')
postup.to_csv('data/player/aggregates/Playtype_Offense_Post_Up_ALL.csv')

putback_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_putback')
putback_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_putback')
putback = pd.concat([putback_reg, putback_playoffs], axis = 0)
```

```

putback = pd.concat([putback_reg, putback_playoffs], axis = 0)

putback_reg.to_csv('data/player/aggregates/Playtype_Offense_Putback-Regular_Season.csv')
putback_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Putback_Playoffs.csv')
putback.to_csv('data/player/aggregates/Playtype_Offense_Putback_ALL.csv')

rollman_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_rollman')
rollman_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_rollman')
rollman = pd.concat([rollman_reg, rollman_playoffs], axis = 0)

rollman_reg.to_csv('data/player/aggregates/Playtype_Offense_Roll_Man-Regular_Season.csv')
rollman_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Roll_Man-Playoffs.csv')
rollman.to_csv('data/player/aggregates/Playtype_Offense_Roll_Man_ALL.csv')

spotups_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_spotups')
spotups_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_spotups')
spotups = pd.concat([spotups_reg, spotups_playoffs], axis = 0)

spotups_reg.to_csv('data/player/aggregates/Playtype_Offense_Spot_Up-Regular_Season.csv')
spotups_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Spot_Up-Playoffs.csv')
spotups.to_csv('data/player/aggregates/Playtype_Offense_Spot_Up_ALL.csv')

transition_reg = append_the_data('data/player/playtype/regular_season/', 'playtype_transition')
transition_playoffs = append_the_data('data/player/playtype/playoffs/', 'playtype_transition')
transition = pd.concat([transition_reg, transition_playoffs], axis = 0)

transition_reg.to_csv('data/player/aggregates/Playtype_Offense_Transition-Regular_Season.csv')
transition_playoffs.to_csv('data/player/aggregates/Playtype_Offense_Transition-Playoffs.csv')
transition.to_csv('data/player/aggregates/Playtype_Offense_Transition_ALL.csv')

```

In []:

```
# get df sizes
print(f' ball_handler: {ball_handler.shape}, cutter: {cutter.shape}, hand_off: {hand_off.shape}, iso: {iso.shape}, misc: {misc.shape}, off_screen: {off_screen.shape}, postup: {postup.shape}, putbacks: {putbacks.shape}, rollman: {rollman.shape}, spotups: {spotups.shape}, transition: {transition.shape}')


ball_handler: (3025, 20), cutter: (3475, 20), hand_off: (2666, 20), iso: (2826, 20), misc: (3430, 23), off_screen: (2421, 20), postup: (1916, 20), putbacks: (3078, 20), rollman: (2379, 20), spotups: (4406, 20), transition: (4339, 20)
```

Because the 'spotups' has the most observations, and I want to use left join for all, I will start with misc.

Add Spotups to Transition

In []:

```
# turn season into int for both dfs
spotups['playtype_spot_up_season'] = spotups['playtype_spot_up_season'].astype(int)
transition['playtype_transition_season'] = transition['playtype_transition_season'].astype(int)
```

In []:

```
# There are duplicates for each team a player played for. We want to keep these, I will drop them.
dups = spotups[spotups.duplicated(subset = ['playtype_spot_up_season', 'playtype_spot_up_player'])]
dups = dups.sort_values(by = ['playtype_spot_up_player', 'playtype_spot_up_season'])
dups
```

Out[]:

	playtype_spot_up_unnamed:	playtype_spot_up_player	playtype_spot_up_team	playtype_spot_up_season
0				

```
In [ ]: spotups_dd = spotups.drop_duplicates(subset = ['playtype_spot_up_season', 'playtyp  
spotups_dd
```

```
Out[ ]: playtype_spot_up_unnamed: 0 playtype_spot_up_player playtype_spot_up_team playtype_spot  
  
0 0 NaN NaN  
1 1 Wesley Matthews DAL  
2 2 Kawhi Leonard SAS  
3 3 Marvin Williams CHA  
4 4 JR Smith CLE  
... ... ... ...  
183 183 Vlatko Cancar DEN  
184 184 George Hill MIL  
185 185 Jarrett Culver MEM  
186 186 Malachi Flynn TOR  
187 187 Javonte Green CHI
```

4406 rows × 20 columns

```
In [ ]: # check for duplicates  
spotups_dd[spotups_dd.duplicated(subset = ['playtype_spot_up_season', 'playtype_sp
```

```
Out[ ]: playtype_spot_up_unnamed: 0 playtype_spot_up_player playtype_spot_up_team playtype_spot_up  
  
0 0 NaN NaN  
1 1 Wesley Matthews DAL  
2 2 Kawhi Leonard SAS  
3 3 Marvin Williams CHA  
4 4 JR Smith CLE  
... ... ... ...  
183 183 Vlatko Cancar DEN  
184 184 George Hill MIL  
185 185 Jarrett Culver MEM  
186 186 Malachi Flynn TOR  
187 187 Javonte Green CHI
```

```
In [ ]: all_playtype_data = pd.merge(spotups, transition,  
                                     how = 'left',  
                                     left_on = ['playtype_spot_up_player', 'playtype_spot_u  
right_on = ['playtype_transition_player', 'playtype_tr
```

```
In [ ]: all_playtype_data
```

```
Out[ ]:   playtype_spot_up_unnamed:0  playtype_spot_up_player  playtype_spot_up_team  playtype_spo
          0                           NaN                         NaN
          1                           1   Wesley Matthews           DAL
          2                           2   Kawhi Leonard            SAS
          3                           3   Marvin Williams          CHA
          4                           4   JR Smith                CLE
          ...
          4401                      183   Vlatko Cancar          DEN
          4402                      184   George Hill              MIL
          4403                      185   Jarrett Culver          MEM
          4404                      186   Malachi Flynn             TOR
          4405                      187   Javonte Green            CHI
```

4406 rows × 40 columns

```
In [ ]: print(f' Spotups shape: {spotups.shape}, Transition shape: {transition.shape}, All
          Spotups shape: (4406, 20), Transition shape: (4339, 20), All Playtype shape: (4406, 40)
```

Add Cutter

```
In [ ]: cutter.head(2)
```

```
Out[ ]:   playtype_cut_unnamed:0  playtype_cut_player  playtype_cut_team  playtype_cut_gp  playtype_cu
          0                           0                           NaN                         NaN
          1                           1   Marcin Gortat           WAS             75.0
```

```
In [ ]: cutter['playtype_cut_season'] = cutter['playtype_cut_season'].astype(int)
```

```
In [ ]: all_playtype_data2 = pd.merge(all_playtype_data, cutter,
                                      how = 'left',
                                      left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                      right_on = ['playtype_cut_player', 'playtype_cut_seas
print(f' previous shape: {all_playtype_data.shape}, cutter shape: {cutter.shape}, n
previous shape: (4406, 40), cutter shape: (3475, 20), new shape: (4406, 60)
```

Add Ball Handler

```
In [ ]: ball_handler['playtype_ball_handler_season'] = ball_handler['playtype_ball_handler']
```

```
In [ ]: all_playtype_data3 = pd.merge(all_playtype_data2, ball_handler,
                                     how = 'left',
                                     left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                                right_on = ['playtype_ball_handler_player', 'playtype_
                                                print(f' previous shape: {all_playtype_data2.shape}, ball_handler shape: {ball_hand
previous shape: (4406, 60), ball_handler shape: (3025, 20), new shape: (4406, 80)
```

Add Hand Off

```
In [ ]: hand_off['playtype_hand_off_season'] = hand_off['playtype_hand_off_season'].astype(int)

In [ ]: all_playtype_data4 = pd.merge(all_playtype_data3, hand_off,
                                     how = 'left',
                                     left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                                right_on = ['playtype_hand_off_player', 'playtype_hand_
                                                print(f' previous shape: {all_playtype_data3.shape}, hand_off shape: {hand_off.shap
previous shape: (4406, 80), hand_off shape: (2666, 20), new shape: (4406, 100)
```

Add Isolation

```
In [ ]: iso['playtype_iso_season'] = iso['playtype_iso_season'].astype(int)

In [ ]: all_playtype_data5 = pd.merge(all_playtype_data4, iso,
                                     how = 'left',
                                     left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                                right_on = ['playtype_iso_player', 'playtype_iso_seas
                                                print(f' previous shape: {all_playtype_data4.shape}, iso shape: {iso.shape}, new sh
previous shape: (4406, 100), iso shape: (2826, 20), new shape: (4406, 120)
```

Add Off Screen

```
In [ ]: off_screen['playtype_off_screen_season'] = off_screen['playtype_off_screen_season'].astype(int)

In [ ]: all_playtype_data6 = pd.merge(all_playtype_data5, off_screen,
                                     how = 'left',
                                     left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                                right_on = ['playtype_off_screen_player', 'playtype_of
                                                print(f' previous shape: {all_playtype_data5.shape}, off_screen shape: {off_screen.
previous shape: (4406, 120), off_screen shape: (2421, 20), new shape: (4406, 140)
```

Add Postup

```
In [ ]: postup['playtype_postup_season'] = postup['playtype_postup_season'].astype(int)
```

```
In [ ]: all_playtype_data7 = pd.merge(all_playtype_data6, postup,
                                     how = 'left',
                                     left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                                 right_on = ['playtype_postup_player', 'playtype_postup

                                     print(f' previous shape: {all_playtype_data6.shape}, postup shape: {postup.shape},
                                         previous shape: (4406, 140), postup shape: (1916, 20), new shape: (4406, 160)
```

Add Putbacks

```
In [ ]: putback['playtype_putback_season'] = putback['playtype_putback_season'].astype(int)

In [ ]: all_playtype_data8 = pd.merge(all_playtype_data7, putback,
                                     how = 'left',
                                     left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                                 right_on = ['playtype_putback_player', 'playtype_putba

                                     print(f' previous shape: {all_playtype_data7.shape}, putback shape: {putback.shape}
                                         previous shape: (4406, 160), putback shape: (3078, 20), new shape: (4406, 180)
```

Add Roll Man

```
In [ ]: rollman['playtype_rollman_season'] = rollman['playtype_rollman_season'].astype(int)

In [ ]: all_playtype_data9 = pd.merge(all_playtype_data8, rollman,
                                     how = 'left',
                                     left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                                 right_on = ['playtype_rollman_player', 'playtype_rollm

                                     print(f' previous shape: {all_playtype_data8.shape}, rollman shape: {rollman.shape}
                                         previous shape: (4406, 180), rollman shape: (2379, 20), new shape: (4406, 200)
```

Add Misc

```
In [ ]: misc['playtype_misc_season'] = misc['playtype_misc_season'].astype(int)

In [ ]: all_playtype_data10 = pd.merge(all_playtype_data9, misc,
                                       how = 'left',
                                       left_on = ['playtype_spot_up_player', 'playtype_spot_u
                                                   right_on = ['playtype_misc_player', 'playtype_misc_se

                                       print(f' previous shape: {all_playtype_data9.shape}, misc shape: {misc.shape}, new
                                         previous shape: (4406, 200), misc shape: (3430, 23), new shape: (4406, 223)

In [ ]: all_playtype_data10.to_csv('data/player/aggregates/ALL_Playtypes_Offense.csv')
```

Player - Playtype - Defense (Complete 12.22)

```
In [ ]: if os.path.isdir('data/player/playtype/defense') is False:
    os.mkdir('data/player/playtype/defense')

def_playtypes = ['isolation', 'ball-handler', 'roll-man',
                 'playtype-post-up', 'spot-up', 'hand-off', 'off-screen']

yearz = ['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17', '2015-16'
        ]
def_playtype_urls = []
for year in yearz:
    for play in def_playtypes:
        for s_types in season_types:
            url = 'https://www.nba.com/stats/players/' + play + '?SeasonYear=' + year
            def_playtype_urls.append(str(url))
```

```
In [ ]: def_playtypes = pd.DataFrame(def_playtype_urls, columns=['url'])
def_playtypes.head(2)
```

Out[]:

	url
0	https://www.nba.com/stats/players/isolation/?S...
1	https://www.nba.com/stats/players/isolation/?S...

```
In [ ]: def_playtypes['filename'] = def_playtypes.apply(lambda row: trans_urls(row['url']),
def_playtypes.head(2)
```

Out[]:

	url	filename
0	https://www.nba.com/stats/players/isolation/?S... isolation_2021-22_Playoffs	
1	https://www.nba.com/stats/players/isolation/?S... isolation_2021-22-Regular	

```
In [ ]: # find already downloaded files
already_downloaded = os.listdir('data/player/playtype/defense')
already_downloaded = [x.replace('.csv', '') for x in already_downloaded]

# remove already downloaded files from the list
def_playtypes_not_dl = def_playtypes[~def_playtypes['filename'].isin(already_downloaded)]

need_to_dl = def_playtypes_not_dl['url'].to_list()

len(need_to_dl)
```

Out[]: 98

```
In [ ]: grab_player_playtype_defense(need_to_dl, 'data/player/playtype/defense/')
```

data/player/playtype/defense/isolation_2021-22_Playoffs.csv Completed Successfully! 1 / 98 Complete!
data/player/playtype/defense/isolation_2021-22-Regular.csv Completed Successfully! 2 / 98 Complete!
data/player/playtype/defense/ball-handler_2021-22_Playoffs.csv Completed Successfully! 3 / 98 Complete!
data/player/playtype/defense/ball-handler_2021-22-Regular.csv Completed Successfully! 4 / 98 Complete!
data/player/playtype/defense/roll-man_2021-22_Playoffs.csv Completed Successfully! 5 / 98 Complete!
data/player/playtype/defense/roll-man_2021-22-Regular.csv Completed Successfully! 6 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2021-22_Playoffs.csv Completed Successfully! 7 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2021-22-Regular.csv Completed Successfully! 8 / 98 Complete!
data/player/playtype/defense/spot-up_2021-22_Playoffs.csv Completed Successfully! 9 / 98 Complete!
data/player/playtype/defense/spot-up_2021-22-Regular.csv Completed Successfully! 10 / 98 Complete!
data/player/playtype/defense/hand-off_2021-22_Playoffs.csv Completed Successfully! 11 / 98 Complete!
data/player/playtype/defense/hand-off_2021-22-Regular.csv Completed Successfully! 12 / 98 Complete!
data/player/playtype/defense/off-screen_2021-22_Playoffs.csv Completed Successfully! 13 / 98 Complete!
data/player/playtype/defense/off-screen_2021-22-Regular.csv Completed Successfully! 14 / 98 Complete!
data/player/playtype/defense/isolation_2020-21_Playoffs.csv Completed Successfully! 15 / 98 Complete!
data/player/playtype/defense/isolation_2020-21-Regular.csv Completed Successfully! 16 / 98 Complete!
data/player/playtype/defense/ball-handler_2020-21_Playoffs.csv Completed Successfully! 17 / 98 Complete!
data/player/playtype/defense/ball-handler_2020-21-Regular.csv Completed Successfully! 18 / 98 Complete!
data/player/playtype/defense/roll-man_2020-21_Playoffs.csv Completed Successfully! 19 / 98 Complete!
data/player/playtype/defense/roll-man_2020-21-Regular.csv Completed Successfully! 20 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2020-21_Playoffs.csv Completed Successfully! 21 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2020-21-Regular.csv Completed Successfully! 22 / 98 Complete!
data/player/playtype/defense/spot-up_2020-21_Playoffs.csv Completed Successfully! 23 / 98 Complete!
data/player/playtype/defense/spot-up_2020-21-Regular.csv Completed Successfully! 24 / 98 Complete!
data/player/playtype/defense/hand-off_2020-21_Playoffs.csv Completed Successfully! 25 / 98 Complete!
data/player/playtype/defense/hand-off_2020-21-Regular.csv Completed Successfully! 26 / 98 Complete!
data/player/playtype/defense/off-screen_2020-21_Playoffs.csv Completed Successfully! 27 / 98 Complete!
data/player/playtype/defense/off-screen_2020-21-Regular.csv Completed Successfully! 28 / 98 Complete!
data/player/playtype/defense/isolation_2019-20_Playoffs.csv Completed Successfully! 29 / 98 Complete!
data/player/playtype/defense/isolation_2019-20-Regular.csv Completed Successfully!

30 / 98 Complete!
data/player/playtype/defense/ball-handler_2019-20_Playoffs.csv Completed Successfully! 31 / 98 Complete!
data/player/playtype/defense/ball-handler_2019-20-Regular.csv Completed Successfully! 32 / 98 Complete!
data/player/playtype/defense/roll-man_2019-20_Playoffs.csv Completed Successfully! 33 / 98 Complete!
data/player/playtype/defense/roll-man_2019-20-Regular.csv Completed Successfully! 34 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2019-20_Playoffs.csv Completed Successfully! 35 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2019-20-Regular.csv Completed Successfully! 36 / 98 Complete!
data/player/playtype/defense/spot-up_2019-20_Playoffs.csv Completed Successfully! 37 / 98 Complete!
data/player/playtype/defense/spot-up_2019-20-Regular.csv Completed Successfully! 38 / 98 Complete!
data/player/playtype/defense/hand-off_2019-20_Playoffs.csv Completed Successfully! 39 / 98 Complete!
data/player/playtype/defense/hand-off_2019-20-Regular.csv Completed Successfully! 40 / 98 Complete!
data/player/playtype/defense/off-screen_2019-20_Playoffs.csv Completed Successfully! 41 / 98 Complete!
data/player/playtype/defense/off-screen_2019-20-Regular.csv Completed Successfully! 42 / 98 Complete!
data/player/playtype/defense/isolation_2018-19_Playoffs.csv Completed Successfully! 43 / 98 Complete!
data/player/playtype/defense/isolation_2018-19-Regular.csv Completed Successfully! 44 / 98 Complete!
data/player/playtype/defense/ball-handler_2018-19_Playoffs.csv Completed Successfully! 45 / 98 Complete!
data/player/playtype/defense/ball-handler_2018-19-Regular.csv Completed Successfully! 46 / 98 Complete!
data/player/playtype/defense/roll-man_2018-19_Playoffs.csv Completed Successfully! 47 / 98 Complete!
data/player/playtype/defense/roll-man_2018-19-Regular.csv Completed Successfully! 48 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2018-19_Playoffs.csv Completed Successfully! 49 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2018-19-Regular.csv Completed Successfully! 50 / 98 Complete!
data/player/playtype/defense/spot-up_2018-19_Playoffs.csv Completed Successfully! 51 / 98 Complete!
data/player/playtype/defense/spot-up_2018-19-Regular.csv Completed Successfully! 52 / 98 Complete!
data/player/playtype/defense/hand-off_2018-19_Playoffs.csv Completed Successfully! 53 / 98 Complete!
data/player/playtype/defense/hand-off_2018-19-Regular.csv Completed Successfully! 54 / 98 Complete!
data/player/playtype/defense/off-screen_2018-19_Playoffs.csv Completed Successfully! 55 / 98 Complete!
data/player/playtype/defense/off-screen_2018-19-Regular.csv Completed Successfully! 56 / 98 Complete!
data/player/playtype/defense/isolation_2017-18_Playoffs.csv Completed Successfully! 57 / 98 Complete!
data/player/playtype/defense/isolation_2017-18-Regular.csv Completed Successfully! 58 / 98 Complete!
data/player/playtype/defense/ball-handler_2017-18_Playoffs.csv Completed Successfully! 59 / 98 Complete!

data/player/playtype/defense/ball-handler__2017-18_Regular.csv Completed Successfully! 60 / 98 Complete!
data/player/playtype/defense/roll-man__2017-18_Playoffs.csv Completed Successfully! 61 / 98 Complete!
data/player/playtype/defense/roll-man__2017-18_Regular.csv Completed Successfully! 62 / 98 Complete!
data/player/playtype/defense/playtype-post-up__2017-18_Playoffs.csv Completed Successfully! 63 / 98 Complete!
data/player/playtype/defense/playtype-post-up__2017-18_Regular.csv Completed Successfully! 64 / 98 Complete!
data/player/playtype/defense/spot-up__2017-18_Playoffs.csv Completed Successfully! 65 / 98 Complete!
data/player/playtype/defense/spot-up__2017-18_Regular.csv Completed Successfully! 66 / 98 Complete!
data/player/playtype/defense/hand-off__2017-18_Playoffs.csv Completed Successfully! 67 / 98 Complete!
data/player/playtype/defense/hand-off__2017-18_Regular.csv Completed Successfully! 68 / 98 Complete!
data/player/playtype/defense/off-screen__2017-18_Playoffs.csv Completed Successfully! 69 / 98 Complete!
data/player/playtype/defense/off-screen__2017-18_Regular.csv Completed Successfully! 70 / 98 Complete!
data/player/playtype/defense/isolation__2016-17_Playoffs.csv Completed Successfully! 71 / 98 Complete!
data/player/playtype/defense/isolation__2016-17_Regular.csv Completed Successfully! 72 / 98 Complete!
data/player/playtype/defense/ball-handler__2016-17_Playoffs.csv Completed Successfully! 73 / 98 Complete!
data/player/playtype/defense/ball-handler__2016-17_Regular.csv Completed Successfully! 74 / 98 Complete!
data/player/playtype/defense/roll-man__2016-17_Playoffs.csv Completed Successfully! 75 / 98 Complete!
data/player/playtype/defense/roll-man__2016-17_Regular.csv Completed Successfully! 76 / 98 Complete!
data/player/playtype/defense/playtype-post-up__2016-17_Playoffs.csv Completed Successfully! 77 / 98 Complete!
data/player/playtype/defense/playtype-post-up__2016-17_Regular.csv Completed Successfully! 78 / 98 Complete!
data/player/playtype/defense/spot-up__2016-17_Playoffs.csv Completed Successfully! 79 / 98 Complete!
data/player/playtype/defense/spot-up__2016-17_Regular.csv Completed Successfully! 80 / 98 Complete!
data/player/playtype/defense/hand-off__2016-17_Playoffs.csv Completed Successfully! 81 / 98 Complete!
data/player/playtype/defense/hand-off__2016-17_Regular.csv Completed Successfully! 82 / 98 Complete!
data/player/playtype/defense/off-screen__2016-17_Playoffs.csv Completed Successfully! 83 / 98 Complete!
data/player/playtype/defense/off-screen__2016-17_Regular.csv Completed Successfully! 84 / 98 Complete!
data/player/playtype/defense/isolation__2015-16_Playoffs.csv Completed Successfully! 85 / 98 Complete!
data/player/playtype/defense/isolation__2015-16_Regular.csv Completed Successfully! 86 / 98 Complete!
data/player/playtype/defense/ball-handler__2015-16_Playoffs.csv Completed Successfully! 87 / 98 Complete!
data/player/playtype/defense/ball-handler__2015-16_Regular.csv Completed Successfully! 88 / 98 Complete!
data/player/playtype/defense/roll-man__2015-16_Playoffs.csv Completed Successfully!

```
89 / 98 Complete!
data/player/playtype/defense/roll-man_2015-16-Regular.csv Completed Successfully!
90 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2015-16_Playoffs.csv Completed Successfully! 91 / 98 Complete!
data/player/playtype/defense/playtype-post-up_2015-16-Regular.csv Completed Successfully! 92 / 98 Complete!
data/player/playtype/defense/spot-up_2015-16_Playoffs.csv Completed Successfully! 93 / 98 Complete!
data/player/playtype/defense/spot-up_2015-16-Regular.csv Completed Successfully! 94 / 98 Complete!
data/player/playtype/defense/hand-off_2015-16_Playoffs.csv Completed Successfully! 95 / 98 Complete!
data/player/playtype/defense/hand-off_2015-16-Regular.csv Completed Successfully! 96 / 98 Complete!
data/player/playtype/defense/off-screen_2015-16_Playoffs.csv Completed Successfully! 97 / 98 Complete!
data/player/playtype/defense/off-screen_2015-16-Regular.csv Completed Successfully! 98 / 98 Complete!
```

```
In [ ]: # move files to the correct folder
for file in os.listdir('data/player/playtype/defense/'):
    if file.endswith('.csv'):
        if 'Playoffs' in file:
            shutil.move('data/player/playtype/defense/'+ file, 'data/player/playtyp
elif 'Regular' in file:
    shutil.move('data/player/playtype/defense/'+ file, 'data/player/playtyp
```

Aggregate

```
In [ ]: playtype_defense_reg = os.listdir('data/player/playtype/defense/regular_season/')
playtype_defense_playoffs = os.listdir('data/player/playtype/defense/playoffs/')
```

```
In [ ]: # agg reg_season ball handler
# agg each sub-category

d_ball_handler_reg = append_the_data('data/player/playtype/defense/regular_season/')
d_ball_handler_playoffs = append_the_data('data/player/playtype/defense/playoffs/',
d_ball_handler = pd.concat([d_ball_handler_reg, d_ball_handler_playoffs], axis = 0)

d_ball_handler_reg.to_csv('data/player/aggregates/Playtype_Defense_Ball_Handler_Reg'
d_ball_handler_playoffs.to_csv('data/player/aggregates/Playtype_Defense_Ball_Handle
d_ball_handler.to_csv('data/player/aggregates/Playtype_Defense_Ball_Handler_ALL.csv

d_hand_off_reg = append_the_data('data/player/playtype/defense/regular_season/', 'p
d_hand_off_playoffs = append_the_data('data/player/playtype/defense/playoffs/', 'pl
d_hand_off = pd.concat([d_hand_off_reg, d_hand_off_playoffs], axis = 0)

d_hand_off_reg.to_csv('data/player/aggregates/Playtype_Defense_Hand_Off-Regular_Sea
d_hand_off_playoffs.to_csv('data/player/aggregates/Playtype_Defense_Hand_Off_Playof
d_hand_off.to_csv('data/player/aggregates/Playtype_Defense_Hand_Off_ALL.csv')

d_iso_reg = append_the_data('data/player/playtype/defense/regular_season/', 'playty
d_iso_playoffs = append_the_data('data/player/playtype/defense/playoffs/', 'playtyp
d_iso = pd.concat([d_iso_reg, d_iso_playoffs], axis = 0)

d_iso_reg.to_csv('data/player/aggregates/Playtype_Defense_Isolation_Regular_Season.
d_iso_playoffs.to_csv('data/player/aggregates/Playtype_Defense_Isolation_Playoffs.c
d_iso.to_csv('data/player/aggregates/Playtype_Defense_Isolation_ALL.csv')

d_off_screen_reg = append_the_data('data/player/playtype/defense/regular_season/', 'd
d_off_screen_playoffs = append_the_data('data/player/playtype/defense/playoffs/', 'd
d_off_screen = pd.concat([d_off_screen_reg, d_off_screen_playoffs], axis = 0)

d_off_screen_reg.to_csv('data/player/aggregates/Playtype_Defense_Off_Screen_Regular
d_off_screen_playoffs.to_csv('data/player/aggregates/Playtype_Defense_Off_Screen_Pl
d_off_screen.to_csv('data/player/aggregates/Playtype_Defense_Off_Screen_ALL.csv')

d_postup_reg = append_the_data('data/player/playtype/defense/regular_season/', 'pla
d_postup_playoffs = append_the_data('data/player/playtype/defense/playoffs/', 'play
d_postup = pd.concat([d_postup_reg, d_postup_playoffs], axis = 0)

d_postup_reg.to_csv('data/player/aggregates/Playtype_Defense_Post_Up_Regular_Season
d_postup_playoffs.to_csv('data/player/aggregates/Playtype_Defense_Post_Up_Playoffs.
d_postup.to_csv('data/player/aggregates/Playtype_Defense_Post_Up_ALL.csv')

d_rollman_reg = append_the_data('data/player/playtype/defense/regular_season/', 'pl
d_rollman_playoffs = append_the_data('data/player/playtype/defense/playoffs/', 'pla
d_rollman = pd.concat([d_rollman_reg, d_rollman_playoffs], axis = 0)

d_rollman_reg.to_csv('data/player/aggregates/Playtype_Defense_Roll_Man_Regular_Sea
d_rollman_playoffs.to_csv('data/player/aggregates/Playtype_Defense_Roll_Man_Playoff
d_rollman.to_csv('data/player/aggregates/Playtype_Defense_Roll_Man_ALL.csv')

d_spotup_reg = append_the_data('data/player/playtype/defense/regular_season/', 'pla
d_spotup_playoffs = append_the_data('data/player/playtype/defense/playoffs/', 'play
d_spotup = pd.concat([d_spotup_reg, d_spotup_playoffs], axis = 0)

d_spotup_reg.to_csv('data/player/aggregates/Playtype_Defense_Spot_Up_Regular_Season
d_spotup_playoffs.to_csv('data/player/aggregates/Playtype_Defense_Spot_Up_Playoffs.
d_spotup.to_csv('data/player/aggregates/Playtype_Defense_Spot_Up_ALL.csv')
```

```
In [ ]: d_ball_handler
```

```
Out[ ]:   playtype_ball_handler_unnamed:0  playtype_ball_handler_player  playtype_ball_handler_team  playtype_ball_handler_possessions  
0          0                     NaN                NaN  
1          1        Reggie Jackson            DET  
2          2      Damian Lillard            POR  
3          3        Chris Paul             LAC  
4          4       Kemba Walker            CHA  
...        ...                   ...              ...  
46         46        Patty Mills            BKN  
47         47      Damion Lee             GSW  
48         48      Nikola Vucevic           CHI  
49         49     Andre Drummond            BKN  
50         50    Dewayne Dedmon            MIA
```

2577 rows × 20 columns

```
In [ ]: print(f' ball handler size: {d_ball_handler.shape}, hand off size: {d_hand_off.shape}, iso size: {d_iso.shape}, of screen size: {d_of_screen.shape}, post up size: {d_post_up.shape}, rollman: {d_rollman.shape}, spotup: {d_spotup.shape}')
```

ball handler size: (2577, 20), hand off size: (2280, 20), iso size: (2306, 20), of screen size: (2295, 20), post up size: (1814, 20), rollman: (1931, 20), spotup: (3141, 20)

```
In [ ]: # Merge the data

defensive_playtypes1 = pd.merge(d_spotup, d_ball_handler,
                                left_on = ['playtype_spot_up_team', 'playtype_spot'],
                                right_on = ['playtype_ball_handler_team', 'playtype_ball_handler'],
                                how = 'left')

defensive_playtypes2 = pd.merge(defensive_playtypes1, d_hand_off,
                                left_on = ['playtype_spot_up_team', 'playtype_spot'],
                                right_on = ['playtype_hand_off_team', 'playtype_hand_off'],
                                how = 'left')

defensive_playtypes3 = pd.merge(defensive_playtypes2, d_iso,
                                left_on = ['playtype_spot_up_team', 'playtype_spot'],
                                right_on = ['playtype_isolation_team', 'playtype_isolation'],
                                how = 'left')

defensive_playtypes4 = pd.merge(defensive_playtypes3, d_off_screen,
                                left_on = ['playtype_spot_up_team', 'playtype_spot'],
                                right_on = ['playtype_off_screen_team', 'playtype_off_screen'],
                                how = 'left')

defensive_playtypes5 = pd.merge(defensive_playtypes4, d_postup,
                                left_on = ['playtype_spot_up_team', 'playtype_spot'],
                                right_on = ['playtype_post_up_team', 'playtype_postup'],
                                how = 'left')

defensive_playtypes6 = pd.merge(defensive_playtypes5, d_rollman,
                                left_on = ['playtype_spot_up_team', 'playtype_spot'],
                                right_on = ['playtype_roll_man_team', 'playtype_rollman'],
                                how = 'left')

defensive playtypes3 size: (3141, 80), defensive playtypes2 size: (3141, 60), iso
size: (2306, 20)
```

```
In [ ]: # save to csv
defensive_playtypes6.to_csv('data/player/aggregates/Playtype_Defense_ALL.csv')
```

Player - Tracking (Complete 12.22)

```
In [ ]: def grab_player_tracking_stats(url_list, file_folder):
    driver = webdriver.Chrome()
    i = 0
    for u in url_list:
        driver.get(u)
        time.sleep(1)
        # if the page does not load, go to the next in the list
        try:
            xpath = '//*[@id="__next"]/div[2]/div[2]/div[3]/section[2]/'
            elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.XPATH, xpath)))
        except:
            print(f'{u} did not load. Moving to next url.')
            continue

        elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.XPATH, xpath)))
        driver.find_element(by=By.XPATH, value=xpath).click()
        src = driver.page_source
        parser = BeautifulSoup(src, "lxml")
        table = parser.find("table", attrs = {"class":"Crom_table_p1izz"})

        # get the headers
        headers = table.findAll('th')
        headerlist = [h.text.strip() for h in headers[0:]]

        # if there are repeated headers in headerList, delete them
        headerlist = [i for n, i in enumerate(headerlist) if i not in headerlist[0:n]]

        row_names = table.findAll('a')
        row_list = [b.text.strip() for b in row_names[0:]]
        rows = table.findAll('tr')[0:]
        player_stats = [[td.getText().strip() for td in rows[i].findAll('td')] for i in range(len(rows))]
        tot_cols = len(headerlist)
        headerlist = headerlist[:tot_cols]
        stats = pd.DataFrame(player_stats, columns = headerlist)

        filename = file_folder + str(u[34:]).replace('/', '_') + '.csv'
        filename = replace_name_values2(filename)
        filename = filename.replace('_Season_','')

        # save
        pd.DataFrame.to_csv(stats, filename)

        # increment counter
        i += 1
        lu = len(url_list)
        print(f'{filename} Completed Successfully! {i} / {lu} Complete!')
```

```
In [ ]: # Get URLs

drives = 'https://www.nba.com/stats/players/drives/?Season='      #=2018-19&SeasonTyp
defensive_impact = 'https://www.nba.com/stats/players/defensive-impact/?Season='
catch_n_shoot = 'https://www.nba.com/stats/players/catch-shoot/?Season='
passing = 'https://www.nba.com/stats/players/passing/?Season='
touches = 'https://www.nba.com/stats/players/touches/?Season='
pullup_shooting = 'https://www.nba.com/stats/players/pullup/?Season='
rebounds = 'https://www.nba.com/stats/players/rebounding/?Season='
offensive_rebounding = 'https://www.nba.com/stats/players/offensive-rebounding/?Sea
defensive_rebounding = 'https://www.nba.com/stats/players/defensive-rebounding/?Sea
shooting_efficiency = 'https://www.nba.com/stats/players/shooting-efficiency/?Seaso
speed_distance = 'https://www.nba.com/stats/players/speed-distance/?Season='
elbow_touch = 'https://www.nba.com/stats/players/elbow-touch/?Season='
postups= 'https://www.nba.com/stats/players/tracking-post-ups/?Season='
paint_touches = 'https://www.nba.com/stats/players/paint-touch/?Season='

tracking_stats = [drives, defensive_impact, catch_n_shoot, passing, touches, pullup
seasonz = ['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17', '2015-2021

tracking_urls = []
for s in seasonz:
    for t in tracking_stats:
        tracking_urls.append(t + s + '&SeasonType=Regular%20Season')
```

```
In [ ]: grab_player_tracking_stats(tracking_urls, 'data/player/tracking/')
```

data/player/tracking/drives_2021-22_Regular.csv Completed Successfully! 1 / 126 Complete!
data/player/tracking/defensive-impact_2021-22_Regular.csv Completed Successfully! 2 / 126 Complete!
data/player/tracking/catch-shoot_2021-22_Regular.csv Completed Successfully! 3 / 126 Complete!
data/player/tracking/passing_2021-22_Regular.csv Completed Successfully! 4 / 126 Complete!
data/player/tracking/touches_2021-22_Regular.csv Completed Successfully! 5 / 126 Complete!
data/player/tracking/pullup_2021-22_Regular.csv Completed Successfully! 6 / 126 Complete!
data/player/tracking/rebounding_2021-22_Regular.csv Completed Successfully! 7 / 126 Complete!
data/player/tracking/offensive-rebounding_2021-22_Regular.csv Completed Successfully! 8 / 126 Complete!
data/player/tracking/defensive-rebounding_2021-22_Regular.csv Completed Successfully! 9 / 126 Complete!
data/player/tracking/shooting-efficiency_2021-22_Regular.csv Completed Successfully! 10 / 126 Complete!
data/player/tracking/speed-distance_2021-22_Regular.csv Completed Successfully! 11 / 126 Complete!
<https://www.nba.com/stats/players/elbow-touch/?Season=2021-22&SeasonType=Regular%20>
Season did not load. Moving to next url.
data/player/tracking/tracking-post-ups_2021-22_Regular.csv Completed Successfully! 12 / 126 Complete!
data/player/tracking/paint-touch_2021-22_Regular.csv Completed Successfully! 13 / 126 Complete!
data/player/tracking/drives_2020-21_Regular.csv Completed Successfully! 14 / 126 Complete!
data/player/tracking/defensive-impact_2020-21_Regular.csv Completed Successfully! 15 / 126 Complete!
data/player/tracking/catch-shoot_2020-21_Regular.csv Completed Successfully! 16 / 126 Complete!
data/player/tracking/passing_2020-21_Regular.csv Completed Successfully! 17 / 126 Complete!
data/player/tracking/touches_2020-21_Regular.csv Completed Successfully! 18 / 126 Complete!
data/player/tracking/pullup_2020-21_Regular.csv Completed Successfully! 19 / 126 Complete!
data/player/tracking/rebounding_2020-21_Regular.csv Completed Successfully! 20 / 126 Complete!
data/player/tracking/offensive-rebounding_2020-21_Regular.csv Completed Successfully! 21 / 126 Complete!
data/player/tracking/defensive-rebounding_2020-21_Regular.csv Completed Successfully! 22 / 126 Complete!
data/player/tracking/shooting-efficiency_2020-21_Regular.csv Completed Successfully! 23 / 126 Complete!
data/player/tracking/speed-distance_2020-21_Regular.csv Completed Successfully! 24 / 126 Complete!
data/player/tracking/elbow-touch_2020-21_Regular.csv Completed Successfully! 25 / 126 Complete!
data/player/tracking/tracking-post-ups_2020-21_Regular.csv Completed Successfully! 26 / 126 Complete!
data/player/tracking/paint-touch_2020-21_Regular.csv Completed Successfully! 27 / 126 Complete!
data/player/tracking/drives_2019-20_Regular.csv Completed Successfully! 28 / 126 Complete!
data/player/tracking/defensive-impact_2019-20_Regular.csv Completed Successfully! 29 / 126 Complete!

9 / 126 Complete!
data/player/tracking/catch-shoot_2019-20_Regular.csv Completed Successfully! 30 / 1
26 Complete!
data/player/tracking/passing_2019-20_Regular.csv Completed Successfully! 31 / 126 C
omplete!
data/player/tracking/touches_2019-20_Regular.csv Completed Successfully! 32 / 126 C
omplete!
data/player/tracking/pullup_2019-20_Regular.csv Completed Successfully! 33 / 126 Co
mplete!
data/player/tracking/rebounding_2019-20_Regular.csv Completed Successfully! 34 / 12
6 Complete!
data/player/tracking/offensive-rebounding_2019-20_Regular.csv Completed Successfull
y! 35 / 126 Complete!
data/player/tracking/defensive-rebounding_2019-20_Regular.csv Completed Successfull
y! 36 / 126 Complete!
data/player/tracking/shooting-efficiency_2019-20_Regular.csv Completed Successfull
y! 37 / 126 Complete!
data/player/tracking/speed-distance_2019-20_Regular.csv Completed Successfully! 38
/ 126 Complete!
data/player/tracking/elbow-touch_2019-20_Regular.csv Completed Successfully! 39 / 1
26 Complete!
data/player/tracking/tracking-post-ups_2019-20_Regular.csv Completed Successfully!
40 / 126 Complete!
data/player/tracking/paint-touch_2019-20_Regular.csv Completed Successfully! 41 / 1
26 Complete!
data/player/tracking/drives_2018-19_Regular.csv Completed Successfully! 42 / 126 Co
mplete!
data/player/tracking/defensive-impact_2018-19_Regular.csv Completed Successfully! 4
3 / 126 Complete!
data/player/tracking/catch-shoot_2018-19_Regular.csv Completed Successfully! 44 / 1
26 Complete!
data/player/tracking/passing_2018-19_Regular.csv Completed Successfully! 45 / 126 C
omplete!
data/player/tracking/touches_2018-19_Regular.csv Completed Successfully! 46 / 126 C
omplete!
data/player/tracking/pullup_2018-19_Regular.csv Completed Successfully! 47 / 126 Co
mplete!
data/player/tracking/rebounding_2018-19_Regular.csv Completed Successfully! 48 / 12
6 Complete!
data/player/tracking/offensive-rebounding_2018-19_Regular.csv Completed Successfull
y! 49 / 126 Complete!
data/player/tracking/defensive-rebounding_2018-19_Regular.csv Completed Successfull
y! 50 / 126 Complete!
data/player/tracking/shooting-efficiency_2018-19_Regular.csv Completed Successfull
y! 51 / 126 Complete!
data/player/tracking/speed-distance_2018-19_Regular.csv Completed Successfully! 52
/ 126 Complete!
data/player/tracking/elbow-touch_2018-19_Regular.csv Completed Successfully! 53 / 1
26 Complete!
data/player/tracking/tracking-post-ups_2018-19_Regular.csv Completed Successfully!
54 / 126 Complete!
data/player/tracking/paint-touch_2018-19_Regular.csv Completed Successfully! 55 / 1
26 Complete!
data/player/tracking/drives_2017-18_Regular.csv Completed Successfully! 56 / 126 Co
mplete!
data/player/tracking/defensive-impact_2017-18_Regular.csv Completed Successfully! 5
7 / 126 Complete!
data/player/tracking/catch-shoot_2017-18_Regular.csv Completed Successfully! 58 / 1
26 Complete!

data/player/tracking/passing_2017-18_Regular.csv Completed Successfully! 59 / 126 Complete!
data/player/tracking/touches_2017-18_Regular.csv Completed Successfully! 60 / 126 Complete!
data/player/tracking/pullup_2017-18_Regular.csv Completed Successfully! 61 / 126 Complete!
data/player/tracking/rebounding_2017-18_Regular.csv Completed Successfully! 62 / 126 Complete!
data/player/tracking/offensive-rebounding_2017-18_Regular.csv Completed Successfully! 63 / 126 Complete!
data/player/tracking/defensive-rebounding_2017-18_Regular.csv Completed Successfully! 64 / 126 Complete!
data/player/tracking/shooting-efficiency_2017-18_Regular.csv Completed Successfully! 65 / 126 Complete!
data/player/tracking/speed-distance_2017-18_Regular.csv Completed Successfully! 66 / 126 Complete!
data/player/tracking/elbow-touch_2017-18_Regular.csv Completed Successfully! 67 / 126 Complete!
data/player/tracking/tracking-post-ups_2017-18_Regular.csv Completed Successfully! 68 / 126 Complete!
data/player/tracking/paint-touch_2017-18_Regular.csv Completed Successfully! 69 / 126 Complete!
data/player/tracking/drives_2016-17_Regular.csv Completed Successfully! 70 / 126 Complete!
data/player/tracking/defensive-impact_2016-17_Regular.csv Completed Successfully! 71 / 126 Complete!
data/player/tracking/catch-shoot_2016-17_Regular.csv Completed Successfully! 72 / 126 Complete!
data/player/tracking/passing_2016-17_Regular.csv Completed Successfully! 73 / 126 Complete!
data/player/tracking/touches_2016-17_Regular.csv Completed Successfully! 74 / 126 Complete!
data/player/tracking/pullup_2016-17_Regular.csv Completed Successfully! 75 / 126 Complete!
data/player/tracking/rebounding_2016-17_Regular.csv Completed Successfully! 76 / 126 Complete!
data/player/tracking/offensive-rebounding_2016-17_Regular.csv Completed Successfully! 77 / 126 Complete!
data/player/tracking/defensive-rebounding_2016-17_Regular.csv Completed Successfully! 78 / 126 Complete!
data/player/tracking/shooting-efficiency_2016-17_Regular.csv Completed Successfully! 79 / 126 Complete!
data/player/tracking/speed-distance_2016-17_Regular.csv Completed Successfully! 80 / 126 Complete!
data/player/tracking/elbow-touch_2016-17_Regular.csv Completed Successfully! 81 / 126 Complete!
data/player/tracking/tracking-post-ups_2016-17_Regular.csv Completed Successfully! 82 / 126 Complete!
data/player/tracking/paint-touch_2016-17_Regular.csv Completed Successfully! 83 / 126 Complete!
data/player/tracking/drives_2015-16_Regular.csv Completed Successfully! 84 / 126 Complete!
data/player/tracking/defensive-impact_2015-16_Regular.csv Completed Successfully! 85 / 126 Complete!
data/player/tracking/catch-shoot_2015-16_Regular.csv Completed Successfully! 86 / 126 Complete!
data/player/tracking/passing_2015-16_Regular.csv Completed Successfully! 87 / 126 Complete!
data/player/tracking/touches_2015-16_Regular.csv Completed Successfully! 88 / 126 Complete!

omplete!
data/player/tracking/pullup_2015-16_Regular.csv Completed Successfully! 89 / 126 Co
mplete!
data/player/tracking/rebounding_2015-16_Regular.csv Completed Successfully! 90 / 12
6 Complete!
data/player/tracking/offensive-rebounding_2015-16_Regular.csv Completed Successfull
y! 91 / 126 Complete!
data/player/tracking/defensive-rebounding_2015-16_Regular.csv Completed Successfull
y! 92 / 126 Complete!
data/player/tracking/shooting-efficiency_2015-16_Regular.csv Completed Successfull
y! 93 / 126 Complete!
data/player/tracking/speed-distance_2015-16_Regular.csv Completed Successfully! 94
/ 126 Complete!
data/player/tracking/elbow-touch_2015-16_Regular.csv Completed Successfully! 95 / 1
26 Complete!
data/player/tracking/tracking-post-ups_2015-16_Regular.csv Completed Successfully!
96 / 126 Complete!
data/player/tracking/paint-touch_2015-16_Regular.csv Completed Successfully! 97 / 1
26 Complete!
data/player/tracking/drives_2014-15_Regular.csv Completed Successfully! 98 / 126 Co
mplete!
data/player/tracking/defensive-impact_2014-15_Regular.csv Completed Successfully! 9
9 / 126 Complete!
data/player/tracking/catch-shoot_2014-15_Regular.csv Completed Successfully! 100 /
126 Complete!
data/player/tracking/passing_2014-15_Regular.csv Completed Successfully! 101 / 126
Complete!
data/player/tracking/touches_2014-15_Regular.csv Completed Successfully! 102 / 126
Complete!
data/player/tracking/pullup_2014-15_Regular.csv Completed Successfully! 103 / 126 C
omplete!
data/player/tracking/rebounding_2014-15_Regular.csv Completed Successfully! 104 / 1
26 Complete!
data/player/tracking/offensive-rebounding_2014-15_Regular.csv Completed Successfull
y! 105 / 126 Complete!
data/player/tracking/defensive-rebounding_2014-15_Regular.csv Completed Successfull
y! 106 / 126 Complete!
data/player/tracking/shooting-efficiency_2014-15_Regular.csv Completed Successfull
y! 107 / 126 Complete!
data/player/tracking/speed-distance_2014-15_Regular.csv Completed Successfully! 108
/ 126 Complete!
data/player/tracking/elbow-touch_2014-15_Regular.csv Completed Successfully! 109 /
126 Complete!
data/player/tracking/tracking-post-ups_2014-15_Regular.csv Completed Successfully!
110 / 126 Complete!
data/player/tracking/paint-touch_2014-15_Regular.csv Completed Successfully! 111 /
126 Complete!
data/player/tracking/drives_2013-14_Regular.csv Completed Successfully! 112 / 126 C
omplete!
data/player/tracking/defensive-impact_2013-14_Regular.csv Completed Successfully! 1
13 / 126 Complete!
data/player/tracking/catch-shoot_2013-14_Regular.csv Completed Successfully! 114 /
126 Complete!
data/player/tracking/passing_2013-14_Regular.csv Completed Successfully! 115 / 126
Complete!
data/player/tracking/touches_2013-14_Regular.csv Completed Successfully! 116 / 126
Complete!
data/player/tracking/pullup_2013-14_Regular.csv Completed Successfully! 117 / 126 C
omplete!

```
data/player/tracking/rebounding_2013-14-Regular.csv Completed Successfully! 118 / 1  
26 Complete!  
data/player/tracking/offensive-rebounding_2013-14-Regular.csv Completed Successfull  
y! 119 / 126 Complete!  
data/player/tracking/defensive-rebounding_2013-14-Regular.csv Completed Successfull  
y! 120 / 126 Complete!  
data/player/tracking/shooting-efficiency_2013-14-Regular.csv Completed Successfull  
y! 121 / 126 Complete!  
data/player/tracking/speed-distance_2013-14-Regular.csv Completed Successfully! 122  
/ 126 Complete!  
data/player/tracking/elbow-touch_2013-14-Regular.csv Completed Successfully! 123 /  
126 Complete!  
data/player/tracking/tracking-post-ups_2013-14-Regular.csv Completed Successfully!  
124 / 126 Complete!  
data/player/tracking/paint-touch_2013-14-Regular.csv Completed Successfully! 125 /  
126 Complete!
```

Folders

```
In [ ]: # move files to proper folders  
files = os.listdir('data/player/tracking/')  
for f in files:  
    if '.csv' in f:  
        if 'Regular' in f:  
            shutil.move('data/player/tracking/' + f, 'data/player/tracking/regular_  
elif 'Playoffs' in f:  
    shutil.move('data/player/tracking/' + f, 'data/player/tracking/playoffs
```

```
In [ ]: # Append
drives_df = append_the_data('data/player/tracking/regular_season/', 'tracking_drive'
defensive_impact_df = append_the_data('data/player/tracking/regular_season/', 'trac
catch_n_shoot_df = append_the_data('data/player/tracking/regular_season/', 'trackin
passing_df = append_the_data('data/player/tracking/regular_season/', 'tracking_pass
touches_df = append_the_data('data/player/tracking/regular_season/', 'tracking_touc
pullup_shooting_df = append_the_data('data/player/tracking/regular_season/', 'track
offensive_rebounding_df = append_the_data('data/player/tracking/regular_season/', '
defensive_rebounding_df = append_the_data('data/player/tracking/regular_season/', '
shooting_efficiency_df = append_the_data('data/player/tracking/regular_season/', 't
speed_distance_df = append_the_data('data/player/tracking/regular_season/', 'tracki
elbow_touch_df = append_the_data('data/player/tracking/regular_season/', 'tracking_
postups_df = append_the_data('data/player/tracking/regular_season/', 'tracking_post
paint_touches_df = append_the_data('data/player/tracking/regular_season/', 'trackin

# Save
drives_df.to_csv('data/player/aggregates/tracking_drives.csv')
defensive_impact_df.to_csv('data/player/aggregates/tracking_defensive_impact.csv')
catch_n_shoot_df.to_csv('data/player/aggregates/tracking_catch_n_shoot.csv')
passing_df.to_csv('data/player/aggregates/tracking_passing.csv')
touches_df.to_csv('data/player/aggregates/tracking_touches.csv')
pullup_shooting_df.to_csv('data/player/aggregates/tracking_pullup_shooting.csv')
offensive_rebounding_df.to_csv('data/player/aggregates/tracking_offensive_reboundin
defensive_rebounding_df.to_csv('data/player/aggregates/tracking_defensive_reboundin
shooting_efficiency_df.to_csv('data/player/aggregates/tracking_shooting_efficiency.
speed_distance_df.to_csv('data/player/aggregates/tracking_speed_distance.csv')
elbow_touch_df.to_csv('data/player/aggregates/tracking_elbow_touch.csv')
postups_df.to_csv('data/player/aggregates/tracking_postups.csv')
paint_touches_df.to_csv('data/player/aggregates/tracking_paint_touches.csv')

print(f' drives: {drives_df.shape}, defensive impact: {defensive_impact_df.shape},

drives: (4689, 26), defensive impact: (4689, 15), catch n shoot: (4689, 15), passi
ng: (4689, 18), touches: (4689, 22), pullup shooting: (4689, 17), offensive rebound
ing: (4689, 17), defensive rebounding: (4689, 17), shooting efficiency: (4689, 23),
speed distance: (4689, 16), elbow touch: (4083, 27), postups: (4689, 27), paint tou
ches: (4689, 27)
```

```
In [ ]: drives_df.head()
```

```
Out[ ]:   tracking_drives_unnamed: 0  tracking_drives_player  tracking_drives_team  tracking_drives_gp  tr
          0                      0             NaN                 NaN                 NaN
          1                      1            AJ Price              MIN             28.0
          2                      2           Aaron Brooks             DEN             72.0
          3                      3           Aaron Gray              SAC             36.0
          4                      4        Adonis Thomas             PHI              6.0
```

5 rows × 26 columns

```
In [ ]: all_tracking_data = pd.merge(drives_df, defensive_impact_df,
                                     left_on = ['tracking_drives_player', 'tracking_dri
                                     right_on = ['tracking_defensive_impact_player', 't
                                     how = 'left')

print(f' drives: {drives_df.shape}, defensive impact: {defensive_impact_df.shape},
      drives: (4689, 26), defensive impact: (4689, 15), all_tracking_data: (4689, 41)
```

```
In [ ]: # add catch n shoot
all_tracking_data2 = pd.merge(all_tracking_data, catch_n_shoot_df,
                             left_on = ['tracking_drives_player', 'tracking_dri
                             right_on = ['tracking_catch_n_shoot_player', 'trac
                             how = 'left')

print(f' drives: {drives_df.shape}, defensive impact: {defensive_impact_df.shape},
      drives: (4689, 26), defensive impact: (4689, 15), catch n shoot: (4689, 15), all_t
      racking_data2: (4689, 56)
```

```
In [ ]: # add passing
all_tracking_data3 = pd.merge(all_tracking_data2, passing_df,
                             left_on = ['tracking_drives_player', 'tracking_dri
                             right_on = ['tracking_passing_player', 'tracking_p
                             how = 'left')

print(f' drives: {drives_df.shape}, defensive impact: {defensive_impact_df.shape},
      drives: (4689, 26), defensive impact: (4689, 15), catch n shoot: (4689, 15), passi
      ng: (4689, 18), all_tracking_data3: (4689, 74)
```

```
In [ ]: # add touches
all_tracking_data4 = pd.merge(all_tracking_data3, touches_df,
                             left_on = ['tracking_drives_player', 'tracking_dri
                             right_on = ['tracking_touches_player', 'tracking_t
                             how = 'left')
```

```
In [ ]: # add pullup shooting
all_tracking_data5 = pd.merge(all_tracking_data4, pullup_shooting_df,
                             left_on = ['tracking_drives_player', 'tracking_dri
                             right_on = ['tracking_pullup_shooting_player', 'tr
                             how = 'left')
```

```
In [ ]: # add offensive rebounding
all_tracking_data6 = pd.merge(all_tracking_data5, offensive_rebounding_df,
                             left_on = ['tracking_drives_player', 'tracking_dri
                             right_on = ['tracking_offensive_rebounding_player'
                             how = 'left')
```

```
In [ ]: # add defensive rebounding
all_tracking_data7 = pd.merge(all_tracking_data6, defensive_rebounding_df,
                             left_on = ['tracking_drives_player', 'tracking_dri
                             right_on = ['tracking_defensive_rebounding_player'
                             how = 'left')
```

```
In [ ]: # add shooting efficiency
all_tracking_data8 = pd.merge(all_tracking_data7, shooting_efficiency_df,
                             left_on = ['tracking_drives_player', 'tracking_dri
                             right_on = ['tracking_shooting_efficiency_player',
                             how = 'left')

In [ ]: # add speed distance
all_tracking_data9 = pd.merge(all_tracking_data8, speed_distance_df,
                             left_on = ['tracking_drives_player', 'tracking_dri
                             right_on = ['tracking_speed_distance_player', 'tra
                             how = 'left')

In [ ]: all_tracking_data10 = pd.merge(all_tracking_data9, catch_n_shoot_df,
                                      left_on = ['tracking_drives_player', 'tracking_dri
                                      right_on = ['tracking_catch_n_shoot_player', 'trac
                                      how = 'left')

In [ ]: all_playtype_data11 = pd.merge(all_tracking_data10, paint_touches_df,
                                      left_on = ['tracking_drives_player', 'tracking_dri
                                      right_on = ['tracking_paint_touches_player', 'trac
                                      how = 'left')

In [ ]: all_playtype_data_final = pd.merge(all_playtype_data11, postups_df,
                                         left_on = ['tracking_drives_player', 'tracking_dri
                                         right_on = ['tracking_postups_player', 'tracking_p
                                         how = 'left')

In [ ]: all_playtype_data_final.to_csv('data/player/aggregates/All_tracking_data.csv', inde
```

Player - Defensive Dashboard (Complete 12.22)

```
In [ ]: # This one is weird... https://www.nba.com/stats/players/defense-dash-overall/?Seas
years =['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17', '2015-16'
types = ['defense-dash-overall', 'defense-dash-3pt', 'defense-dash-2pt', 'defense-d
    'defense-dash-lt10', 'defense-dash-gt15' ]
season_types = ['Playoffs', 'RegularSeason']

def_dash_urls = []

for year in years:
    for typ in types:
        for s_types in season_types:
            url = 'https://www.nba.com/stats/players/' + typ + '?SeasonYear=' + year
            def_dash_urls.append(str(url))

In [ ]: if os.path.isdir('data/player/defensive_dashboard') is False:
        os.mkdir('data/player/defensive_dashboard')

In [ ]: driver = webdriver.Chrome()

In [ ]: grab_player_data2(def_dash_urls, 'data/player/defensive_dashboard/')
```

data/player/defensive_dashboard/defense-dash-overall_2021-22_Playoffs_Season_2021-22.csv Completed Successfully! 1 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2021-22-Regular_Season_2021-22.csv Completed Successfully! 2 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2021-22_Playoffs_Season_2021-22.csv Completed Successfully! 3 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2021-22-Regular_Season_2021-22.csv Completed Successfully! 4 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2021-22_Playoffs_Season_2021-22.csv Completed Successfully! 5 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2021-22-Regular_Season_2021-22.csv Completed Successfully! 6 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2021-22_Playoffs_Season_2021-22.csv Completed Successfully! 7 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2021-22-Regular_Season_2021-22.csv Completed Successfully! 8 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2021-22_Playoffs_Season_2021-22.csv Completed Successfully! 9 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2021-22-Regular_Season_2021-22.csv Completed Successfully! 10 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2021-22_Playoffs_Season_2021-22.csv Completed Successfully! 11 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2021-22-Regular_Season_2021-22.csv Completed Successfully! 12 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2020-21_Playoffs_Season_2020-21.csv Completed Successfully! 13 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2020-21-Regular_Season_2020-21.csv Completed Successfully! 14 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2020-21_Playoffs_Season_2020-21.csv Completed Successfully! 15 / 108 Complete!
<https://www.nba.com/stats/players/defense-dash-3pt/?SeasonYear=2020-21&SeasonType=Regular%20Season&Season=2020-21> did not load. Moving to next url.
data/player/defensive_dashboard/defense-dash-2pt_2020-21_Playoffs_Season_2020-21.csv Completed Successfully! 16 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2020-21-Regular_Season_2020-21.csv Completed Successfully! 17 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2020-21_Playoffs_Season_2020-21.csv Completed Successfully! 18 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2020-21-Regular_Season_2020-21.csv Completed Successfully! 19 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2020-21_Playoffs_Season_2020-21.csv Completed Successfully! 20 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2020-21-Regular_Season_2020-21.csv Completed Successfully! 21 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2020-21_Playoffs_Season_2020-21.csv Completed Successfully! 22 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2020-21-Regular_Season_2020-21.csv Completed Successfully! 23 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2019-20_Playoffs_Season_2019-20.csv Completed Successfully! 24 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2019-20-Regular_Season_2019-20.csv Completed Successfully! 25 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2019-20_Playoffs_Season_2019-20.csv Completed Successfully! 26 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2019-20-Regular_Season_2019-20.csv Completed Successfully! 27 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2019-20_Playoffs_Season_2019-20.csv Completed Successfully! 28 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2019-20-Regular_Season_2019-20.csv

v Completed Successfully! 29 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2019-20_Playoffs_Season_2019-20.csv Completed Successfully! 30 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2019-20-Regular_Season_2019-20.csv Completed Successfully! 31 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2019-20_Playoffs_Season_2019-20.csv Completed Successfully! 32 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2019-20-Regular_Season_2019-20.csv Completed Successfully! 33 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2019-20_Playoffs_Season_2019-20.csv Completed Successfully! 34 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2019-20-Regular_Season_2019-20.csv Completed Successfully! 35 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2018-19_Playoffs_Season_2018-19.csv Completed Successfully! 36 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2018-19-Regular_Season_2018-19.csv Completed Successfully! 37 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2018-19_Playoffs_Season_2018-19.csv Completed Successfully! 38 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2018-19-Regular_Season_2018-19.csv Completed Successfully! 39 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2018-19_Playoffs_Season_2018-19.csv Completed Successfully! 40 / 108 Complete!
[https://www.nba.com/stats/players/defense-dash-2pt/?SeasonYear=2018-19&SeasonType=R
egular%20Season&Season=2018-19](https://www.nba.com/stats/players/defense-dash-2pt/?SeasonYear=2018-19&SeasonType=RegularSeason&Season=2018-19) did not load. Moving to next url.
data/player/defensive_dashboard/defense-dash-lt6_2018-19_Playoffs_Season_2018-19.csv Completed Successfully! 41 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2018-19-Regular_Season_2018-19.csv Completed Successfully! 42 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2018-19_Playoffs_Season_2018-19.csv Completed Successfully! 43 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2018-19-Regular_Season_2018-19.csv Completed Successfully! 44 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2018-19_Playoffs_Season_2018-19.csv Completed Successfully! 45 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2018-19-Regular_Season_2018-19.csv Completed Successfully! 46 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2017-18_Playoffs_Season_2017-18.csv Completed Successfully! 47 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2017-18-Regular_Season_2017-18.csv Completed Successfully! 48 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2017-18_Playoffs_Season_2017-18.csv Completed Successfully! 49 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2017-18-Regular_Season_2017-18.csv Completed Successfully! 50 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2017-18_Playoffs_Season_2017-18.csv Completed Successfully! 51 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2017-18-Regular_Season_2017-18.csv Completed Successfully! 52 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2017-18_Playoffs_Season_2017-18.csv Completed Successfully! 53 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2017-18-Regular_Season_2017-18.csv Completed Successfully! 54 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2017-18_Playoffs_Season_2017-18.csv Completed Successfully! 55 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2017-18-Regular_Season_2017-18.csv Completed Successfully! 56 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2017-18_Playoffs_Season_2017-18.csv Completed Successfully! 57 / 108 Complete!

data/player/defensive_dashboard/defense-dash-gt15__2017-18_Regular_Season_2017-18.csv Completed Successfully! 58 / 108 Complete!

data/player/defensive_dashboard/defense-dash-overall__2016-17_Playoffs_Season_2016-17.csv Completed Successfully! 59 / 108 Complete!

data/player/defensive_dashboard/defense-dash-overall__2016-17_Regular_Season_2016-17.csv Completed Successfully! 60 / 108 Complete!

data/player/defensive_dashboard/defense-dash-3pt__2016-17_Playoffs_Season_2016-17.csv Completed Successfully! 61 / 108 Complete!

<https://www.nba.com/stats/players/defense-dash-3pt/?SeasonYear=2016-17&SeasonType=Regular%20Season&Season=2016-17> did not load. Moving to next url.

data/player/defensive_dashboard/defense-dash-2pt__2016-17_Playoffs_Season_2016-17.csv Completed Successfully! 62 / 108 Complete!

data/player/defensive_dashboard/defense-dash-2pt__2016-17_Regular_Season_2016-17.csv Completed Successfully! 63 / 108 Complete!

data/player/defensive_dashboard/defense-dash-lt6__2016-17_Playoffs_Season_2016-17.csv Completed Successfully! 64 / 108 Complete!

data/player/defensive_dashboard/defense-dash-lt6__2016-17_Regular_Season_2016-17.csv Completed Successfully! 65 / 108 Complete!

<https://www.nba.com/stats/players/defense-dash-lt10/?SeasonYear=2016-17&SeasonType=Playoffs&Season=2016-17> did not load. Moving to next url.

data/player/defensive_dashboard/defense-dash-lt10__2016-17_Regular_Season_2016-17.csv Completed Successfully! 66 / 108 Complete!

data/player/defensive_dashboard/defense-dash-gt15__2016-17_Playoffs_Season_2016-17.csv Completed Successfully! 67 / 108 Complete!

data/player/defensive_dashboard/defense-dash-gt15__2016-17_Regular_Season_2016-17.csv Completed Successfully! 68 / 108 Complete!

data/player/defensive_dashboard/defense-dash-overall__2015-16_Playoffs_Season_2015-16.csv Completed Successfully! 69 / 108 Complete!

data/player/defensive_dashboard/defense-dash-overall__2015-16_Regular_Season_2015-16.csv Completed Successfully! 70 / 108 Complete!

data/player/defensive_dashboard/defense-dash-3pt__2015-16_Playoffs_Season_2015-16.csv Completed Successfully! 71 / 108 Complete!

data/player/defensive_dashboard/defense-dash-3pt__2015-16_Regular_Season_2015-16.csv Completed Successfully! 72 / 108 Complete!

<https://www.nba.com/stats/players/defense-dash-2pt/?SeasonYear=2015-16&SeasonType=Playoffs&Season=2015-16> did not load. Moving to next url.

data/player/defensive_dashboard/defense-dash-2pt__2015-16_Regular_Season_2015-16.csv Completed Successfully! 73 / 108 Complete!

data/player/defensive_dashboard/defense-dash-lt6__2015-16_Playoffs_Season_2015-16.csv Completed Successfully! 74 / 108 Complete!

data/player/defensive_dashboard/defense-dash-lt6__2015-16_Regular_Season_2015-16.csv Completed Successfully! 75 / 108 Complete!

data/player/defensive_dashboard/defense-dash-lt10__2015-16_Playoffs_Season_2015-16.csv Completed Successfully! 76 / 108 Complete!

data/player/defensive_dashboard/defense-dash-lt10__2015-16_Regular_Season_2015-16.csv Completed Successfully! 77 / 108 Complete!

data/player/defensive_dashboard/defense-dash-gt15__2015-16_Playoffs_Season_2015-16.csv Completed Successfully! 78 / 108 Complete!

data/player/defensive_dashboard/defense-dash-gt15__2015-16_Regular_Season_2015-16.csv Completed Successfully! 79 / 108 Complete!

data/player/defensive_dashboard/defense-dash-overall__2014-15_Playoffs_Season_2014-15.csv Completed Successfully! 80 / 108 Complete!

data/player/defensive_dashboard/defense-dash-overall__2014-15_Regular_Season_2014-15.csv Completed Successfully! 81 / 108 Complete!

data/player/defensive_dashboard/defense-dash-3pt__2014-15_Playoffs_Season_2014-15.csv Completed Successfully! 82 / 108 Complete!

data/player/defensive_dashboard/defense-dash-3pt__2014-15_Regular_Season_2014-15.csv Completed Successfully! 83 / 108 Complete!

data/player/defensive_dashboard/defense-dash-2pt__2014-15_Playoffs_Season_2014-15.csv

```

sv Completed Successfully! 84 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2014-15-Regular_Season_2014-15.cs
v Completed Successfully! 85 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2014-15_Playoffs_Season_2014-15.c
sv Completed Successfully! 86 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2014-15-Regular_Season_2014-15.cs
v Completed Successfully! 87 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2014-15_Playoffs_Season_2014-15.
csv Completed Successfully! 88 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2014-15-Regular_Season_2014-15.c
sv Completed Successfully! 89 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2014-15_Playoffs_Season_2014-15.
csv Completed Successfully! 90 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2014-15-Regular_Season_2014-15.c
sv Completed Successfully! 91 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2013-14_Playoffs_Season_2013-
14.csv Completed Successfully! 92 / 108 Complete!
data/player/defensive_dashboard/defense-dash-overall_2013-14-Regular_Season_2013-1
4.csv Completed Successfully! 93 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2013-14_Playoffs_Season_2013-14.c
sv Completed Successfully! 94 / 108 Complete!
data/player/defensive_dashboard/defense-dash-3pt_2013-14-Regular_Season_2013-14.cs
v Completed Successfully! 95 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2013-14_Playoffs_Season_2013-14.c
sv Completed Successfully! 96 / 108 Complete!
data/player/defensive_dashboard/defense-dash-2pt_2013-14-Regular_Season_2013-14.cs
v Completed Successfully! 97 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2013-14_Playoffs_Season_2013-14.c
sv Completed Successfully! 98 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt6_2013-14-Regular_Season_2013-14.cs
v Completed Successfully! 99 / 108 Complete!
data/player/defensive_dashboard/defense-dash-lt10_2013-14_Playoffs_Season_2013-14.
csv Completed Successfully! 100 / 108 Complete!
https://www.nba.com/stats/players/defense-dash-lt10/?SeasonYear=2013-14&SeasonType=
Regular%20Season&Season=2013-14 did not load. Moving to next url.
data/player/defensive_dashboard/defense-dash-gt15_2013-14_Playoffs_Season_2013-14.
csv Completed Successfully! 101 / 108 Complete!
data/player/defensive_dashboard/defense-dash-gt15_2013-14-Regular_Season_2013-14.c
sv Completed Successfully! 102 / 108 Complete!

```

Folders

```
In [ ]: if os.path.isdir('data/player/defensive_dashboard/regular_season') is False:
    os.mkdir('data/player/defensive_dashboard/regular_season')
if os.path.isdir('data/player/defensive_dashboard/playoffs') is False:
    os.mkdir('data/player/defensive_dashboard/playoffs')
```

```
In [ ]: # move files to correct folders
for file in os.listdir('data/player/defensive_dashboard'):
    if 'Regular' in file:
        shutil.move('data/player/defensive_dashboard/' + file, 'data/player/defensi
    if 'Playoffs' in file:
        shutil.move('data/player/defensive_dashboard/' + file, 'data/player/defensi
```

Append Together

```
In [ ]: # append the files by subcat
dd_2_reg = append_the_data('data/player/defensive_dashboard/regular_season/', 'def_
dd_2_play = append_the_data('data/player/defensive_dashboard/playoffs/', 'def_dash_
dd_2_tot = pd.concat([dd_2_reg, dd_2_play])
dd_2_tot
```

```
Out[ ]:      def_dash_2pt_unnamed:
              0   def_dash_2pt_player  def_dash_2pt_team  def_dash_2pt_age  def_dash_2pt_min
0                   0             NaN            NaN            NaN            NaN
1                   1  DeAndre Jordan        LAC         25.0
2                   2    Robin Lopez        POR         26.0
3                   3  Spencer Hawes       CLE         26.0
4                   4   Marcin Gortat       WAS         30.0
...
207                 207  Kevin Knox II      ATL         22.0
208                 208    Luca Vildoza      MIL         26.0
209                 209     Zeke Nnaji      DEN         21.0
210                 210   Juwan Morgan      BOS         25.0
211                 211   Rayjon Tucker      MIL         24.0
```

5778 rows × 15 columns

```
In [ ]: dd_3_reg = append_the_data('data/player/defensive_dashboard/regular_season/', 'def_
dd_3_play = append_the_data('data/player/defensive_dashboard/playoffs/', 'def_dash_
dd_3_tot = pd.concat([dd_3_reg, dd_3_play])

lt_6_reg = append_the_data('data/player/defensive_dashboard/regular_season/', 'def_
lt_6_play = append_the_data('data/player/defensive_dashboard/playoffs/', 'def_dash_
lt_6_tot = pd.concat([lt_6_reg, lt_6_play])

lt_10_reg = append_the_data('data/player/defensive_dashboard/regular_season/', 'def_
lt_10_play = append_the_data('data/player/defensive_dashboard/playoffs/', 'def_dash_
lt_10_tot = pd.concat([lt_10_reg, lt_10_play])

gt_15_reg = append_the_data('data/player/defensive_dashboard/regular_season/', 'def_
gt_15_play = append_the_data('data/player/defensive_dashboard/playoffs/', 'def_dash_
gt_15_tot = pd.concat([gt_15_reg, gt_15_play])

dd_overall_reg = append_the_data('data/player/defensive_dashboard/regular_season/', 'def_
dd_overall_play = append_the_data('data/player/defensive_dashboard/playoffs/', 'def_
dd_overall_tot = pd.concat([dd_overall_reg, dd_overall_play])
```

```
In [ ]: # check tot dataframe sizes
print(dd_2_tot.shape, dd_3_tot.shape, lt_6_tot.shape, lt_10_tot.shape, gt_15_tot.sh
(5778, 15) (5413, 15) (6398, 15) (5755, 15) (6488, 15) (6561, 15)
```

```
In [ ]: # start with overall
all_def_dash = pd.merge(dd_overall_tot, dd_2_tot,
                       left_on = ['def_dash_overall_player', 'def_dash_ove
right_on = ['def_dash_2pt_player', 'def_dash_2pt_te
how = 'left')

all_def_dash2 = pd.merge(all_def_dash, dd_3_tot,
                        left_on = ['def_dash_overall_player', 'def_dash_ove
right_on = ['def_dash_3pt_player', 'def_dash_3pt_te
how = 'left')

all_def_dash3 = pd.merge(all_def_dash2, lt_6_tot,
                        left_on = ['def_dash_overall_player', 'def_dash_ove
right_on = ['def_dash_lt6_player', 'def_dash_lt6_te
how = 'left')

all_def_dash4 = pd.merge(all_def_dash3, lt_10_tot,
                        left_on = ['def_dash_overall_player', 'def_dash_ove
right_on = ['def_dash_lt10_player', 'def_dash_lt10_
how = 'left')

all_def_dash5 = pd.merge(all_def_dash4, gt_15_tot,
                        left_on = ['def_dash_overall_player', 'def_dash_ove
right_on = ['def_dash_gt15_player', 'def_dash_gt15_
how = 'left')

init_size = (6567, 30)
```

```
In [ ]: all_def_dash5 = pd.merge(all_def_dash4, gt_15_tot,
                               left_on = ['def_dash_overall_player', 'def_dash_ove
right_on = ['def_dash_gt15_player', 'def_dash_gt15_
how = 'left')

print(f' init_size = {all_def_dash5.shape}')
```

```
init_size = (6715, 90)
```

```
In [ ]: all_def_dash5.to_csv('data/player/aggregates/All_Defensive_Dashboard.csv', index =
```

Doubleheader Data Function

Some data has two headers, this is the general code to scrape it:

```
In [ ]: def get_data_w_double_header(url_list, file_folder, option_numbers,option_names, he
        i = 0
        optionz = np.arange(0,option_numbers, 1)
        # get first option
        for u in url_list:
            for option in optionz:
                driver.get(u)
                time.sleep(1)
                # get option xpath
                op = option + 1

            try:
                xpath_option = '/html/body/div[1]/div[2]/div[3]/sect
                elem = WebDriverWait(driver, 30).until(EC.presence_of_eleme
            except:
                print(f'{u} did not load. Moving to next url.')
                continue

            elem = WebDriverWait(driver, 30).until(EC.presence_of_element_locat
            driver.find_element(by=By.XPATH, value=xpath_option).click()

            # all pages
            xpath_all = '//*[@id="__next"]/div[2]/div[3]/section[2]/div/
            elem = WebDriverWait(driver, 30).until(EC.presence_of_element_locat
            driver.find_element(by=By.XPATH, value=xpath_all).click()
            src = driver.page_source
            parser = BeautifulSoup(src, "lxml")
            table = parser.find("table", attrs = {"class":"Crom_table__p1izz"})
            headers = table.findAll('th')
            headerlist = [h.text.strip() for h in headers[headers_to_skip:]] #
            row_names = table.findAll('a')                                     # find r
            row_list = [b.text.strip() for b in row_names[0:]]
            rows = table.findAll('tr')[0:]
            player_stats = [[td.getText().strip() for td in rows[i].findAll('td
            tot_cols = len(player_stats[2])                                         #set the
            headerlist = headerlist[:tot_cols]
            stats = pd.DataFrame(player_stats, columns = headerlist)
            filename = file_folder + str(u[34:]).replace('/', '_') + 'op_' + st
            filename = replace_name_values2(filename)
            pd.DataFrame.to_csv(stats, filename)
            i += 1
            lu = len(url_list)
            print(f'{filename} Completed Successfully! {i} / {lu} Complete!')
```

Player - Shot Dashboard

```
In [ ]: player_general = 'https://www.nba.com/stats/players/shots-general/'      # 4 option
player_shotclock = 'https://www.nba.com/stats/players/shots-shotclock/'    # 6 option
player_dribbles = 'https://www.nba.com/stats/players/shots-dribbles/'       # 5 option
player_touchtime = 'https://www.nba.com/stats/players/shots-touch-time/'   # 3 option
player_closest_defender = 'https://www.nba.com/stats/players/shots-closest-defender'
player_closest_defender_plus10 = 'https://www.nba.com/stats/players/shots-closest-d
```

```
In [ ]: driver = webdriver.Chrome()
```

```
In [ ]: def get_shot_dash_doubleheader(url_list, file_folder, option_numbers, option_names,
    i = 0
    optionz = np.arange(0,option_numbers, 1)
    # get first option
    for u in url_list:
        for option in optionz:
            driver.get(u)
            time.sleep(1)
            # get option xpath
            op = option + 1

            try:
                xpath_option = '//*[@id="__next"]/div[2]/div[3]/section[2]/div/div[3]/div[' + str(op) + ']'
                elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.XPATH, xpath_option)))
                driver.find_element(by=By.XPATH, value=xpath_option).click()
            except:
                print(f'{u} did not load. Moving to next url.')
                continue

    # all pages
    xpath_all = '//*[@id="__next"]/div[2]/div[3]/section[2]/div/div[3]/div[' + str(i+1) + ']' + xpath_option
    elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.XPATH, xpath_all)))
    driver.find_element(by=By.XPATH, value=xpath_all).click()
    src = driver.page_source
    parser = BeautifulSoup(src, "lxml")
    table = parser.find("table", attrs = {"class":"Crom_table__p1izz"})
    headers = table.findAll('th')
    headerlist = [h.text.strip() for h in headers[headers_to_skip:]] # skip first 3 columns
    row_names = table.findAll('a') # find rows
    row_list = [b.text.strip() for b in row_names[0:]]
    rows = table.findAll('tr')[1:]
    player_stats = [[td.getText().strip() for td in rows[i].findAll('td')] for i in range(len(rows))]
    tot_cols = len(player_stats[2]) #set the total number of columns
    headerlist = headerlist[:tot_cols]
    stats = pd.DataFrame(player_stats, columns = headerlist)
    filename = file_folder + str(u[34:]).replace('/', '_') + 'op_' + str(op)
    filename = replace_name_values(filename)
    pd.DataFrame.to_csv(stats, filename)
    i += 1
    lu = len(url_list)
    print(f'{filename} Completed Successfully! {i} / {lu} Complete!')
```

Shot Dashboard -- General

```
In [ ]: gen_urls = []
years = ['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17', '2015-16']
season_types = ['Regular Season', 'Playoffs']
for year in years:
    for s_types in season_types:
        url = player_general + '?SeasonYear=' + year + '&SeasonType=' + s_types + '&Category=General'
        gen_urls.append(str(url))
```

```
In [ ]: get_shot_dash_doubleheader(gen_urls, 'data/player/shot_dashboard/general/', 4, ['Ov'])
```

data/player/shot_dashboard/general/shots-general_SeasonYear_2021-22-Regular Season
_Season_2021-22op_Overall.csv Completed Successfully! 1 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2021-22-Regular Season
_Season_2021-22op_Catch_Shoot.csv Completed Successfully! 2 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2021-22-Regular Season
_Season_2021-22op_Pullups.csv Completed Successfully! 3 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2021-22-Regular Season
_Season_2021-22op_Less_than_10_feet.csv Completed Successfully! 4 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2021-22_Playoffs_Seaso
n_2021-22op_Overall.csv Completed Successfully! 5 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2021-22_Playoffs_Seaso
n_2021-22op_Catch_Shoot.csv Completed Successfully! 6 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2021-22_Playoffs_Seaso
n_2021-22op_Pullups.csv Completed Successfully! 7 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2021-22_Playoffs_Seaso
n_2021-22op_Less_than_10_feet.csv Completed Successfully! 8 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2020-21-Regular Season
_Season_2020-21op_Overall.csv Completed Successfully! 9 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2020-21-Regular Season
_Season_2020-21op_Catch_Shoot.csv Completed Successfully! 10 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2020-21-Regular Season
_Season_2020-21op_Pullups.csv Completed Successfully! 11 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2020-21-Regular Season
_Season_2020-21op_Less_than_10_feet.csv Completed Successfully! 12 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2020-21_Playoffs_Seaso
n_2020-21op_Overall.csv Completed Successfully! 13 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2020-21_Playoffs_Seaso
n_2020-21op_Catch_Shoot.csv Completed Successfully! 14 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2020-21_Playoffs_Seaso
n_2020-21op_Pullups.csv Completed Successfully! 15 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2020-21_Playoffs_Seaso
n_2020-21op_Less_than_10_feet.csv Completed Successfully! 16 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2019-20-Regular Season
_Season_2019-20op_Overall.csv Completed Successfully! 17 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2019-20-Regular Season
_Season_2019-20op_Catch_Shoot.csv Completed Successfully! 18 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2019-20-Regular Season
_Season_2019-20op_Pullups.csv Completed Successfully! 19 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2019-20-Regular Season
_Season_2019-20op_Less_than_10_feet.csv Completed Successfully! 20 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2019-20_Playoffs_Seaso
n_2019-20op_Overall.csv Completed Successfully! 21 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2019-20_Playoffs_Seaso
n_2019-20op_Catch_Shoot.csv Completed Successfully! 22 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2019-20_Playoffs_Seaso
n_2019-20op_Pullups.csv Completed Successfully! 23 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2019-20_Playoffs_Seaso
n_2019-20op_Less_than_10_feet.csv Completed Successfully! 24 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2018-19-Regular Season
_Season_2018-19op_Overall.csv Completed Successfully! 25 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2018-19-Regular Season
_Season_2018-19op_Catch_Shoot.csv Completed Successfully! 26 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2018-19-Regular Season
_Season_2018-19op_Pullups.csv Completed Successfully! 27 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2018-19-Regular Season
_Season_2018-19op_Less_than_10_feet.csv Completed Successfully! 28 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2018-19_Playoffs_Seaso
n_2018-19op_Overall.csv Completed Successfully! 29 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2018-19_Playoffs_Seaso

n_2018-19op_Catch_Shoot.csv Completed Successfully! 30 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2018-19_Playoffs_Seaso
n_2018-19op_Pullups.csv Completed Successfully! 31 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2018-19_Playoffs_Seaso
n_2018-19op_Less_than_10_feet.csv Completed Successfully! 32 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2017-18-Regular Season
_Season_2017-18op_Overall.csv Completed Successfully! 33 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2017-18-Regular Season
_Season_2017-18op_Catch_Shoot.csv Completed Successfully! 34 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2017-18-Regular Season
_Season_2017-18op_Pullups.csv Completed Successfully! 35 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2017-18-Regular Season
_Season_2017-18op_Less_than_10_feet.csv Completed Successfully! 36 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2017-18_Playoffs_Seaso
n_2017-18op_Overall.csv Completed Successfully! 37 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2017-18_Playoffs_Seaso
n_2017-18op_Catch_Shoot.csv Completed Successfully! 38 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2017-18_Playoffs_Seaso
n_2017-18op_Pullups.csv Completed Successfully! 39 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2017-18_Playoffs_Seaso
n_2017-18op_Less_than_10_feet.csv Completed Successfully! 40 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2016-17-Regular Season
_Season_2016-17op_Overall.csv Completed Successfully! 41 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2016-17-Regular Season
_Season_2016-17op_Catch_Shoot.csv Completed Successfully! 42 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2016-17-Regular Season
_Season_2016-17op_Pullups.csv Completed Successfully! 43 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2016-17-Regular Season
_Season_2016-17op_Less_than_10_feet.csv Completed Successfully! 44 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2016-17_Playoffs_Seaso
n_2016-17op_Overall.csv Completed Successfully! 45 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2016-17_Playoffs_Seaso
n_2016-17op_Catch_Shoot.csv Completed Successfully! 46 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2016-17_Playoffs_Seaso
n_2016-17op_Pullups.csv Completed Successfully! 47 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2016-17_Playoffs_Seaso
n_2016-17op_Less_than_10_feet.csv Completed Successfully! 48 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2015-16-Regular Season
_Season_2015-16op_Overall.csv Completed Successfully! 49 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2015-16-Regular Season
_Season_2015-16op_Catch_Shoot.csv Completed Successfully! 50 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2015-16-Regular Season
_Season_2015-16op_Pullups.csv Completed Successfully! 51 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2015-16-Regular Season
_Season_2015-16op_Less_than_10_feet.csv Completed Successfully! 52 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2015-16_Playoffs_Seaso
n_2015-16op_Overall.csv Completed Successfully! 53 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2015-16_Playoffs_Seaso
n_2015-16op_Catch_Shoot.csv Completed Successfully! 54 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2015-16_Playoffs_Seaso
n_2015-16op_Pullups.csv Completed Successfully! 55 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2015-16_Playoffs_Seaso
n_2015-16op_Less_than_10_feet.csv Completed Successfully! 56 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2014-15-Regular Season
_Season_2014-15op_Overall.csv Completed Successfully! 57 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2014-15-Regular Season
_Season_2014-15op_Catch_Shoot.csv Completed Successfully! 58 / 18 Complete!
data/player/shot_dashboard/general/shots-general_SeasonYear_2014-15-Regular Season
_Season_2014-15op_Pullups.csv Completed Successfully! 59 / 18 Complete!

```
data/player/shot_dashboard/general/shots-general_SeasonYear_2014-15-Regular Season  
_Season_2014-15op_Less_than_10_feet.csv Completed Successfully! 60 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2014-15_Playoffs_Seaso  
n_2014-15op_Overall.csv Completed Successfully! 61 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2014-15_Playoffs_Seaso  
n_2014-15op_Catch_Shoot.csv Completed Successfully! 62 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2014-15_Playoffs_Seaso  
n_2014-15op_Pullups.csv Completed Successfully! 63 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2014-15_Playoffs_Seaso  
n_2014-15op_Less_than_10_feet.csv Completed Successfully! 64 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2013-14-Regular Season  
_Season_2013-14op_Overall.csv Completed Successfully! 65 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2013-14-Regular Season  
_Season_2013-14op_Catch_Shoot.csv Completed Successfully! 66 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2013-14-Regular Season  
_Season_2013-14op_Pullups.csv Completed Successfully! 67 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2013-14-Regular Season  
_Season_2013-14op_Less_than_10_feet.csv Completed Successfully! 68 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2013-14_Playoffs_Seaso  
n_2013-14op_Overall.csv Completed Successfully! 69 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2013-14_Playoffs_Seaso  
n_2013-14op_Catch_Shoot.csv Completed Successfully! 70 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2013-14_Playoffs_Seaso  
n_2013-14op_Pullups.csv Completed Successfully! 71 / 18 Complete!  
data/player/shot_dashboard/general/shots-general_SeasonYear_2013-14_Playoffs_Seaso  
n_2013-14op_Less_than_10_feet.csv Completed Successfully! 72 / 18 Complete!
```

```
In [ ]: shotdash_files = os.listdir('data/player/shot_dashboard/general/')  
for file in shotdash_files:  
    if '.csv' in file:  
        # move to correct folder  
        if 'Regular' in file:  
            shutil.move('data/player/shot_dashboard/general/' + file, 'data/player/  
else:  
    shutil.move('data/player/shot_dashboard/general/' + file, 'data/player/
```

Append

```
In [ ]: # TODO: Append
```

```
In [ ]: # TODO: Save to csv
```

```
In [ ]: # TODO: Append total file, save to CSV
```

Shot Dashboard -- Shotclock

```
In [ ]: shotclock_urls = []  
for year in years:  
    for s_types in season_types:  
        url = player_shotclock + '?SeasonYear=' + year + '&SeasonType=' + s_types +  
shotclock_urls.append(str(url))
```

```
In [ ]: driver = webdriver.Chrome()
```

```
In [ ]: get_data_w_double_header(shotclock_urls, 'data/player/shot_dashboard/shotclock/', 5
```

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Regular Season_Season_2021-22op_24-22.csv Completed Successfully! 1 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Regular Season_Season_2021-22op_22-18.csv Completed Successfully! 2 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Regular Season_Season_2021-22op_18-15.csv Completed Successfully! 3 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Regular Season_Season_2021-22op_15-7.csv Completed Successfully! 4 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Regular Season_Season_2021-22op_7-4.csv Completed Successfully! 5 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Playoffs_Season_2021-22op_24-22.csv Completed Successfully! 6 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Playoffs_Season_2021-22op_22-18.csv Completed Successfully! 7 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Playoffs_Season_2021-22op_18-15.csv Completed Successfully! 8 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2021-22_Playoffs_Season_2021-22op_15-7.csv Completed Successfully! 9 / 18 Complete!

<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2021-22&SeasonType=Playoffs&Season=2021-22> did not load. Moving to next url.

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Regular Season_Season_2020-21op_24-22.csv Completed Successfully! 10 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Regular Season_Season_2020-21op_22-18.csv Completed Successfully! 11 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Regular Season_Season_2020-21op_18-15.csv Completed Successfully! 12 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Regular Season_Season_2020-21op_15-7.csv Completed Successfully! 13 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Regular Season_Season_2020-21op_7-4.csv Completed Successfully! 14 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Playoffs_Season_2020-21op_24-22.csv Completed Successfully! 15 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Playoffs_Season_2020-21op_22-18.csv Completed Successfully! 16 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Playoffs_Season_2020-21op_18-15.csv Completed Successfully! 17 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2020-21_Playoffs_Season_2020-21op_15-7.csv Completed Successfully! 18 / 18 Complete!

<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2020-21&SeasonType=Playoffs&Season=2020-21> did not load. Moving to next url.

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Regular Season_Season_2019-20op_24-22.csv Completed Successfully! 19 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Regular Season_Season_2019-20op_22-18.csv Completed Successfully! 20 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Regular Season_Season_2019-20op_18-15.csv Completed Successfully! 21 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Regular Season_Season_2019-20op_15-7.csv Completed Successfully! 22 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Regular Season_Season_2019-20op_7-4.csv Completed Successfully! 23 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Playoffs_Season_2019-20op_24-22.csv Completed Successfully! 24 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Playoffs_Season_2019-20op_22-18.csv Completed Successfully! 25 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Playoffs_Season_2019-20op_18-15.csv Completed Successfully! 26 / 18 Complete!

data/player/shot_dashboard/shotclock/shots-shotclock__2019-20_Playoffs_Season_2019-20op_15-7.csv Completed Successfully! 27 / 18 Complete!

<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2019-20&SeasonType=Playoffs&Season=2019-20>

ayoffs&Season=2019-20 did not load. Moving to next url.
data/player/shot_dashboard/shotclock/shots-shotclock_2018-19_Regular Season_Season_2018-19op_24-22.csv Completed Successfully! 28 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2018-19_Regular Season_Season_2018-19op_22-18.csv Completed Successfully! 29 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2018-19_Regular Season_Season_2018-19op_18-15.csv Completed Successfully! 30 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2018-19_Regular Season_Season_2018-19op_15-7.csv Completed Successfully! 31 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2018-19_Regular Season_Season_2018-19op_7-4.csv Completed Successfully! 32 / 18 Complete!
<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2018-19&SeasonType=Playoffs&Season=2018-19> did not load. Moving to next url.
data/player/shot_dashboard/shotclock/shots-shotclock_2018-19_Playoffs_Season_2018-19op_22-18.csv Completed Successfully! 33 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2018-19_Playoffs_Season_2018-19op_18-15.csv Completed Successfully! 34 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2018-19_Playoffs_Season_2018-19op_15-7.csv Completed Successfully! 35 / 18 Complete!
<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2018-19&SeasonType=Playoffs&Season=2018-19> did not load. Moving to next url.
data/player/shot_dashboard/shotclock/shots-shotclock_2017-18_Regular Season_Season_2017-18op_24-22.csv Completed Successfully! 36 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2017-18_Regular Season_Season_2017-18op_22-18.csv Completed Successfully! 37 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2017-18_Regular Season_Season_2017-18op_18-15.csv Completed Successfully! 38 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2017-18_Regular Season_Season_2017-18op_15-7.csv Completed Successfully! 39 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2017-18_Regular Season_Season_2017-18op_7-4.csv Completed Successfully! 40 / 18 Complete!
<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2017-18&SeasonType=Playoffs&Season=2017-18> did not load. Moving to next url.
data/player/shot_dashboard/shotclock/shots-shotclock_2017-18_Playoffs_Season_2017-18op_22-18.csv Completed Successfully! 41 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2017-18_Playoffs_Season_2017-18op_18-15.csv Completed Successfully! 42 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2017-18_Playoffs_Season_2017-18op_15-7.csv Completed Successfully! 43 / 18 Complete!
<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2017-18&SeasonType=Playoffs&Season=2017-18> did not load. Moving to next url.
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Regular Season_Season_2016-17op_24-22.csv Completed Successfully! 44 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Regular Season_Season_2016-17op_22-18.csv Completed Successfully! 45 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Regular Season_Season_2016-17op_18-15.csv Completed Successfully! 46 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Regular Season_Season_2016-17op_15-7.csv Completed Successfully! 47 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Regular Season_Season_2016-17op_7-4.csv Completed Successfully! 48 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Playoffs_Season_2016-17op_24-22.csv Completed Successfully! 49 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Playoffs_Season_2016-17op_22-18.csv Completed Successfully! 50 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Playoffs_Season_2016-17op_18-15.csv Completed Successfully! 51 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2016-17_Playoffs_Season_2016-17op_15-7.csv Completed Successfully! 52 / 18 Complete!

<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2016-17&SeasonType=Playoffs&Season=2016-17> did not load. Moving to next url.
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Regular Season_Season_2015-16op_24-22.csv Completed Successfully! 53 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Regular Season_Season_2015-16op_22-18.csv Completed Successfully! 54 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Regular Season_Season_2015-16op_18-15.csv Completed Successfully! 55 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Regular Season_Season_2015-16op_15-7.csv Completed Successfully! 56 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Regular Season_Season_2015-16op_7-4.csv Completed Successfully! 57 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Playoffs_Season_2015-16op_24-22.csv Completed Successfully! 58 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Playoffs_Season_2015-16op_22-18.csv Completed Successfully! 59 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Playoffs_Season_2015-16op_18-15.csv Completed Successfully! 60 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2015-16_Playoffs_Season_2015-16op_15-7.csv Completed Successfully! 61 / 18 Complete!
<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2015-16&SeasonType=Playoffs&Season=2015-16> did not load. Moving to next url.
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Regular Season_Season_2014-15op_24-22.csv Completed Successfully! 62 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Regular Season_Season_2014-15op_22-18.csv Completed Successfully! 63 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Regular Season_Season_2014-15op_18-15.csv Completed Successfully! 64 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Regular Season_Season_2014-15op_15-7.csv Completed Successfully! 65 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Regular Season_Season_2014-15op_7-4.csv Completed Successfully! 66 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Playoffs_Season_2014-15op_24-22.csv Completed Successfully! 67 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Playoffs_Season_2014-15op_22-18.csv Completed Successfully! 68 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Playoffs_Season_2014-15op_18-15.csv Completed Successfully! 69 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2014-15_Playoffs_Season_2014-15op_15-7.csv Completed Successfully! 70 / 18 Complete!
<https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2014-15&SeasonType=Playoffs&Season=2014-15> did not load. Moving to next url.
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Regular Season_Season_2013-14op_24-22.csv Completed Successfully! 71 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Regular Season_Season_2013-14op_22-18.csv Completed Successfully! 72 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Regular Season_Season_2013-14op_18-15.csv Completed Successfully! 73 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Regular Season_Season_2013-14op_15-7.csv Completed Successfully! 74 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Regular Season_Season_2013-14op_7-4.csv Completed Successfully! 75 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Playoffs_Season_2013-14op_24-22.csv Completed Successfully! 76 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Playoffs_Season_2013-14op_22-18.csv Completed Successfully! 77 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Playoffs_Season_2013-14op_18-15.csv Completed Successfully! 78 / 18 Complete!
data/player/shot_dashboard/shotclock/shots-shotclock_2013-14_Playoffs_Season_2013-

```
14op_15-7.csv Completed Successfully! 79 / 18 Complete!
https://www.nba.com/stats/players/shots-shotclock/?SeasonYear=2013-14&SeasonType=Playoffs&Season=2013-14 did not load. Moving to next url.
```

```
In [ ]: player_general = 'https://www.nba.com/stats/players/shots-general/'      # 4 option
player_shotclock = 'https://www.nba.com/stats/players/shots-shotclock/'    # 6 option
player_dribbles = 'https://www.nba.com/stats/players/shots-dribbles/'       # 5 option
player_touchtime = 'https://www.nba.com/stats/players/shots-touch-time/'   # 3 option
player_closest_defender = 'https://www.nba.com/stats/players/shots-closest-defender'
player_plus10 = 'https://www.nba.com/stats/players/shots-closest-defender-10/' # 4
```

Shot Dashboard -- Dribbles

```
In [ ]: dribbles_urls = []
for year in years:
    for s_types in season_types:
        url = player_dribbles + '?SeasonYear=' + year + '&SeasonType=' + s_types +
dribbles_urls.append(str(url))
```

```
In [ ]: driver = webdriver.Chrome()
```

```
In [ ]: get_data_w_double_header(dribbles_urls, 'data/player/shot_dashboard/dribbles/', 6,
```


op_7-drib.csv Completed Successfully! 30 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Regular Season_Season_2
018-19op_0-drib.csv Completed Successfully! 31 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Regular Season_Season_2
018-19op_1-drib.csv Completed Successfully! 32 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Regular Season_Season_2
018-19op_2-drib.csv Completed Successfully! 33 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Regular Season_Season_2
018-19op_3-6-drib.csv Completed Successfully! 34 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Regular Season_Season_2
018-19op_7-drib.csv Completed Successfully! 35 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Playoffs_Season_2018-19
op_0-drib.csv Completed Successfully! 36 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Playoffs_Season_2018-19
op_1-drib.csv Completed Successfully! 37 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Playoffs_Season_2018-19
op_2-drib.csv Completed Successfully! 38 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Playoffs_Season_2018-19
op_3-6-drib.csv Completed Successfully! 39 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2018-19_Playoffs_Season_2018-19
op_7-drib.csv Completed Successfully! 40 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Regular Season_Season_2
017-18op_0-drib.csv Completed Successfully! 41 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Regular Season_Season_2
017-18op_1-drib.csv Completed Successfully! 42 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Regular Season_Season_2
017-18op_2-drib.csv Completed Successfully! 43 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Regular Season_Season_2
017-18op_3-6-drib.csv Completed Successfully! 44 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Regular Season_Season_2
017-18op_7-drib.csv Completed Successfully! 45 / 18 Complete!
<https://www.nba.com/stats/players/shots-dribbles/?SeasonYear=2017-18&SeasonType=Playoffs&Season=2017-18> did not load. Moving to next url.
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Playoffs_Season_2017-18
op_1-drib.csv Completed Successfully! 46 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Playoffs_Season_2017-18
op_2-drib.csv Completed Successfully! 47 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Playoffs_Season_2017-18
op_3-6-drib.csv Completed Successfully! 48 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2017-18_Playoffs_Season_2017-18
op_7-drib.csv Completed Successfully! 49 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Regular Season_Season_2
016-17op_0-drib.csv Completed Successfully! 50 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Regular Season_Season_2
016-17op_1-drib.csv Completed Successfully! 51 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Regular Season_Season_2
016-17op_2-drib.csv Completed Successfully! 52 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Regular Season_Season_2
016-17op_3-6-drib.csv Completed Successfully! 53 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Regular Season_Season_2
016-17op_7-drib.csv Completed Successfully! 54 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Playoffs_Season_2016-17
op_0-drib.csv Completed Successfully! 55 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Playoffs_Season_2016-17
op_1-drib.csv Completed Successfully! 56 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Playoffs_Season_2016-17
op_2-drib.csv Completed Successfully! 57 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2016-17_Playoffs_Season_2016-17
op_3-6-drib.csv Completed Successfully! 58 / 18 Complete!


```
op_3-6-drib.csv Completed Successfully! 88 / 18 Complete!
data/player/shot_dashboard/dribbles/shots-dribbles_2013-14_Playoffs_Season_2013-14
op_7-drib.csv Completed Successfully! 89 / 18 Complete!
```

```
In [ ]: # check if dribbles/regular_season folder exists
if not os.path.exists('data/player/shot_dashboard/dribbles/regular_season/'):
    os.makedirs('data/player/shot_dashboard/dribbles/regular_season/')

# check if dribbles/playoffs folder exists
if not os.path.exists('data/player/shot_dashboard/dribbles/playoffs/'):
    os.makedirs('data/player/shot_dashboard/dribbles/playoffs/')
```

```
In [ ]: # move files to correct folder
dribbles_files = os.listdir('data/player/shot_dashboard/dribbles/')

for file in dribbles_files:
    if '.csv' in file:
        # move to correct folder
        if 'Regular' in file:
            shutil.move('data/player/shot_dashboard/dribbles/' + file, 'data/player')
        else:
            shutil.move('data/player/shot_dashboard/dribbles/' + file, 'data/player')
```

```
In [ ]: # append the data
drib_1_reg = append_the_data('data/player/shot_dashboard/dribbles/regular_season/',
drib_2_reg = append_the_data('data/player/shot_dashboard/dribbles/regular_season/',
drib_3_reg = append_the_data('data/player/shot_dashboard/dribbles/regular_season/',
drib_4_reg = append_the_data('data/player/shot_dashboard/dribbles/regular_season/',
drib_5_reg = append_the_data('data/player/shot_dashboard/dribbles/regular_season/',
```

```
In [ ]: drib_1_play = append_the_data('data/player/shot_dashboard/dribbles/playoffs/', 'sd_'
drib_2_play = append_the_data('data/player/shot_dashboard/dribbles/playoffs/', 'sd_'
drib_3_play = append_the_data('data/player/shot_dashboard/dribbles/playoffs/', 'sd_'
drib_4_play = append_the_data('data/player/shot_dashboard/dribbles/playoffs/', 'sd_'
drib_5_play = append_the_data('data/player/shot_dashboard/dribbles/playoffs/', 'sd_')
```

```
In [ ]: drib_1_reg.columns
```

```
Out[ ]: Index(['sd_drib_0_dribbles_unnamed: 0', 'sd_drib_0_dribbles_player',
               'sd_drib_0_dribbles_team', 'sd_drib_0_dribbles_age',
               'sd_drib_0_dribbles_gp', 'sd_drib_0_dribbles_g',
               'sd_drib_0_dribbles_freq%', 'sd_drib_0_dribbles_fgm',
               'sd_drib_0_dribbles_fga', 'sd_drib_0_dribbles_fg%',
               'sd_drib_0_dribbles_efg%', 'sd_drib_0_dribbles_2fg_freq%',
               'sd_drib_0_dribbles_2fgm', 'sd_drib_0_dribbles_2fga',
               'sd_drib_0_dribbles_2fg%', 'sd_drib_0_dribbles_3fg_freq%',
               'sd_drib_0_dribbles_3pm', 'sd_drib_0_dribbles_3pa',
               'sd_drib_0_dribbles_3p%', 'sd_drib_0_dribbles_season',
               'sd_drib_0_dribbles_season_type'],
              dtype='object')
```

Out[]:	sd_drib_0_dribbles_unnamed: 0	sd_drib_0_dribbles_player	sd_drib_0_dribbles_team	sd_drib_0_
0	0	NaN	NaN	NaN
1	0	NaN	NaN	NaN
2	1	NaN	NaN	NaN
3	1	NaN	NaN	NaN
4	2	Kevin Love	MIN	
...
4643	583	Wayne Selden	NYK	
4644	584	Craig Sword	WAS	
4645	585	Sharife Cooper	ATL	
4646	586	Myles Powell	PHI	
4647	587	Aaron Henry	PHI	

4648 rows × 42 columns

```
Out[ ]:      sd_drib_0_dribbles_unnamed:0  sd_drib_0_dribbles_player  sd_drib_0_dribbles_team  sd_drib_0_

```

	sd_drib_0_dribbles_unnamed:0	sd_drib_0_dribbles_player	sd_drib_0_dribbles_team	sd_drib_0_
0	0	NaN	NaN	
1	0	NaN	NaN	
2	0	NaN	NaN	
3	0	NaN	NaN	
4	0	NaN	NaN	
...
4895	583	Wayne Selden	NYK	
4896	584	Craig Sword	WAS	
4897	585	Sharife Cooper	ATL	
4898	586	Myles Powell	PHI	
4899	587	Aaron Henry	PHI	

4900 rows × 105 columns

```
In [ ]: # drop nan in player column
all_dribbles_reg4 = all_dribbles_reg4.dropna(subset = ['sd_drib_0_dribbles_player'])
all_dribbles_reg4
```

```
Out[ ]:      sd_drib_0_dribbles_unnamed:0  sd_drib_0_dribbles_player  sd_drib_0_dribbles_team  sd_drib_0_

```

	sd_drib_0_dribbles_unnamed:0	sd_drib_0_dribbles_player	sd_drib_0_dribbles_team	sd_drib_0_
32	2	Kevin Love	MIN	
33	3	Ryan Anderson	NOP	
34	4	Al Horford	ATL	
35	5	LaMarcus Aldridge	POR	
36	6	Serge Ibaka	OKC	
...
4895	583	Wayne Selden	NYK	
4896	584	Craig Sword	WAS	
4897	585	Sharife Cooper	ATL	
4898	586	Myles Powell	PHI	
4899	587	Aaron Henry	PHI	

4612 rows × 105 columns

```
In [ ]: all_dribbles_reg4.to_csv('data/player/aggregates/ShotDash_Dribbles_Regular_Season.csv')
```

```
In [ ]: all_dribbles_play1 = pd.merge(drib_1_play, drib_2_play,
                                     left_on = ['sd_drib_0_dribbles_player', 'sd_drib_0'],
                                     right_on = ['sd_drib_1_dribbles_player', 'sd_drib_1'],
                                     how = 'left')

all_dribbles_play2 = pd.merge(all_dribbles_play1, drib_3_play,
                             left_on = ['sd_drib_0_dribbles_player', 'sd_drib_0'],
                             right_on = ['sd_drib_2_dribbles_player', 'sd_drib_2'],
                             how = 'left')

all_dribbles_play3 = pd.merge(all_dribbles_play2, drib_4_play,
                             left_on = ['sd_drib_0_dribbles_player', 'sd_drib_0'],
                             right_on = ['sd_drib_3-6_dribbles_player', 'sd_drib_3'],
                             how = 'left')

all_dribbles_play4 = pd.merge(all_dribbles_play3, drib_5_play,
                             left_on = ['sd_drib_0_dribbles_player', 'sd_drib_0'],
                             right_on = ['sd_drib_7_dribbles_player', 'sd_drib_7'],
                             how = 'left')

all_dribbles_play4
```

```
Out[ ]:      sd_drib_0_dribbles_unnamed:0  sd_drib_0_dribbles_player  sd_drib_0_dribbles_team  sd_drib_0_
0                      0                  NaN                  NaN                  NaN
1                      0                  NaN                  NaN                  NaN
2                      0                  NaN                  NaN                  NaN
3                      0                  NaN                  NaN                  NaN
4                      0                  NaN                  NaN                  NaN
...
1856                 200        Facundo Campazzo          DEN
1857                 201           Malik Fitts          BOS
1858                 202         Jaden Springer          PHI
1859                 203          Isaiah Joe          PHI
1860                 204        Rayjon Tucker          MIL
```

1861 rows × 105 columns

```
In [ ]: # drop nan in player column
all_dribbles_play4 = all_dribbles_play4.dropna(subset = ['sd_drib_0_dribbles_player'])
all_dribbles_play4
```

```
Out[ ]:    sd_drib_0_dribbles_unnamed:0  sd_drib_0_dribbles_player  sd_drib_0_dribbles_team  sd_drib_0_

```

	sd_drib_0_dribbles_unnamed:0	sd_drib_0_dribbles_player	sd_drib_0_dribbles_team	sd_drib_0_
32	2	Al Jefferson	CHA	
33	3	LaMarcus Aldridge	POR	
34	4	Marc Gasol	MEM	
35	5	Kevin Durant	OKC	
36	6	Nene	WAS	
...
1856	200	Facundo Campazzo	DEN	
1857	201	Malik Fitts	BOS	
1858	202	Jaden Springer	PHI	
1859	203	Isaiah Joe	PHI	
1860	204	Rayjon Tucker	MIL	

1605 rows × 105 columns

```
In [ ]: all_dribbles_reg4.to_csv('data/player/aggregates/ShotDash_Dribbles_Playoffs.csv', index=False)
```

```
In [ ]: # concat all dribbles
all_dribbles = pd.concat([all_dribbles_reg4, all_dribbles_play4])
all_dribbles.to_csv('data/player/aggregates/ShotDash_All_Dribbles.csv', index=False)
```

Shot Dashboard -- TouchTime

```
In [ ]: touchtime_urls = []
for year in years:
    for s_types in season_types:
        url = player_touchtime + '?SeasonYear=' + year + '&SeasonType=' + s_types +
touchtime_urls.append(str(url))
```

```
In [ ]: get_data_w_double_header(touchtime_urls, 'data/player/shot_dashboard/touch_time/')
```



```
7-18op_6+ seconds.csv Completed Successfully! 30 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2016-17_Regular_Season_Season_2016-17op_0-2.csv Completed Successfully! 31 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2016-17_Regular_Season_Season_2016-17op_2-6.csv Completed Successfully! 32 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2016-17_Regular_Season_Season_2016-17op_6+ seconds.csv Completed Successfully! 33 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2016-17_Playoffs_Season_2016-17op_0-2.csv Completed Successfully! 34 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2016-17_Playoffs_Season_2016-17op_2-6.csv Completed Successfully! 35 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2016-17_Playoffs_Season_2016-17op_6+ seconds.csv Completed Successfully! 36 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2015-16_Regular_Season_Season_2015-16op_0-2.csv Completed Successfully! 37 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2015-16_Regular_Season_Season_2015-16op_2-6.csv Completed Successfully! 38 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2015-16_Regular_Season_Season_2015-16op_6+ seconds.csv Completed Successfully! 39 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2015-16_Playoffs_Season_2015-16op_0-2.csv Completed Successfully! 40 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2015-16_Playoffs_Season_2015-16op_2-6.csv Completed Successfully! 41 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2015-16_Playoffs_Season_2015-16op_6+ seconds.csv Completed Successfully! 42 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2014-15_Regular_Season_Season_2014-15op_0-2.csv Completed Successfully! 43 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2014-15_Regular_Season_Season_2014-15op_2-6.csv Completed Successfully! 44 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2014-15_Regular_Season_Season_2014-15op_6+ seconds.csv Completed Successfully! 45 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2014-15_Playoffs_Season_2014-15op_0-2.csv Completed Successfully! 46 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2014-15_Playoffs_Season_2014-15op_2-6.csv Completed Successfully! 47 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2014-15_Playoffs_Season_2014-15op_6+ seconds.csv Completed Successfully! 48 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2013-14_Regular_Season_Season_2013-14op_0-2.csv Completed Successfully! 49 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2013-14_Regular_Season_Season_2013-14op_2-6.csv Completed Successfully! 50 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2013-14_Regular_Season_Season_2013-14op_6+ seconds.csv Completed Successfully! 51 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2013-14_Playoffs_Season_2013-14op_0-2.csv Completed Successfully! 52 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2013-14_Playoffs_Season_2013-14op_2-6.csv Completed Successfully! 53 / 18 Complete!
data/player/shot_dashboard/touch_time/shots-touch-time__2013-14_Playoffs_Season_2013-14op_6+ seconds.csv Completed Successfully! 54 / 18 Complete!
```

```
In [ ]: # check if regular season or playoffs folders exist
if not os.path.exists('data/player/shot_dashboard/touch_time/regular_season/'):
    os.makedirs('data/player/shot_dashboard/touch_time/regular_season/')
if not os.path.exists('data/player/shot_dashboard/touch_time/playoffs/'):
    os.makedirs('data/player/shot_dashboard/touch_time/playoffs/')
```

```
In [ ]: # move files to regular season or playoffs folders
        for file in os.listdir('data/player/shot_dashboard/touch_time/'):
            if '.csv' in file:
                if 'Regular' in file:
                    shutil.move('data/player/shot_dashboard/touch_time/' + file, 'data/player/shot_dashboard/touch_time/Regular')
                elif 'Playoffs' in file:
                    shutil.move('data/player/shot_dashboard/touch_time/' + file, 'data/player/shot_dashboard/touch_time/Playoffs')
```

```
In [ ]: # TODO: Append

# TODO: SAVE
```

Shot Dashboard -- Closest Defenders

```
In [ ]: closest_defender_urls = []
        for year in years:
            for s_types in season_types:
                url = player_closest_defender + '?SeasonYear=' + year + '&SeasonType=' + s_types
                closest_defender_urls.append(str(url))

In [ ]: driver = webdriver.Chrome()

In [ ]: get_data_w_double_header(closest_defender_urls, 'data/player/shot_dashboard/closest')
```



```
data/player/shot_dashboard/closest_defender/shots-closest-defender__2014-15_Regular  
Season_Season_2014-15op_6+ feet.csv Completed Successfully! 60 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2014-15_Playoff  
s_Season_2014-15op_0-2.csv Completed Successfully! 61 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2014-15_Playoff  
s_Season_2014-15op_2-4.csv Completed Successfully! 62 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2014-15_Playoff  
s_Season_2014-15op_4-6.csv Completed Successfully! 63 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2014-15_Playoff  
s_Season_2014-15op_6+ feet.csv Completed Successfully! 64 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2013-14_Regular  
Season_Season_2013-14op_0-2.csv Completed Successfully! 65 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2013-14_Regular  
Season_Season_2013-14op_2-4.csv Completed Successfully! 66 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2013-14_Regular  
Season_Season_2013-14op_4-6.csv Completed Successfully! 67 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2013-14_Regular  
Season_Season_2013-14op_6+ feet.csv Completed Successfully! 68 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2013-14_Playoff  
s_Season_2013-14op_0-2.csv Completed Successfully! 69 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2013-14_Playoff  
s_Season_2013-14op_2-4.csv Completed Successfully! 70 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2013-14_Playoff  
s_Season_2013-14op_4-6.csv Completed Successfully! 71 / 18 Complete!  
data/player/shot_dashboard/closest_defender/shots-closest-defender__2013-14_Playoff  
s_Season_2013-14op_6+ feet.csv Completed Successfully! 72 / 18 Complete!
```

```
In [ ]: closest_defender_plus10_urls = []  
for year in years:  
    for s_types in season_types:  
        url = player_closest_defender_plus10 + '?SeasonYear=' + year + '&SeasonType'  
        closest_defender_plus10_urls.append(str(url))
```

```
In [ ]: get_data_w_double_header(closest_defender_plus10_urls, 'data/player/shot_dashboard/
```


data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2018-19_Regular Season_Season_2018-19op_2-4.csv Completed Successfully! 26 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2018-19_Regular Season_Season_2018-19op_4-6.csv Completed Successfully! 27 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2018-19_Regular Season_Season_2018-19op_6+ feet.csv Completed Successfully! 28 / 18 Complete!

<https://www.nba.com/stats/players/shots-closest-defender-10/?SeasonYear=2018-19&SeasonType=Playoffs&Season=2018-19> did not load. Moving to next url.

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2018-19_Playoffs_Season_2018-19op_2-4.csv Completed Successfully! 29 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2018-19_Playoffs_Season_2018-19op_4-6.csv Completed Successfully! 30 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2018-19_Playoffs_Season_2018-19op_6+ feet.csv Completed Successfully! 31 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2017-18_Regular Season_Season_2017-18op_0-2.csv Completed Successfully! 32 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2017-18_Regular Season_Season_2017-18op_2-4.csv Completed Successfully! 33 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2017-18_Regular Season_Season_2017-18op_4-6.csv Completed Successfully! 34 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2017-18_Regular Season_Season_2017-18op_6+ feet.csv Completed Successfully! 35 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2017-18_Playoffs_Season_2017-18op_0-2.csv Completed Successfully! 36 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2017-18_Playoffs_Season_2017-18op_2-4.csv Completed Successfully! 37 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2017-18_Playoffs_Season_2017-18op_4-6.csv Completed Successfully! 38 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2017-18_Playoffs_Season_2017-18op_6+ feet.csv Completed Successfully! 39 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2016-17_Regular Season_Season_2016-17op_0-2.csv Completed Successfully! 40 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2016-17_Regular Season_Season_2016-17op_2-4.csv Completed Successfully! 41 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2016-17_Regular Season_Season_2016-17op_4-6.csv Completed Successfully! 42 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2016-17_Regular Season_Season_2016-17op_6+ feet.csv Completed Successfully! 43 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2016-17_Playoffs_Season_2016-17op_0-2.csv Completed Successfully! 44 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2016-17_Playoffs_Season_2016-17op_2-4.csv Completed Successfully! 45 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2016-17_Playoffs_Season_2016-17op_4-6.csv Completed Successfully! 46 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2016-17_Playoffs_Season_2016-17op_6+ feet.csv Completed Successfully! 47 / 18 Complete!

data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2015-16_Regular Season_Season_2015-16op_0-2.csv Completed Successfully! 48 / 18 Complete

```
e!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2015-
16_Regular Season_Season_2015-16op_2-4.csv Completed Successfully! 49 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2015-
16_Regular Season_Season_2015-16op_4-6.csv Completed Successfully! 50 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2015-
16_Regular Season_Season_2015-16op_6+ feet.csv Completed Successfully! 51 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2015-
16_Playoffs_Season_2015-16op_0-2.csv Completed Successfully! 52 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2015-
16_Playoffs_Season_2015-16op_2-4.csv Completed Successfully! 53 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2015-
16_Playoffs_Season_2015-16op_4-6.csv Completed Successfully! 54 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2015-
16_Playoffs_Season_2015-16op_6+ feet.csv Completed Successfully! 55 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2014-
15_Regular Season_Season_2014-15op_0-2.csv Completed Successfully! 56 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2014-
15_Regular Season_Season_2014-15op_2-4.csv Completed Successfully! 57 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2014-
15_Regular Season_Season_2014-15op_4-6.csv Completed Successfully! 58 / 18 Complete!
data/player/shot_dashboard/closest_defender_plus10/shots-closest-defender-10__2014-
15_Regular Season_Season_2014-15op_6+ feet.csv Completed Successfully! 59 / 18 Complete!
```

```
TimeoutException                                     Traceback (most recent call last)
Cell In [611], line 1
----> 1 get_data_w_double_header(closest_defender_plus10_urls, 'data/player/shot_da
shboard/closest_defender_plus10/', 4, ['0-2', '2-4', '4-6', '6+ feet'], 6)

Cell In [566], line 24, in get_data_w_double_header(url_list, file_folder, option_n
umbers, option_names, headers_to_skip)
    22 # all pages
    23 xpath_all = '//*[@id="__next"]/div[2]/div[2]/div[3]/section[2]/div/div[2]/d
iv[2]/div[1]/div[3]/div/label/div/select/option[1]'
--> 24 elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.X
PATH, xpath_all)))
    25 driver.find_element(by=By.XPATH, value=xpath_all).click()
    26 src = driver.page_source

File c:\Users\Travis\anaconda3\envs\Trav310\lib\site-packages\selenium\webdriver\su
pport\wait.py:80, in WebDriverWait.until(self, method, message)
    78     if time.time() > end_time:
    79         break
--> 80 raise TimeoutException(message, screen, stacktrace)
```

TimeoutException: Message:

Combine Closest_Defender data

```
In [ ]: # combine closest defender dfs
cd2 = append_the_data('data/player/shot_dashboard/closest_defender/0-2ft/', 'closes')
cd2 = cdd.dropna(subset=['closest_d_0-2ft__player'])
cd4 = append_the_data('data/player/shot_dashboard/closest_defender/2-4ft/', 'closes')
cd4 = cd4.dropna(subset=['closest_d_2-4ft__player'])
cd6 = append_the_data('data/player/shot_dashboard/closest_defender/4-6ft/', 'closes')
cd6 = cd6.dropna(subset=['closest_d_4-6ft__player'])
cd10 = append_the_data('data/player/shot_dashboard/closest_defender/6_plusft/', 'closes')
cd10 = cd10.dropna(subset=['closest_d_6_plusft__player'])
cd10
```

```
In [ ]: print(f' cd2: {cd2.shape}, cd4: {cd4.shape}, cd6: {cd6.shape}, cd10: {cd10.shape}')
```

```
In [ ]: mergecols = ['player', 'season', 'season_type']
mergecols[2]
```

```
In [ ]: all_closest_defender = quad_merge(cd2,cd4,cd6,cd10, 'closest_d_0-2ft__', 'closest_d_2-4ft__', 'closest_d_4-6ft__', 'closest_d_6_plusft__')

if os.path.isfile('data/player/shot_dashboard/closest_defender/All_Closest_Defender.csv'):
    all_closest_defender.to_csv('data/player/shot_dashboard/closest_defender/All_Closest_Defender.csv')
```

Shotclock Folders

```
In [ ]: if os.path.isdir('data/player/shot_dashboard/shotclock/regular_season') is False:
    os.makedirs('data/player/shot_dashboard/shotclock/regular_season')
if os.path.isdir('data/player/shot_dashboard/shotclock/playoffs') is False:
    os.makedirs('data/player/shot_dashboard/shotclock/playoffs')
```

```
In [ ]: sd1 = append_the_data('data/player/shot_dashboard/shotclock/4-0sec/', 'shotclock_4-0sec')
sd1 = sd1.dropna(subset=['shotclock_4-0_sec__player'])
sd2 = append_the_data('data/player/shot_dashboard/shotclock/7-4sec/', 'shotclock_7-4sec')
sd2 = sd2.dropna(subset=['shotclock_7-4_sec__player'])
sd3 = append_the_data('data/player/shot_dashboard/shotclock/15-7sec/', 'shotclock_15-7sec')
sd3 = sd3.dropna(subset=['shotclock_15-7_sec__player'])
sd4 = append_the_data('data/player/shot_dashboard/shotclock/18-15sec/', 'shotclock_18-15sec')
sd4 = sd4.dropna(subset=['shotclock_18-15_sec__player'])
sd5 = append_the_data('data/player/shot_dashboard/shotclock/22-18sec/', 'shotclock_22-18sec')
sd5 = sd5.dropna(subset=['shotclock_22-18_sec__player'])
sd6 = append_the_data('data/player/shot_dashboard/shotclock/24-22sec/', 'shotclock_24-22sec')
sd6 = sd6.dropna(subset=['shotclock_24-22_sec__player'])
```

```
In [ ]: sd1.to_csv('data/player/shot_dashboard/shotclock/4-0sec/ALL_Shotclock_4-0_sec.csv')
sd2.to_csv('data/player/shot_dashboard/shotclock/7-4sec/ALL_Shotclock_7-4_sec.csv')
sd3.to_csv('data/player/shot_dashboard/shotclock/15-7sec/ALL_Shotclock_15-7_sec.csv')
sd4.to_csv('data/player/shot_dashboard/shotclock/18-15sec/ALL_Shotclock_18-15_sec.csv')
sd5.to_csv('data/player/shot_dashboard/shotclock/22-18sec/ALL_Shotclock_22-18_sec.csv')
sd6.to_csv('data/player/shot_dashboard/shotclock/24-22sec/ALL_Shotclock_24-22_sec.csv')
```

Touchtime Folders

```
In [ ]: if os.path.isdir('data/player/shot_dashboard/touch_time/regular_season') is False:  
    os.makedirs('data/player/shot_dashboard/touch_time/regular_season')  
if os.path.isdir('data/player/shot_dashboard/touch_time/playoffs') is False:  
    os.makedirs('data/player/shot_dashboard/touch_time/playoffs')
```

```
In [ ]: # TODO: THIS  
  
touchtime_files = os.listdir('data/player/shot_dashboard/touch_time')  
  
for file in touchtime_files:  
    if '.csv' in file:  
        if ''
```

```
In [ ]: tt1 = append_the_data('data/player/shot_dashboard/touch_time/0-2sec/', 'touch_time_  
tt1 = tt1.dropna(subset=['touch_time_0-2_sec__player'])  
tt2 = append_the_data('data/player/shot_dashboard/touch_time/2-6sec/', 'touch_time_  
tt2 = tt2.dropna(subset=['touch_time_2-6_sec__player'])  
tt3 = append_the_data('data/player/shot_dashboard/touch_time/6_plussec/', 'touch_time_  
tt3 = tt3.dropna(subset=['touch_time_6_plus_sec__player'])
```

```
In [ ]: all_touchtime = triple_merge(tt1,tt2,tt3, 'touch_time_0-2_sec__', 'touch_time_2-6_  
all_touchtime
```

```
In [ ]: if os.path.isfile('data/player/shot_dashboard/touch_time/All_TouchTime.csv') is Fal  
    all_touchtime.to_csv('data/player/shot_dashboard/touch_time/All_TouchTime.csv')
```

Game-Level Player Stats (Player Box Scores)

```
In [ ]: def grab_player_data2(url_list, file_folder):
    # Scrape Season-Level player data from the url_list

    i = 0
    for u in url_list:

        driver.get(u)
        time.sleep(2)

        # if the page does not load, go to the next in the list
        try:
            xpath = '//*[@id="__next"]/div[2]/div[2]/div[3]/section[2]/'
            elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.XPATH, xpath)))
        except:
            print(f'{u} did not load. Moving to next url.')
            continue

        # click "all pages"
        xpath_all = '//*[@id="__next"]/div[2]/div[2]/div[3]/section[2]/div['
        elem = WebDriverWait(driver, 30).until(EC.presence_of_element_located((By.XPATH, xpath_all)))

        driver.find_element(by=By.XPATH, value=xpath_all).click()
        src = driver.page_source
        parser = BeautifulSoup(src, "lxml")
        table = parser.find("table", attrs = {"class":"Crom_table_p1izz"})
        headers = table.findAll('th')
        headerlist = [h.text.strip() for h in headers[0:]]
        row_names = table.findAll('a')                                     # find names
        row_list = [b.text.strip() for b in row_names[0:]]
        rows = table.findAll('tr')[0:]
        player_stats = [[td.getText().strip() for td in rows[i].findAll('td')] for i in range(len(rows))]
        tot_cols = len(player_stats[1])                                    #set the total columns
        headerlist = headerlist[:tot_cols]
        stats = pd.DataFrame(player_stats, columns = headerlist)

        # assign filename
        filename = file_folder + str(u[34:]).replace('/', '_') + '.csv'
        filename = replace_name_values2(filename)
        pd.DataFrame.to_csv(stats, filename)
        i += 1
        lu = len(url_list)
        # close driver
        print(f'{filename} Completed Successfully! {i} / {lu} Complete!')

    winsound.Beep(523, 500)
```

```
In [ ]: today = datetime.date.today()
print(today)
month = today.month
print(month)
```

2022-12-21

12

```
In [ ]: # get months since oct 2022
today = datetime.date.today()
months_since_oct_2022 = (today.year - 2022) * 12 + today.month - 9
this_season_months = np.arange(1, months_since_oct_2022+1, 1)

s_17 = '2017-18'
s_18 = '2018-19'
s_19 = '2019-20'
s_20 = '2020-21'
s_21 = '2021-22'
s_22 = '2022-23'

s_16 = '2016-17'
s_15 = '2015-16'
s_14 = '2014-15'
s_13 = '2013-14'
s_12 = '2012-13'
s_11 = '2011-12'

yearz = ['2022', '2021', '2020', '2019', '2018', '2017', '2016', '2015', '2014', '2013', '2012', '2011']
s_years = [s_22, s_21, s_20, s_19, s_18, s_17, s_16, s_15, s_14, s_13, s_12, s_11]

#months played by year -- the months that HAD GAMES during said season
# October is counted as Month #1 --- Most should go 1-7.
months_2022 = this_season_months
months_2021 = ['1', '2', '3', '4', '5', '6', '7']
months_2020 = ['3', '4', '5', '6', '7', '8']
months_2019 = ['1', '2', '3', '4', '5', '6']
months_2018 = ['1', '2', '3', '4', '5', '6', '7']
months_2017 = ['1', '2', '3', '4', '5', '6', '7']
months_2016 = ['1', '2', '3', '4', '5', '6', '7']
months_2015 = ['1', '2', '3', '4', '5', '6', '7']
months_2014 = ['1', '2', '3', '4', '5', '6', '7']
months_2013 = ['1', '2', '3', '4', '5', '6', '7']
months_2012 = ['1', '2', '3', '4', '5', '6', '7']
months_2011 = ['1', '2', '3', '4', '5', '6', '7']
```

```
In [ ]: years = ['2022-23', '2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17']
types = ['boxscores-advanced', 'boxscores-traditional']
season_types = ['Regular%20Season', 'Playoffs']
```

```
In [ ]: # List all months to scrape
urls1 = []

for m in months_2022:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2022-23&sort
        urls1.append(url)

for m in months_2021:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2021-22&
        urls1.append(url)

for m in months_2020:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2020-21&
        urls1.append(url)

for m in months_2019:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2019-20&
        urls1.append(url)

for m in months_2018:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2018-19&
        urls1.append(url)

for m in months_2017:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2017-18&
        urls1.append(url)

for m in months_2016:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2016-17&
        urls1.append(url)

for m in months_2015:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2015-16&
        urls1.append(url)

for m in months_2014:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2014-15&
        urls1.append(url)

for m in months_2013:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2013-14&
        urls1.append(url)

for m in months_2012:
    for t in types:
        url = 'https://www.nba.com/stats/players/' + str(t) +'/?Season=2012-13&
        urls1.append(url)
```

```
    return oado
lendo
```

```
Out[ ]: 142
```

```
In [ ]: # get list of files in player/box_scores
files = os.listdir('data/player/box_scores')

# only csv files
files = [f for f in files if f.endswith('.csv')]
files
```

```
Out[ ]: ['boxscores-advanced_Season_2021-22_Month_1-Regular.csv',
 'boxscores-advanced_Season_2021-22_Month_2-Regular.csv',
 'boxscores-advanced_Season_2021-22_Month_3-Regular.csv',
 'boxscores-advanced_Season_2022-23_Month_1-Regular.csv',
 'boxscores-advanced_Season_2022-23_Month_2-Regular.csv',
 'boxscores-advanced_Season_2022-23_Month_3-Regular.csv',
 'boxscores-traditional_Season_2021-22_Month_1-Regular.csv',
 'boxscores-traditional_Season_2021-22_Month_2-Regular.csv',
 'boxscores-traditional_Season_2021-22_Month_3-Regular.csv',
 'boxscores-traditional_Season_2022-23_Month_1-Regular.csv',
 'boxscores-traditional_Season_2022-23_Month_2-Regular.csv',
 'boxscores-traditional_Season_2022-23_Month_3-Regular.csv']
```

```
In [ ]: driver = webdriver.Chrome()
```

```
In [ ]: grab_player_data2(urls1, 'data/player/box_scores/')
```



```
data/player/box_scores/boxscores-advanced_Season_2013-14_Month_3-Regular.csv Completed Successfully! 119 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2013-14_Month_3-Regular.csv Completed Successfully! 120 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2013-14_Month_4-Regular.csv Completed Successfully! 121 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2013-14_Month_4-Regular.csv Completed Successfully! 122 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2013-14_Month_5-Regular.csv Completed Successfully! 123 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2013-14_Month_5-Regular.csv Completed Successfully! 124 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2013-14_Month_6-Regular.csv Completed Successfully! 125 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2013-14_Month_6-Regular.csv Completed Successfully! 126 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2013-14_Month_7-Regular.csv Completed Successfully! 127 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2013-14_Month_7-Regular.csv Completed Successfully! 128 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2012-13_Month_1-Regular.csv Completed Successfully! 129 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2012-13_Month_1-Regular.csv Completed Successfully! 130 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2012-13_Month_2-Regular.csv Completed Successfully! 131 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2012-13_Month_2-Regular.csv Completed Successfully! 132 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2012-13_Month_3-Regular.csv Completed Successfully! 133 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2012-13_Month_3-Regular.csv Completed Successfully! 134 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2012-13_Month_4-Regular.csv Completed Successfully! 135 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2012-13_Month_4-Regular.csv Completed Successfully! 136 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2012-13_Month_5-Regular.csv Completed Successfully! 137 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2012-13_Month_5-Regular.csv Completed Successfully! 138 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2012-13_Month_6-Regular.csv Completed Successfully! 139 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2012-13_Month_6-Regular.csv Completed Successfully! 140 / 142 Complete!
data/player/box_scores/boxscores-advanced_Season_2012-13_Month_7-Regular.csv Completed Successfully! 141 / 142 Complete!
data/player/box_scores/boxscores-traditional_Season_2012-13_Month_7-Regular.csv Completed Successfully! 142 / 142 Complete!
```

Append boxscore data

```
In [ ]: all_boxes = append_the_data('data/player/box_scores', 'trad_', 'traditional')
all_boxes
```

Out[]:

	trad_unnamed: 0	trad_player	trad_team	trad_match up	trad_game date	trad_w/l	trad_min	trad_pt:
0	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	1	Damian Lillard	POR	POR vs. LAL	10/31/2012	W	35.0	23.0
2	2	Kobe Bryant	LAL	LAL @ POR	10/31/2012	L	38.0	30.0
3	3	Nicolas Batum	POR	POR vs. LAL	10/31/2012	W	40.0	26.0
4	4	Al Jefferson	UTA	UTA vs. DAL	10/31/2012	W	29.0	12.0
...
2960	2960	Killian Hayes	DET	DET vs. DAL	12/01/2022	W	33.0	22.0
2961	2961	Christian Wood	DAL	DAL @ DET	12/01/2022	L	35.0	25.0
2962	2962	Marvin Bagley III	DET	DET vs. DAL	12/01/2022	W	34.0	19.0
2963	2963	Tim Hardaway Jr.	DAL	DAL @ DET	12/01/2022	L	40.0	26.0
2964	2964	Bojan Bogdanovic	DET	DET vs. DAL	12/01/2022	W	41.0	30.0

261374 rows × 28 columns

In []: `all_boxes.to_csv('data/player/aggregates/trad_box_scores.csv', index=False)`

In []: `all_boxes_adv = append_the_data('data/player/box_scores', 'adv_', 'advanced')`
`all_boxes_adv`

Out[]:

	adv_unnamed: 0	adv_player	adv_team	adv_match up	adv_game date	adv_w/l	adv_min	adv_offrtg
0	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	1	Wesley Matthews	POR	POR vs. LAL	10/31/2012	W	37.0	118.9
2	2	Sasha Pavlovic	POR	POR vs. LAL	10/31/2012	W	18.0	132.4
3	3	Steve Blake	LAL	LAL @ POR	10/31/2012	L	28.0	117.0
4	4	Brandan Wright	DAL	DAL @ UTA	10/31/2012	L	26.0	107.8
...
2960	2960	Jalen Duren	DET	DET vs. DAL	12/01/2022	W	18.0	105.1
2961	2961	Christian Wood	DAL	DAL @ DET	12/01/2022	L	35.0	104.3
2962	2962	Killian Hayes	DET	DET vs. DAL	12/01/2022	W	33.0	131.3
2963	2963	Dwight Powell	DAL	DAL @ DET	12/01/2022	L	18.0	129.7
2964	2964	Isaiah Livers	DET	DET vs. DAL	12/01/2022	W	7.0	169.2

261374 rows × 24 columns

In []: `all_boxes_adv.to_csv('data/player/aggregates/adv_box_scores.csv', index=False)`

In []: `#merge`
`all_da_boxes = pd.merge(all_boxes, all_boxes_adv,`
`left_on=['trad_player', 'trad_team', 'trad_game date'],`
`right_on=['adv_player', 'adv_team', 'adv_game date'],`
`how = 'left')`

In []: `all_da_boxes = all_da_boxes.dropna(subset = ['trad_player'])`
`all_da_boxes`

Out[]:

	trad_unnamed: 0	trad_player	trad_team	trad_match up	trad_game date	trad_w/l	trad_min	trad_
71	1	Damian Lillard	POR	POR vs. LAL	10/31/2012	W	35.0	2
72	2	Kobe Bryant	LAL	LAL @ POR	10/31/2012	L	38.0	3
73	3	Nicolas Batum	POR	POR vs. LAL	10/31/2012	W	40.0	2
74	4	Al Jefferson	UTA	UTA vs. DAL	10/31/2012	W	29.0	1
75	5	Paul Millsap	UTA	UTA vs. DAL	10/31/2012	W	33.0	1
...
266339	2960	Killian Hayes	DET	DET vs. DAL	12/01/2022	W	33.0	2
266340	2961	Christian Wood	DAL	DAL @ DET	12/01/2022	L	35.0	2
266341	2962	Marvin Bagley III	DET	DET vs. DAL	12/01/2022	W	34.0	1
266342	2963	Tim Hardaway Jr.	DAL	DAL @ DET	12/01/2022	L	40.0	2
266343	2964	Bojan Bogdanovic	DET	DET vs. DAL	12/01/2022	W	41.0	3

261303 rows × 52 columns

In []: `all_da_boxes.to_csv('data/player/aggregates/Trad&Adv_box_scores_GameView.csv')`

In-Shot Dashboard

Player - Shooting (in shot dashboard)

End Result: All CSVs in player/shot_dashboard/shooting

```
In [ ]: player_shooting = 'https://www.nba.com/stats/players/shooting/'
shooting_urls = []
years =['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17', '2015-16']

for year in years:
    for s_types in season_types:
        url = player_shooting + '?Season=' + year + '&SeasonType=' + s_types
        shooting_urls.append(str(url))
```

In []: `shooting_urls`

```
Out[ ]: ['https://www.nba.com/stats/players/shooting/?Season=2021-22&SeasonType=Regular%20Season',
 'https://www.nba.com/stats/players/shooting/?Season=2021-22&SeasonType=Playoffs',
 'https://www.nba.com/stats/players/shooting/?Season=2020-21&SeasonType=Regular%20Season',
 'https://www.nba.com/stats/players/shooting/?Season=2020-21&SeasonType=Playoffs',
 'https://www.nba.com/stats/players/shooting/?Season=2019-20&SeasonType=Regular%20Season',
 'https://www.nba.com/stats/players/shooting/?Season=2019-20&SeasonType=Playoffs',
 'https://www.nba.com/stats/players/shooting/?Season=2018-19&SeasonType=Regular%20Season',
 'https://www.nba.com/stats/players/shooting/?Season=2018-19&SeasonType=Playoffs',
 'https://www.nba.com/stats/players/shooting/?Season=2017-18&SeasonType=Regular%20Season',
 'https://www.nba.com/stats/players/shooting/?Season=2017-18&SeasonType=Playoffs',
 'https://www.nba.com/stats/players/shooting/?Season=2016-17&SeasonType=Regular%20Season',
 'https://www.nba.com/stats/players/shooting/?Season=2016-17&SeasonType=Playoffs',
 'https://www.nba.com/stats/players/shooting/?Season=2015-16&SeasonType=Regular%20Season',
 'https://www.nba.com/stats/players/shooting/?Season=2015-16&SeasonType=Playoffs']
```

```
In [ ]: def get_scoring2(url_list, file_folder, option_numbers, option_names):  
  
    # Function scrapes data from nba.com/stats/players/shooting/ and saves to c  
    # Scrapes both 5-ft and by-zone shooting data  
  
    i = 0  
    optionz = np.arange(0,option_numbers, 1)  
  
    # get first option  
    for u in url_list:  
        for option in optionz:  
            driver.get(u)  
            time.sleep(1)  
            # get option xpath  
            op = option + 1  
            print(f'Getting {option_names[option]} for {u}...')  
            print(f' option is {op}')  
  
            try:  
                # click OPTION  
                xpath_option = '//*[@id="__next"]/div[2]/div[2]/div[3]/sect  
                elem = WebDriverWait(driver, 30).until(EC.presence_of_eleme  
            except:  
                print(f'{u} did not load. Moving to next url.')  
                continue  
  
            driver.find_element(by=By.XPATH, value=xpath_option).click()  
  
            # all pages  
            xpath_all = '//*[@id="__next"]/div[2]/div[2]/div[3]/section[2]/div/  
            elem = WebDriverWait(driver, 30).until(EC.presence_of_element_locat  
            driver.find_element(by=By.XPATH, value=xpath_all).click()  
  
            src = driver.page_source  
            parser = BeautifulSoup(src, "lxml")  
  
  
            # if there are repreated headers in headerList, delete them  
            #headerlist = [i for n, i in enumerate(headerlist) if i not in head  
  
            # deal with options  
  
            if op == 1:  
                # Find Table  
                table = parser.find("table", attrs = {"class":"Crom_table_"}  
                headers = table.findAll('th')  
                # Skip first header  
                headerlist = [h.text.strip() for h in headers[:]]  
  
                # Find rows, cols, stats  
                row_names = table.findAll('a')  
                row_list = [b.text.strip() for b in row_names[0:]]  
                rows = table.findAll('tr')[0:]  
                player_stats = [[td.getText().strip() for td in rows[i].fin  
  
                cols = ['player', 'team', 'age', 'lessthan5_FGM', 'lessthan  
                '10-14ft_FGM', '10-14ft_FGA', '10-14ft_FG%', '15-19ft_FGM',  
                '10-14ft_FGA', '10-14ft_FG%', '15-19ft_FGA', '15-19ft_FG%']
```

```

'20-24TT_FG%', '25-29TT_FGM', '25-29TT_FGA', '25-29TT_FG%']

#set the length to ignore hidden columns
tot_cols = 21
headerlist = headerlist[:tot_cols]

stats = pd.DataFrame(player_stats, columns = cols)

filename = file_folder + str(u[34:]).replace('/', '_') + 'o'
filename = replace_name_values(filename)
pd.DataFrame.to_csv(stats, filename)

i += 1
lu = len(url_list)
print(f'{filename} Completed Successfully! {i} / {lu} Compl

elif op == 2:
    print('option 2 - do nothing')

elif op == 3:

    u2 = u + '&DistanceRange=By+Zone'
    driver.get(u2)
    time.sleep(1)
    src = driver.page_source
    parser = BeautifulSoup(src, "lxml")

    try:
        # click OPTION
        xpath_option = '//*[@id="__next"]/div[2]/div[2]/div'
        elem = WebDriverWait(driver, 30).until(EC.presence_
    except:
        print(f'{u} did not load. Moving to next url.')
        continue

    driver.find_element(by=By.XPATH, value=xpath_option).click()

    # all pages
    xpath_all = '//*[@id="__next"]/div[2]/div[2]/div[3]/section'
    elem = WebDriverWait(driver, 30).until(EC.presence_of_eleme
    driver.find_element(by=By.XPATH, value=xpath_all).click()

    src = driver.page_source
    parser = BeautifulSoup(src, "lxml")

    # Find Table
    table = parser.find("table", attrs = {"class":"Crom_table__"})
    headers = table.findAll('th')
    # Skip first header
    headerlist = [h.text.strip() for h in headers[:]]

    # Find rows, cols, stats
    row_names = table.findAll('a')
    row_list = [b.text.strip() for b in row_names[0:]]
    rows = table.findAll('tr')[0:]
    player_stats = [[td.getText().strip() for td in rows[i].fin

    cols1 = ['player', 'team', 'age', 'restricted_fgm', 'restri
        'mid range fgm', 'mid range fga', 'mid range fg%'
```

```
'right_corn3_fgm', 'right_corn3_fga', 'right_corn3_fg%', 'corner3_fgm'
```

```
#set the length to ignore hidden columns
tot_cols = 24
headerlist = headerlist[:tot_cols]
stats = pd.DataFrame(player_stats, columns = cols1)
filename = file_folder + str(u[34:]).replace('/', '_') + 'o'
filename = replace_name_values2(filename)
pd.DataFrame.to_csv(stats, filename)
i += 1
lu = len(url_list)
print(f'{filename} Completed Successfully! {i} / {lu} Compl
```

```
In [ ]: driver = webdriver.Chrome()
```

```
In [ ]: get_scoring2(shooting_urls, 'data/player/shot_dashboard/shooting/', 3, ['5ft_range'
```

```
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2021-22&Se
asonType=Regular%20Season...
    option is 1
data/player/shot_dashboard/shooting/shooting_Season_2021-22-Regular_20Seasonop_5ft
_range.csv Completed Successfully! 1 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2021-22&Se
asonType=Regular%20Season...
    option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2021-22&Seas
onType=Regular%20Season...
    option is 3
data/player/shot_dashboard/shooting/shooting_Season_2021-22-Regularop_by_zone.csv
Completed Successfully! 2 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2021-22&Se
asonType=Playoffs...
    option is 1
data/player/shot_dashboard/shooting/shooting_Season_2021-22_Playoffsop_5ft_range.c
sv Completed Successfully! 3 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2021-22&Se
asonType=Playoffs...
    option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2021-22&Seas
onType=Playoffs...
    option is 3
data/player/shot_dashboard/shooting/shooting_Season_2021-22_Playoffsop_by_zone.csv
Completed Successfully! 4 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2020-21&Se
asonType=Regular%20Season...
    option is 1
data/player/shot_dashboard/shooting/shooting_Season_2020-21-Regular_20Seasonop_5ft
_range.csv Completed Successfully! 5 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2020-21&Se
asonType=Regular%20Season...
    option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2020-21&Seas
onType=Regular%20Season...
    option is 3
data/player/shot_dashboard/shooting/shooting_Season_2020-21-Regularop_by_zone.csv
Completed Successfully! 6 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2020-21&Se
asonType=Playoffs...
    option is 1
data/player/shot_dashboard/shooting/shooting_Season_2020-21_Playoffsop_5ft_range.c
sv Completed Successfully! 7 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2020-21&Se
asonType=Playoffs...
    option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2020-21&Seas
onType=Playoffs...
    option is 3
data/player/shot_dashboard/shooting/shooting_Season_2020-21_Playoffsop_by_zone.csv
Completed Successfully! 8 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2019-20&Se
asonType=Regular%20Season...
    option is 1
```

```
data/player/shot_dashboard/shooting/shooting_Season_2019-20_Regular_20Seasonop_5ft
_range.csv Completed Successfully! 9 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2019-20&Se
asonType=Regular%20Season...
    option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2019-20&Seas
onType=Regular%20Season...
    option is 3
data/player/shot_dashboard/shooting/shooting_Season_2019-20_Regularop_by_zone.csv
Completed Successfully! 10 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2019-20&Se
asonType=Playoffs...
    option is 1
data/player/shot_dashboard/shooting/shooting_Season_2019-20_Playoffsop_5ft_range.c
sv Completed Successfully! 11 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2019-20&Se
asonType=Playoffs...
    option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2019-20&Seas
onType=Playoffs...
    option is 3
data/player/shot_dashboard/shooting/shooting_Season_2019-20_Playoffsop_by_zone.csv
Completed Successfully! 12 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2018-19&Se
asonType=Regular%20Season...
    option is 1
data/player/shot_dashboard/shooting/shooting_Season_2018-19_Regular_20Seasonop_5ft
_range.csv Completed Successfully! 13 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2018-19&Se
asonType=Regular%20Season...
    option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2018-19&Seas
onType=Regular%20Season...
    option is 3
data/player/shot_dashboard/shooting/shooting_Season_2018-19_Regularop_by_zone.csv
Completed Successfully! 14 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2018-19&Se
asonType=Playoffs...
    option is 1
data/player/shot_dashboard/shooting/shooting_Season_2018-19_Playoffsop_5ft_range.c
sv Completed Successfully! 15 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2018-19&Se
asonType=Playoffs...
    option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2018-19&Seas
onType=Playoffs...
    option is 3
data/player/shot_dashboard/shooting/shooting_Season_2018-19_Playoffsop_by_zone.csv
Completed Successfully! 16 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2017-18&Se
asonType=Regular%20Season...
    option is 1
data/player/shot_dashboard/shooting/shooting_Season_2017-18_Regular_20Seasonop_5ft
_range.csv Completed Successfully! 17 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2017-18&Se
```

```
asonType=Regular%20Season...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2017-18&Seas
onType=Regular%20Season...
option is 3
data/player/shot_dashboard/shooting/shooting_Season_2017-18-Regularop_by_zone.csv
Completed Successfully! 18 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2017-18&Se
asonType=Playoffs...
option is 1
data/player/shot_dashboard/shooting/shooting_Season_2017-18_Playoffsop_5ft_range.c
sv Completed Successfully! 19 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2017-18&Se
asonType=Playoffs...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2017-18&Seas
onType=Playoffs...
option is 3
data/player/shot_dashboard/shooting/shooting_Season_2017-18_Playoffsop_by_zone.csv
Completed Successfully! 20 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2016-17&Se
asonType=Regular%20Season...
option is 1
data/player/shot_dashboard/shooting/shooting_Season_2016-17-Regular_20Seasonop_5ft
_range.csv Completed Successfully! 21 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2016-17&Se
asonType=Regular%20Season...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2016-17&Seas
onType=Regular%20Season...
option is 3
data/player/shot_dashboard/shooting/shooting_Season_2016-17-Regularop_by_zone.csv
Completed Successfully! 22 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2016-17&Se
asonType=Playoffs...
option is 1
data/player/shot_dashboard/shooting/shooting_Season_2016-17_Playoffsop_5ft_range.c
sv Completed Successfully! 23 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2016-17&Se
asonType=Playoffs...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2016-17&Seas
onType=Playoffs...
option is 3
data/player/shot_dashboard/shooting/shooting_Season_2016-17_Playoffsop_by_zone.csv
Completed Successfully! 24 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2015-16&Se
asonType=Regular%20Season...
option is 1
data/player/shot_dashboard/shooting/shooting_Season_2015-16-Regular_20Seasonop_5ft
_range.csv Completed Successfully! 25 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2015-16&Se
asonType=Regular%20Season...
option is 2
option 2 - do nothing
```

```

Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2015-16&SeasonType=Regular%20Season...
option is 3
data/player/shot_dashboard/shooting/shooting_Season_2015-16-Regularop_by_zone.csv
Completed Successfully! 26 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/shooting/?Season=2015-16&SeasonType=Playoffs...
option is 1
data/player/shot_dashboard/shooting/shooting_Season_2015-16_Playoffsop_5ft_range.csv
Completed Successfully! 27 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/shooting/?Season=2015-16&SeasonType=Playoffs...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/shooting/?Season=2015-16&SeasonType=Playoffs...
option is 3
data/player/shot_dashboard/shooting/shooting_Season_2015-16_Playoffsop_by_zone.csv
Completed Successfully! 28 / 14 Complete!

```

```
In [ ]: shootin_files = os.listdir('data/player/shot_dashboard/shooting')
```

Append Shooting (Not Done Dec22)

```
In [ ]: shot1 = append_the_data('data/player/shot_dashboard/shooting/', 'shooting_5ft__', 'shooting_by_zone')
shot1 = shot1.dropna(subset=['shooting_5ft__player'])
shot1 = shot1.dropna(subset=['shooting_5ft__lessthan5_fgm'])
shot1.to_csv('data/player/aggregates/ShotDash_Shooting_5ft.csv')

In [ ]: shot3 = append_the_data('data/player/shot_dashboard/shooting/', 'shooting_by_zone')
shot3 = shot3.dropna(subset=['shooting_by_zone__player'])
shot3 = shot3.dropna(subset=['shooting_by_zone__restricted_fgm'])
shot3.to_csv('data/player/aggregates/ShotDash_Shooting_by_zone.csv')

In [ ]: shootingz = double_merge(shot1, shot3, 'shooting_5ft__', 'shooting_by_zone__')
shootingz.to_csv('data/player/aggregates/ShotDash_All_Shooting.csv')
```

Player - Opponent Shooting (ISD) (Done 12.22)

ISD = In Shot Dashboard

```
In [ ]: player_opp_shooting = 'https://www.nba.com/stats/players/opponent-shooting/'
opp_shooting_urls = []
years =['2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17', '2015-16']

for year in years:
    for s_types in season_types:
        url = player_opp_shooting + '?Season=' + year + '&SeasonType=' + s_types
        opp_shooting_urls.append(str(url))

In [ ]: get_scoring2(opp_shooting_urls, 'data/player/shot_dashboard/opponent_shooting/', 3,
```

```
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2021-22&SeasonType=Regular%20Season...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2021-22_Regular_20Seasonop_5ft_range.csv Completed Successfully! 1 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2021-22&SeasonType=Regular%20Season...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=2021-22&SeasonType=Regular%20Season...
option is 3
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2021-22_Regularop_by_zone.csv Completed Successfully! 2 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2021-22&SeasonType=Playoffs...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2021-22_Playoffsop_5ft_range.csv Completed Successfully! 3 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2021-22&SeasonType=Playoffs...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=2021-22&SeasonType=Playoffs...
option is 3
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2021-22_Playoffsop_by_zone.csv Completed Successfully! 4 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2020-21&SeasonType=Regular%20Season...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2020-21_Regular_20Seasonop_5ft_range.csv Completed Successfully! 5 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2020-21&SeasonType=Regular%20Season...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=2020-21&SeasonType=Regular%20Season...
option is 3
https://www.nba.com/stats/players/opponent-shooting/?Season=2020-21&SeasonType=Regular%20Season did not load. Moving to next url.
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2020-21&SeasonType=Playoffs...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2020-21_Playoffsop_5ft_range.csv Completed Successfully! 6 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2020-21&SeasonType=Playoffs...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=2020-21&SeasonType=Playoffs...
option is 3
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2020-21_Playoffsop_by_zone.csv Completed Successfully! 7 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2019-20&SeasonType=Regular%20Season...
option is 1
```

```
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2019-20_Regu  
lar_20Seasonop_5ft_range.csv Completed Successfully! 8 / 14 Complete!  
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2  
019-20&SeasonType=Regular%20Season...  
    option is 2  
option 2 - do nothing  
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=201  
9-20&SeasonType=Regular%20Season...  
    option is 3  
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2019-20_Regu  
larop_by_zone.csv Completed Successfully! 9 / 14 Complete!  
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2  
019-20&SeasonType=Playoffs...  
    option is 1  
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2019-20_Play  
offsop_5ft_range.csv Completed Successfully! 10 / 14 Complete!  
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2  
019-20&SeasonType=Playoffs...  
    option is 2  
option 2 - do nothing  
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=201  
9-20&SeasonType=Playoffs...  
    option is 3  
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2019-20_Play  
offsop_by_zone.csv Completed Successfully! 11 / 14 Complete!  
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2  
018-19&SeasonType=Regular%20Season...  
    option is 1  
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2018-19_Regu  
lar_20Seasonop_5ft_range.csv Completed Successfully! 12 / 14 Complete!  
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2  
018-19&SeasonType=Regular%20Season...  
    option is 2  
option 2 - do nothing  
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=201  
8-19&SeasonType=Regular%20Season...  
    option is 3  
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2018-19_Regu  
larop_by_zone.csv Completed Successfully! 13 / 14 Complete!  
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2  
018-19&SeasonType=Playoffs...  
    option is 1  
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2018-19_Play  
offsop_5ft_range.csv Completed Successfully! 14 / 14 Complete!  
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2  
018-19&SeasonType=Playoffs...  
    option is 2  
option 2 - do nothing  
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=201  
8-19&SeasonType=Playoffs...  
    option is 3  
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2018-19_Play  
offsop_by_zone.csv Completed Successfully! 15 / 14 Complete!  
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2  
017-18&SeasonType=Regular%20Season...  
    option is 1  
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2017-18_Regu  
lar_20Seasonop_5ft_range.csv Completed Successfully! 16 / 14 Complete!  
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
```

```
017-18&SeasonType=Regular%20Season...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=201
7-18&SeasonType=Regular%20Season...
option is 3
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2017-18_Regu
larop_by_zone.csv Completed Successfully! 17 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
017-18&SeasonType=Playoffs...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2017-18_Play
offsop_5ft_range.csv Completed Successfully! 18 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
017-18&SeasonType=Playoffs...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=201
7-18&SeasonType=Playoffs...
option is 3
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2017-18_Play
offsop_by_zone.csv Completed Successfully! 19 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
016-17&SeasonType=Regular%20Season...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2016-17_Regu
lar_20Seasonop_5ft_range.csv Completed Successfully! 20 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
016-17&SeasonType=Regular%20Season...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=201
6-17&SeasonType=Regular%20Season...
option is 3
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2016-17_Regu
larop_by_zone.csv Completed Successfully! 21 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
016-17&SeasonType=Playoffs...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2016-17_Play
offsop_5ft_range.csv Completed Successfully! 22 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
016-17&SeasonType=Playoffs...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=201
6-17&SeasonType=Playoffs...
option is 3
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2016-17_Play
offsop_by_zone.csv Completed Successfully! 23 / 14 Complete!
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
015-16&SeasonType=Regular%20Season...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2015-16_Regu
lar_20Seasonop_5ft_range.csv Completed Successfully! 24 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2
015-16&SeasonType=Regular%20Season...
option is 2
option 2 - do nothing
```

```

Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=2015-16&SeasonType=Regular%20Season...
option is 3
https://www.nba.com/stats/players/opponent-shooting/?Season=2015-16&SeasonType=Regular%20Season did not load. Moving to next url.
Getting 5ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2015-16&SeasonType=Playoffs...
option is 1
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2015-16_Playoffsop_5ft_range.csv Completed Successfully! 25 / 14 Complete!
Getting 8ft_range for https://www.nba.com/stats/players/opponent-shooting/?Season=2015-16&SeasonType=Playoffs...
option is 2
option 2 - do nothing
Getting by_zone for https://www.nba.com/stats/players/opponent-shooting/?Season=2015-16&SeasonType=Playoffs...
option is 3
data/player/shot_dashboard/opponent_shooting/opponent-shooting_Season_2015-16_Playoffsop_by_zone.csv Completed Successfully! 26 / 14 Complete!

```

Append Opp Shooting

```

In [ ]: opshot1 = append_the_data('data/player/shot_dashboard/opponent_shooting/', 'opp_sho
opshot1 = opshot1.dropna(subset=['opp_shooting_5ft_player'])
opshot1 = opshot1.dropna(subset=['opp_shooting_5ft_lessthan5_fgm'])

opshot1.to_csv('data/player/aggregates/ShotDash_Opponent_Shooting_5ft.csv')

In [ ]: opshot3 = append_the_data('data/player/shot_dashboard/opponent_shooting/', 'opp_sho
opshot3 = opshot3.dropna(subset=['opp_shooting_by_zone_player'])
opshot3 = opshot3.dropna(subset=['opp_shooting_by_zone_restricted_fgm'])

opshot3.to_csv('data/player/aggregates/ShotDash_Opponent_Shooting_by_zone.csv')

In [ ]: opshootinz = double_merge(opshot1, opshot3, 'opp_shooting_5ft__', 'opp_shooting_by_
opshootinz.to_csv('data/player/aggregates/ShotDash_All_Opponent_Shooting.csv')

```

ALL Shot Dashboard Data -- Combine (NOTE: AM I MISSING SOME? Dec22)

```

In [ ]: closest_def = pd.read_csv('data/player/shot_dashboard/closest_defender/All_Closest_dribblez = pd.read_csv('data/player/shot_dashboard/dribbles/All_Dribbles.csv')
generall = pd.read_csv('data/player/shot_dashboard/general/All_shotdash_General.csv
opp_shootingz = pd.read_csv('data/player/shot_dashboard/oppoent_shooting/All_Opp_shootingz = pd.read_csv('data/player/shot_dashboard/shooting/All_Shooting.csv')
shotclockz = pd.read_csv('data/player/shot_dashboard/shotclock/All_ShotClock.csv')
touchtimez = pd.read_csv('data/player/shot_dashboard/touch_time/All_TouchTime.csv')

In [ ]: print(f' closest defender: {closest_def.columns[2]}, {closest_def.shape} \n drib: {dribblez.shape} \n generall: {generall.shape} \n opp_shootingz: {opp_shootingz.shape} \n shotclockz: {shotclockz.shape} \n touchtimez: {touchtimez.shape} \n')

In [ ]: print(f' closest def nas: {closest_def.isnull().sum()} \n drib nas: {dribblez.isnull().sum()} \n generall nas: {generall.isnull().sum()} \n opp_shootingz nas: {opp_shootingz.isnull().sum()} \n shotclockz nas: {shotclockz.isnull().sum()} \n touchtimez nas: {touchtimez.isnull().sum()} \n')

```

```
In [ ]: closest_def['closest_d_0-2ft_season'] = closest_def['closest_d_0-2ft_season'].astype(int)
dribblez['sd_drib_0_dribbles_season'] = dribblez['sd_drib_0_dribbles_season'].astype(int)
generall['shot_dash_gen_overall_season'] = generall['shot_dash_gen_overall_season'].astype(int)
opp_shootingz['opp_shooting_5ft_season'] = opp_shootingz['opp_shooting_5ft_season'].astype(int)
shootingz['shooting_5ft_season'] = shootingz['shooting_5ft_season'].astype(int)
shotclockz['shotclock_4-0_sec_season'] = shotclockz['shotclock_4-0_sec_season'].astype(int)
touchtimez['touch_time_0-2_sec_season'] = touchtimez['touch_time_0-2_sec_season'].astype(int)
```

```
In [ ]: first_six = sextuple_merge(closest_def, dribblez, generall, opp_shootingz, shootingz)
```

```
In [ ]: all = pd.merge(first_six, touchtimez.drop_duplicates(subset = ['touch_time_0-2_sec']),
                     left_on = ['closest_d_0-2ft_player', 'closest_d_0-2ft_season', 'closest_d_0-2ft'],
                     right_on = ['touch_time_0-2_sec_player', 'touch_time_0-2_sec_season'],
                     how = 'left')
```

```
In [ ]: all.to_csv('data/player/shot_dashboard/All_shot_dashboard.csv')
```

Player - Hustle (Done 12.23)

```
In [ ]: player_hustle = 'https://www.nba.com/stats/players/hustle/'
hustle_urls = []
years =[ '2021-22', '2020-21', '2019-20', '2018-19', '2017-18', '2016-17']

for year in years:
    for s_types in season_types:
        url = player_hustle + '?Season=' + year + '&SeasonType=' + s_types
        hustle_urls.append(str(url))
```

```
In [ ]: driver = webdriver.Chrome()
```

```
In [ ]: grab_player_data(hustle_urls, 'data/player/hustle/')
```

```
data/player/hustle/hustle_Season_2021-22-Regular Season.csv Completed Successfully! 1 / 12 Complete!
data/player/hustle/hustle_Season_2021-22_Playoffs.csv Completed Successfully! 2 / 12 Complete!
data/player/hustle/hustle_Season_2020-21-Regular Season.csv Completed Successfully! 3 / 12 Complete!
data/player/hustle/hustle_Season_2020-21_Playoffs.csv Completed Successfully! 4 / 12 Complete!
data/player/hustle/hustle_Season_2019-20-Regular Season.csv Completed Successfully! 5 / 12 Complete!
data/player/hustle/hustle_Season_2019-20_Playoffs.csv Completed Successfully! 6 / 12 Complete!
data/player/hustle/hustle_Season_2018-19-Regular Season.csv Completed Successfully! 7 / 12 Complete!
data/player/hustle/hustle_Season_2018-19_Playoffs.csv Completed Successfully! 8 / 12 Complete!
data/player/hustle/hustle_Season_2017-18-Regular Season.csv Completed Successfully! 9 / 12 Complete!
data/player/hustle/hustle_Season_2017-18_Playoffs.csv Completed Successfully! 10 / 12 Complete!
data/player/hustle/hustle_Season_2016-17-Regular Season.csv Completed Successfully! 11 / 12 Complete!
data/player/hustle/hustle_Season_2016-17_Playoffs.csv Completed Successfully! 12 / 12 Complete!
```

```
In [ ]: # move the files to the correct folder
for file in os.listdir('data/player/hustle/'):
    if '.csv' in file:
        if 'Playoffs' in file:
            os.rename('data/player/hustle/' + file, 'data/player/hustle/playoffs/'
        else:
            os.rename('data/player/hustle/' + file, 'data/player/hustle/regular_sea
```

```
In [ ]: hustle_data = append_the_data('data/player/hustle/regular_season/', 'hust_', 'hustle_data
```

Out[]:

	hust_unnamed: 0	hust_player	hust_team	hust_age	hust_gp	hust_min	hust_screenassists	hus
0	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	1	AJ Hammons	DAL	24.0	22.0	7.4		1.0
2	2	Aaron Brooks	IND	32.0	65.0	13.7		0.2
3	3	Aaron Gordon	ORL	21.0	80.0	28.7		0.5
4	4	Aaron Harrison	CHA	22.0	5.0	3.3		0.0
...
601	601	Zach LaVine	CHI	27.0	67.0	34.7		0.5
602	602	Zavier Simpson	OKC	25.0	4.0	43.5		0.0
603	603	Zeke Nnaji	DEN	21.0	41.0	17.0		0.9
604	604	Ziaire Williams	MEM	20.0	62.0	21.7		0.1
605	605	Zylan Cheatham	UTA	26.0	1.0	5.2		0.0

3236 rows × 20 columns

In []: `hustle_data.to_csv('data/player/aggregates/All_Hustle.csv')`

Player - Box Outs (Done 12.23)

In []:

```
player_boxouts = 'https://www.nba.com/stats/players/box-outs/'
boxouts_urls = []
years = ['2021-22', '2020-21', '2019-20', '2018-19', '2017-18']

for year in years:
    for s_types in season_types:
        url = player_boxouts + '?Season=' + year + '&SeasonType=' + s_types
        boxouts_urls.append(str(url))
```

In []: `grab_player_data(boxouts_urls, 'data/player/boxouts/')`

```

data/player/boxouts/box-outs_Season_2021-22-Regular Season.csv Completed Successfully! 1 / 10 Complete!
data/player/boxouts/box-outs_Season_2021-22_Playoffs.csv Completed Successfully! 2 / 10 Complete!
data/player/boxouts/box-outs_Season_2020-21-Regular Season.csv Completed Successfully! 3 / 10 Complete!
data/player/boxouts/box-outs_Season_2020-21_Playoffs.csv Completed Successfully! 4 / 10 Complete!
data/player/boxouts/box-outs_Season_2019-20-Regular Season.csv Completed Successfully! 5 / 10 Complete!
data/player/boxouts/box-outs_Season_2019-20_Playoffs.csv Completed Successfully! 6 / 10 Complete!
data/player/boxouts/box-outs_Season_2018-19-Regular Season.csv Completed Successfully! 7 / 10 Complete!
data/player/boxouts/box-outs_Season_2018-19_Playoffs.csv Completed Successfully! 8 / 10 Complete!
data/player/boxouts/box-outs_Season_2017-18-Regular Season.csv Completed Successfully! 9 / 10 Complete!
data/player/boxouts/box-outs_Season_2017-18_Playoffs.csv Completed Successfully! 10 / 10 Complete!

```

```
In [ ]: # move the files to the correct folder
for file in os.listdir('data/player/boxouts/'):
    if '.csv' in file:
        if 'Playoffs' in file:
            os.rename('data/player/boxouts/' + file, 'data/player/boxouts/playoffs/')
        else:
            os.rename('data/player/boxouts/' + file, 'data/player/boxouts/regular_s
```

```
In [ ]: boxouts = append_the_data('data/player/boxouts/regular_season', 'boxouts_', 'box-outs')
boxouts
```

Out[]:

	boxouts_unnamed: 0	boxouts_player	boxouts_team	boxouts_age	boxouts_gp	boxouts_min	b
0	0	NaN	NaN	NaN	NaN	NaN	
1	1	Aaron Brooks	MIN	33.0	32.0	5.9	
2	2	Aaron Gordon	ORL	22.0	58.0	32.9	
3	3	Aaron Harrison	DAL	23.0	9.0	25.9	
4	4	Aaron Jackson	HOU	32.0	1.0	34.5	
...
601	601	Zach LaVine	CHI	27.0	67.0	34.7	
602	602	Zavier Simpson	OKC	25.0	4.0	43.5	
603	603	Zeke Nnaji	DEN	21.0	41.0	17.0	
604	604	Ziaire Williams	MEM	20.0	62.0	21.7	
605	605	Zylan Cheatham	UTA	26.0	1.0	5.2	

2749 rows × 17 columns

```
In [ ]: boxouts.to_csv('data/player/aggregates/All_Boxouts.csv')
```

Player - Matchups

```
In [ ]: # Load from my player matchups file
```

Player - Images

Now, I have the player names and ids. From looking through the NBA.com website, I know I can access the player photos through this general url: [https://cdn.nba.com/headshots/nba/latest/260x190/\[PLAYER_ID\].png](https://cdn.nba.com/headshots/nba/latest/260x190/[PLAYER_ID].png)

So, from here I add a player URL column to download the photos from.

```
In [ ]: stats = pd.read_csv('data/player/nba_players_and_photo_urls.csv')
```

Now, to download the images

```
In [ ]: pic_url = stats['photo_url']
pic_url = pd.DataFrame(pic_url)
pic_url.head()
```

```
In [ ]: os.mkdir('data/player/photos')
os.chdir('data/player/photos')

# Download all listed pictures. Takes about 18 minutes.

for pic in pic_url['photo_url']:
    image_url = pic
    filename = image_url.split("/")[-1]
    r = requests.get(image_url, stream = True)
    if r.status_code == 200:                                # Check if image found
        r.raw.decode_content = True
        with open(filename, 'wb') as f:
            shutil.copyfileobj(r.raw, f)
```