

# Wikipedia Fighting Games Research Paper

## Introduction

This document aims to examine the Wikipedia "List of fighting games" page.

The goal is to discover trends, patterns and interesting trivia in this list. Although rudimentary-seeming, data on titles, their naming, publishers and subgenres can be incorporated into a structured study of trends in the genre.

## Guide

This paper is organised into several parts:

- Motivations - Personal reasons for creating this paper. *(Optional to read)*
- Goals and Objectives - Establishing clear expectations for the paper.
- The Dataset - Any information regarding the dataset, how and why it was obtained, etc.
  - Extracting the Dataset - code and explanations on dataset Extraction
    - Game Entries - the production of the array for all game entries
    - Publisher Entries - the production of the publishers dictionary
    - Series - The production of the series dictionary
- Data Analysis - Describes how and why data will be analysed.
  - Naming Conventions
  - Publisher Relevance
  - Series Entries
- Feedback and Reflection - Notes of the Author on their work
  - Positives
  - Negatives
  - Overall

## Motivations *(Optional to read)*

Fighting games have been an inseparable part of my life ever since I bought and built my first gaming PC and bought my first arcade stick with my first salary. Simply put, they are just plain fun. Not so simply put:

Fighting games are a subgenre where each title takes incredible skill to execute both from the developers (one of the hardest genres for gameplay programmers and game designers by far) and the players. Fighting games are the earliest form of eSports with some of the earliest gaming tournaments being dedicated to Street Fighter 2. Street Fighter 2 was instrumental in cementing that genre. It combined the twitch reflexes of action games, mixed that with classified specialist characters (shoto, rushdown, grappler, zoner) which can definitely be inspired by RPGs, and finally added the element of mind games, seen in traditional sports and games, of playing against another human. It is a perfect formula that keeps being refined and sometimes reinvented.

Personally, I thought I would never be good at them. I was right. I am still pretty bad. But I am definitely much better than what I thought I would be. I discovered a passion for these games, people who make them, people who play them and their history. Getting good, spacing, mind games, neutral, frame data - these are the fundamentals that actually make this video game genre qualify for a sport in my opinion. Mixing in physical execution of commands with tactics and strategy turns this into a quick chess game at the highest level.

This genre is still relevant. However, its flaw is is - player retention. While big series like Tekken and Street Fighter sell copies in the millions, it is only some ten, if lucky, 20 thousand players that stay the first year of the lifespan of the game. With the numbers dwindling during the years. Casual players blaming the barrier of entry (the skill floor) being too high, while hardcore players giving the exact opposite reason - a lowered barrier of expression (the skill ceiling).

I want to see what trends could be discovered in all fighting games indexed in this Wikipedia list. Which titles dominate in numbers, what naming conventions are most common, which studios produce the most games? The aim of this is not to fix the underlying issues of the genre, I am not the person capable of doing that. The aim is to notice trends and draw insights for entertainment value from something that I appreciate.

## Goals and Objectives

### Guide:

- **Goal** - *a large milestone for the project*
  - **objective** - *a smaller milestone that leads to completing that goal*

### Goals and Objectives:

- **Develop a working dataset**
  - Provide webpage source and definition
  - Provide details on the dataset (necessary for setting up clear expectations)
  - Describe the extraction method (language, libraries and reasons for using them)
  - Establish required fields from that data and reasons for them
- **Parse extracted data**
  - Create objects that hold relevant values
  - Test for accuracy and quality
  - **If tests are unsatisfactory:**
    - Develop a validation system that would remove "junk" data such as unwanted characters in strings, etc.
    - Test again
    - Repeat until satisfaction (each test is documented in the paper to display the working process)
  - When tests are satisfactory, move on to the next goal
- **Build statistics**
  - **For each statistic:**
    - Provide definition
    - Provide reasoning for creating it
    - Provide reasoning for the output method (i.e. "Why pie chart?", "Why bar chart?", etc.)
    - Code the process (this has its own unique implementations with descriptions)
    - Report findings

- **Statistics list:**
  - Most frequent naming conventions
  - Most published studios
  - Most series entries
- **Abstract:**
  - Summarise findings for each statistic

## The Dataset

The dataset is drawn from the "List of fighting games" Wikipedia article

- **Type:** list of lists (2D array)
- **Sorted:** Yes
  - **If yes, sort order:** A set of unsorted lists sorted in various categories with some repetitions.
- **Traits of dataset:** Dynamically updated
- **Ethics:** The dataset is ethically sourced as nowhere in the wikipedia robots.txt is web-scraping disallowed. However, web-scraping that involves bots issuing too many requests at once is forbidden. Therefore, I will do my best in ethically sourcing the data as not to violate any guidelines. For more information, please refer to the official source: <https://en.wikipedia.org/robots.txt>
- **Method of acquisition:** Web-scraping script using Python with requests library and BeautifulSoup 4
  - **Reason:** It is most familiar and furthermore gives more control than downloading an API
- **Why Wikipedia:**
  - User-run and user-moderated.
  - Largest user-run wiki. Therefore moderation is more quality as well.
  - Other websites with indexes of titles such as Metacritic impose strict TOS bans on any type of web-scraping for commercial and for non-commercial use. I prefer to give my traffic to websites which believe that data should be free.
  - The amount of data on this webpage includes many domestic releases (mainly in Japan) which are not indexed on websites such as Metacritic.
- **Source:** [https://en.wikipedia.org/wiki/List\\_of\\_fighting\\_games](https://en.wikipedia.org/wiki/List_of_fighting_games)

## Extracting the Dataset: Game Entries

```
In [1]: #importing requests to retrieve data from website and BS4 for scraping data
import requests
from bs4 import BeautifulSoup

#test code to see if connection is established
url = "https://en.wikipedia.org/wiki/List_of_fighting_games"
res = requests.get(url)

#Remove comment for testing purposes
#print(res.text)
```

```
In [2]: #load into BS4 obj
soup = BeautifulSoup(res.text, 'lxml')

#test code to demonstrate soup is working
#Remove comment for testing purposes
#print(soup.prettify())
```

```

In [3]: #Isolate Tags, the tag for each entry is <i>
entryTags = soup.find_all('i')

#Print all text in entry tags, we do this to see what input cleaning we need to do
#Remove comment for testing purposes
#for tag in entryTags:
#    print(tag.text)

In [4]: #We will need a list of all entries, therefore we will store it into an array
allEntries = []
for tag in entryTags:
    allEntries.append(tag.text)
#Remove comment for testing purposes
#print(allEntries[len(allEntries)-1])

In [5]: #Now to clean up the allEntries array
#NOTE: If you find yourself running this cell more than once it will impact the entries

#the first three elements are unneeded
allEntries.pop(0)
allEntries.pop(0)
allEntries.pop(0)

Out[5]: ' (Learn how and when to remove this template message) '

In [6]: #test if entries list free of junk data
#Remove comment for testing purposes
#print(allEntries)

```

## Extracting the Dataset: Game Entries 1.1

All games entries are successfully extracted. However, this list has some problems. While all titles look to be on point there are several repetitions. This makes sense as there are several sub-lists on this page that re-use titles. Repeating entries can easily sway data analysis.

```

In [7]: #removing repetitions method: Using a dictionary.
#Each key is a representative of each title. If a key is repeated, it will simply not be
#Finally, a list is created with elements being all dictionary keys.

#Demonstration Code, Remove Comments for testing purposes
# foo = ["one","one","one","two", "three","two"]
# foo = list(dict.fromkeys(foo))
# print(foo)
# #Expected output:['one', 'two', 'three']

In [8]: #Implementation for our list
#Remove Comments for testing purposes
#print(len(allEntries))
allEntries = list(dict.fromkeys(allEntries))
#print(len(allEntries))

```

## Extracting the Dataset: Publisher Entries

After extracting all game entries, a list of publisher entries is needed before conducting analysis The goal is to extract that data and see if any junk data should be cleaned

```
In [9]: #example of publisher entry in HTML:
#<td style = "text-align: left; vertical-align: top;">
#     <a href="/wiki/Bandai_Namco" class="mw-redirect" title="Bandai Namco">Bandai Namco<
#Goal is to extract text data with that tag and class into a list and see if resulting l
#publisherTags = soup.find_all("a", class_ = "mw-redirect")
publishers = []
for cell in soup.find_all("td",{"style":"text-align: left; vertical-align: top;"}):
    for attribute in cell.find_all("a"):
        publishers.append(attribute.text)
#Remove Comments for testing purposes
#print(publishers)
```

```
In [10]: #The resulting array is not satisfactory to what is needed. Way too much junk data
#this will clean up any game entries in the publishers list
```

```
#Remove Comments for testing purposes
#print(len(publishers))
i = 0
while i < len(publishers):
    if publishers[i] in allEntries:
        print("Found and removed " + publishers.pop(i) + " from publishers list.")
        i=0
    i+=1

#Remove Comments for testing purposes
#print(len(publishers))
#print(publishers)
```

```
Found and removed Aggressors of Dark Kombat from publishers list.
Found and removed Tōkidenshō Angel Eyes from publishers list.
Found and removed Akatsuki EN-Eins from publishers list.
Found and removed Aquapazza: Aquaplus Dream Match from publishers list.
Found and removed Arcana Heart from publishers list.
Found and removed Arcana Heart 2 from publishers list.
Found and removed Arcana Heart 3 from publishers list.
Found and removed Art of Fighting from publishers list.
Found and removed Astra Superstars from publishers list.
Found and removed Avengers in Galactic Storm from publishers list.
Found and removed Battle Blaze from publishers list.
Found and removed Battle Beast from publishers list.
Found and removed Battle K-Road from publishers list.
Found and removed Battle Monsters from publishers list.
Found and removed Barbarian from publishers list.
Found and removed Barbarian: The Ultimate Warrior / Death Sword from publishers list.
Found and removed Barbarian II: The Dungeon of Drax / Axe of Rage from publishers list.
Found and removed Big Bang Beat from publishers list.
Found and removed Bikini Karate Babes from publishers list.
Found and removed Black Belt from publishers list.
Found and removed Black Hole Assault from publishers list.
Found and removed Blandia from publishers list.
Found and removed BlazBlue from publishers list.
Found and removed BlazBlue: Calamity Trigger from publishers list.
Found and removed BlazBlue: Continuum Shift from publishers list.
Found and removed BlazBlue: Super Melee Brawlers Battle Royale from publishers list.
Found and removed BlazBlue: Chrono Phantasma from publishers list.
Found and removed BlazBlue: Clone Phantasma from publishers list.
Found and removed BlazBlue: Central Fiction from publishers list.
Found and removed BlazBlue: Cross Tag Battle from publishers list.
Found and removed Blood Warrior / Ooedo Fight from publishers list.
Found and removed BloodStorm from publishers list.
Found and removed Body Blows from publishers list.
Found and removed Body Blows from publishers list.
Found and removed Body Blows Galactic from publishers list.
Found and removed Ultimate Body Blows from publishers list.
Found and removed Bounces from publishers list.
```

Found and removed Breakers/Breakers Revenge from publishers list.  
Found and removed Brutal: Paws of Fury from publishers list.  
Found and removed Brutal: Paws of Fury from publishers list.  
Found and removed Brutal Unleashed: Above the Claw from publishers list.  
Found and removed Budokan: The Martial Spirit from publishers list.  
Found and removed Burning Rival from publishers list.  
Found and removed Capcom Fighting Evolution from publishers list.  
Found and removed Catfight from publishers list.  
Found and removed Chinese Hero from publishers list.  
Found and removed Chaos Code from publishers list.  
Found and removed Cho Aniki: Bakuretsu Ranto Hen from publishers list.  
Found and removed Chop Suey from publishers list.  
Found and removed ClayFighter from publishers list.  
Found and removed ClayFighter: Tournament Edition from publishers list.  
Found and removed ClayFighter 2 / ClayFighter 2: Judgement Clay / C2: Judgement Clay from publishers list.  
Found and removed ClayFighter 63½ from publishers list.  
Found and removed ClayFighter: Sculptor's Cut from publishers list.  
Found and removed Cosmic Carnage from publishers list.  
Found and removed Cyberbots: Full Metal Madness from publishers list.  
Found and removed Dangerous Streets from publishers list.  
Found and removed Darkstalkers from publishers list.  
Found and removed Darkstalkers: The Night Warriors from publishers list.  
Found and removed Night Warriors: Darkstalkers' Revenge from publishers list.  
Found and removed Darkstalkers 3 from publishers list.  
Found and removed Vampire Hunter 2: Darkstalkers' Revenge from publishers list.  
Found and removed Vampire Savior 2: The Lord of Vampire from publishers list.  
Found and removed Dengeki Bunko: Fighting Climax from publishers list.  
Found and removed Dino Rex from publishers list.  
Found and removed Divekick from publishers list.  
Found and removed Double Dragon: The Movie from publishers list.  
Found and removed Dr. Doom's Revenge from publishers list.  
Found and removed Custom Beat Battle: Draglade from publishers list.  
Found and removed Dragon: The Bruce Lee Story from publishers list.  
Found and removed Dragon Ball Z (Arcade) from publishers list.  
Found and removed Dragon Master from publishers list.  
Found and removed Dragoon Might from publishers list.  
Found and removed Eternal Champions from publishers list.  
Found and removed Eternal Champions: Challenge from the Dark Side from publishers list.  
Found and removed Eternal Fighter Zero from publishers list.  
Found and removed The Fallen Angels / Daraku Tenshi from publishers list.  
Found and removed Fatal Fury/Garou Densetsu from publishers list.  
Found and removed Fatal Fury: King of Fighters from publishers list.  
Found and removed Fatal Fury 2 from publishers list.  
Found and removed Fatal Fury Special from publishers list.  
Found and removed Fatal Fury 3: Road to the Final Victory from publishers list.  
Found and removed Real Bout Fatal Fury from publishers list.  
Found and removed Real Bout Fatal Fury Special from publishers list.  
Found and removed Real Bout Fatal Fury 2: The Newcomers from publishers list.  
Found and removed Real Bout Garou Densetsu Special: Dominated Mind from publishers list.  
Found and removed Fatal Fury: 1st Contact from publishers list.  
Found and removed Garou: Mark of the Wolves from publishers list.  
Found and removed Fighter's History from publishers list.  
Found and removed Fighter's History from publishers list.  
Found and removed Fighter's History Dynamite from publishers list.  
Found and removed Fighter's History: Mizoguchi Kiki Ippatsu!! from publishers list.  
Found and removed Fighting Masters from publishers list.  
Found and removed Fist of the North Star from publishers list.  
Found and removed Fight Fever / Wang Jung Wang from publishers list.  
Found and removed Flash Hiders from publishers list.  
Found and removed Fu'un from publishers list.  
Found and removed Savage Reign from publishers list.  
Found and removed Kizuna Encounter: Super Tag Battle from publishers list.  
Found and removed Fuuka Taisen from publishers list.  
Found and removed Galactic Warriors from publishers list.  
Found and removed Galaxy Fight: Universal Warriors from publishers list.

Found and removed Glove on Fight from publishers list.  
Found and removed Golden Axe: The Duel from publishers list.  
Found and removed Guilty Gear from publishers list.  
Found and removed Gundam: Battle Assault from publishers list.  
Found and removed Hiryu no Ken from publishers list.  
Found and removed Holosseum from publishers list.  
Found and removed Human Killing Machine / HKM from publishers list.  
Found and removed Immaterial and Missing Power from publishers list.  
Found and removed Insane Paine from publishers list.  
Found and removed InuYasha: A Feudal Fairy Tale from publishers list.  
Found and removed International Karate from publishers list.  
Found and removed International Karate / World Karate Championship from publishers list.  
Found and removed IK+ / International Karate + / Chop N' Drop from publishers list.  
Found and removed JoJo's Bizarre Adventure from publishers list.  
Found and removed Joy Mech Fight from publishers list.  
Found and removed Jump Super Stars from publishers list.  
Found and removed Jump Ultimate Stars from publishers list.  
Found and removed Justice League Task Force from publishers list.  
Found and removed Kabuki Klash: Far East Of Eden from publishers list.  
Found and removed Kaiser Knuckle / Global Champion / Dan-Ku-Ga from publishers list.  
Found and removed Karate from publishers list.  
Found and removed Karate Champ from publishers list.  
Found and removed Karateka from publishers list.  
Found and removed Kart Fighter from publishers list.  
Found and removed Kasumi Ninja from publishers list.  
Found and removed Killer Instinct from publishers list.  
Found and removed Killer Instinct 2 from publishers list.  
Found and removed Killer Instinct Gold from publishers list.  
Found and removed Avengers in Galactic Storm from publishers list.  
Found and removed Battle Fantasia from publishers list.  
Found and removed Battle Stadium D.O.N. from publishers list.  
Found and removed Blade Arcus from Shining from publishers list.  
Found and removed Blade Strangers from publishers list.  
Found and removed Breakers from publishers list.  
Found and removed Canimals Fighters from publishers list.  
Found and removed Cartoon Network: Punch Time Explosion from publishers list.  
Found and removed Digimon Rumble Arena from publishers list.  
Found and removed Digimon Rumble Arena 2 from publishers list.  
Found and removed Dragon Ball FighterZ from publishers list.  
Found and removed Dream Mix TV World Fighters from publishers list.  
Found and removed Fantasy Strike from publishers list.  
Found and removed Fight of Gods from publishers list.  
Found and removed Fighters Uncaged from publishers list.  
Found and removed Fighter Within from publishers list.  
Found and removed Fighting EX Layer from publishers list.  
Found and removed Fullmetal Alchemist: Dream Carnival from publishers list.  
Found and removed Ganryu from publishers list.  
Found and removed Critical Blow from publishers list.  
Found and removed Guilty Gear from publishers list.  
Found and removed Guilty Gear Xrd from publishers list.  
Found and removed Guilty Gear Strive from publishers list.  
Found and removed Hinokakera from publishers list.  
Found and removed Injustice: Gods Among Us from publishers list.  
Found and removed Injustice 2 from publishers list.  
Found and removed Killer Instinct (2013) from publishers list.  
Found and removed The King of Fighters from publishers list.  
Found and removed The King of Fighters XIV from publishers list.  
Found and removed The King of Fighters XV from publishers list.  
Found and removed Kirby Fighters 2 from publishers list.  
Found and removed Konjiki no Gash Bell!! Go! Go! Mamono Fight!! from publishers list.  
Found and removed Marvel vs Capcom 3: Fate of Two Worlds from publishers list.  
Found and removed Ultimate Marvel vs. Capcom3 from publishers list.  
Found and removed Marvel vs. Capcom: Infinite from publishers list.  
Found and removed .hack//Versus from publishers list.  
Found and removed ARMS from publishers list.  
Found and removed Ballz from publishers list.

Found and removed Battle Arena Toshinden from publishers list.  
Found and removed Battle Tryst from publishers list.  
Found and removed Bio F.R.E.A.K.S. from publishers list.  
Found and removed Bloody Roar / Beastorizer from publishers list.  
Found and removed Buriki One from publishers list.  
Found and removed Capcom Fighting All-Stars from publishers list.  
Found and removed Cardinal Syn from publishers list.  
Found and removed Castlevania Judgment from publishers list.  
Found and removed Celebrity Deathmatch from publishers list.  
Found and removed Criticom from publishers list.  
Found and removed Dark Rift from publishers list.  
Found and removed Dead or Alive from publishers list.  
Found and removed Dead or Alive from publishers list.  
Found and removed Dead or Alive 2 from publishers list.  
Found and removed Dead or Alive 3 from publishers list.  
Found and removed Dead or Alive Ultimate from publishers list.  
Found and removed Dead or Alive 4 from publishers list.  
Found and removed Dead or Alive: Dimensions from publishers list.  
Found and removed Dead or Alive 5 from publishers list.  
Found and removed Dead or Alive 6 from publishers list.  
Found and removed Deadly Arts from publishers list.  
Found and removed Def Jam from publishers list.  
Found and removed Destrega from publishers list.  
Found and removed Dragon Ball Z: Budokai (series) from publishers list.  
Found and removed Dragon Ball Z: Budokai Tenkaichi from publishers list.  
Found and removed Dragon Ball: Raging Blast from publishers list.  
Found and removed Dragon Ball: Raging Blast 2 from publishers list.  
Found and removed Dragon Ball Xenoverse from publishers list.  
Found and removed Dragon Ball Xenoverse 2 from publishers list.  
Found and removed Dual Heroes from publishers list.  
Found and removed Ehrgeiz from publishers list.  
Found and removed Evil Zone from publishers list.  
Found and removed Fate/tiger colosseum from publishers list.  
Found and removed Fate/unlimited codes from publishers list.  
Found and removed Fight for Life from publishers list.  
Found and removed Fighters Megamix from publishers list.  
Found and removed Fighter's Destiny from publishers list.  
Found and removed Fighter's Impact from publishers list.  
Found and removed Fighter's Impact A from publishers list.  
Found and removed Fighting Bujutsu from publishers list.  
Found and removed Fighting Bujutsu 2nd! from publishers list.  
Found and removed Fighting Layer from publishers list.  
Found and removed Fighting Vipers from publishers list.  
Found and removed Fighting Vipers 2 from publishers list.  
Found and removed Final Fight Revenge from publishers list.  
Found and removed FIST from publishers list.  
Found and removed FX Fighter from publishers list.  
Found and removed FX Fighter Turbo from publishers list.  
Found and removed Genei Tougi: Shadow Struggle from publishers list.  
Found and removed Groove Adventure Rave: Fighting Live from publishers list.  
Found and removed Hiryu no Ken from publishers list.  
Found and removed Flying Dragon from publishers list.  
Found and removed Iron and Blood from publishers list.  
Found and removed JoJo's Bizarre Adventure: All Star Battle from publishers list.  
Found and removed JoJo's Bizarre Adventure: Eyes of Heaven from publishers list.  
Found and removed Kabuki Warriors from publishers list.  
Found and removed Kakuto Chojin: Back Alley Brutal from publishers list.  
Found and removed Kensei: Sacred Fist from publishers list.  
Found and removed Killing Zone from publishers list.  
Found and removed Kinnikuman Muscle Grand Prix from publishers list.  
Found and removed KOF: Maximum Impact from publishers list.  
Found and removed Kung Fu Chaos from publishers list.  
Found and removed Legend of the Dragon from publishers list.  
Found and removed Mace: The Dark Age from publishers list.  
Found and removed Magical Battle Arena from publishers list.  
Found and removed Marvel Avengers: Battle for Earth from publishers list.



Found and removed Marvel Nemesis: Rise of the Imperfects from publishers list.  
Found and removed Mortal Kombat from publishers list.  
Found and removed Mortal Kombat 4 from publishers list.  
Found and removed Mortal Kombat: Deadly Alliance from publishers list.  
Found and removed Mortal Kombat: Deception from publishers list.  
Found and removed Mortal Kombat: Armageddon from publishers list.  
Found and removed Mortal Kombat vs. DC Universe from publishers list.  
Found and removed Naruto: Clash of Ninja (series) from publishers list.  
Found and removed Naruto: Ultimate Ninja Storm from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm 2 from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm Generations from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm 3 from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm Revolution from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm 4 from publishers list.  
Found and removed One Must Fall: Battlegrounds from publishers list.  
Found and removed One Piece from publishers list.  
Found and removed One-Punch Man: A Hero Nobody Knows from publishers list.  
Found and removed Pokkén Tournament from publishers list.  
Found and removed Barbarian from publishers list.  
Found and removed Battle Blaze from publishers list.  
Found and removed Blade Arcus from Shining from publishers list.  
Found and removed Blandia from publishers list.  
Found and removed BlazBlue from publishers list.  
Found and removed BlazBlue: Cross Tag Battle from publishers list.  
Found and removed Dragoon Might from publishers list.  
Found and removed Dual Blades from publishers list.  
Found and removed Savage Reign from publishers list.  
Found and removed Kizuna Encounter from publishers list.  
Found and removed Guilty Gear from publishers list.  
Found and removed Guilty Gear: The Missing Link from publishers list.  
Found and removed Guilty Gear X from publishers list.  
Found and removed Guilty Gear X2 from publishers list.  
Found and removed Guilty Gear Isuka from publishers list.  
Found and removed Guilty Gear Dust Strikers from publishers list.  
Found and removed Hana no Keiji: Kumo no Kanata ni from publishers list.  
Found and removed Highlander from publishers list.  
Found and removed Knuckle Heads from publishers list.  
Found and removed Samurai Deeper Kyo from publishers list.  
Found and removed The Last Blade from publishers list.  
Found and removed The Last Blade 2 from publishers list.  
Found and removed Battle Fantasia from publishers list.  
Found and removed Granblue Fantasy Versus from publishers list.  
Found and removed Guilty Gear from publishers list.  
Found and removed Guilty Gear Xrd from publishers list.  
Found and removed Guilty Gear -Strive- from publishers list.  
Found and removed Mortal Kombat from publishers list.  
Found and removed Mortal Kombat from publishers list.  
Found and removed Mortal Kombat X from publishers list.  
Found and removed Mortal Kombat 11 from publishers list.  
Found and removed Samurai Shodown from publishers list.  
Found and removed Shadow Fight from publishers list.  
Found and removed Battle Arena Toshinden from publishers list.  
Found and removed Bleach (video game series) from publishers list.  
Found and removed Bushido Blade from publishers list.  
Found and removed Bushido Blade 2 from publishers list.  
Found and removed Cardinal Syn from publishers list.  
Found and removed Criticom from publishers list.  
Found and removed Dark Rift from publishers list.  
Found and removed Deadliest Warrior: The Game from publishers list.  
Found and removed Dynasty Warriors from publishers list.  
Found and removed Hellish Quart from publishers list.  
Found and removed Kengo from publishers list.  
Found and removed Last Bronx from publishers list.  
Found and removed Mace: The Dark Age from publishers list.

Found and removed Blade Arcus from publishers list.  
Found and removed BlazBlue: Cross Tag Battle from publishers list.  
Found and removed The Eye of Typhoon / Kyoku Cho Gou Ken from publishers list.  
Found and removed Kizuna Encounter: Super Tag Battle from publishers list.  
Found and removed Marvel vs. Capcom from publishers list.  
Found and removed NeoGeo Battle Coliseum from publishers list.  
Found and removed Umineko: Golden Fantasia from publishers list.  
Found and removed The King of Fighters from publishers list.  
Found and removed The King of Fighters 2003 from publishers list.  
Found and removed The King of Fighters XI from publishers list.  
Found and removed Dead or Alive from publishers list.  
Found and removed Dead or Alive 2 from publishers list.  
Found and removed Dead or Alive 3 from publishers list.  
Found and removed Dead or Alive Ultimate from publishers list.  
Found and removed Dead or Alive 4 from publishers list.  
Found and removed Dead or Alive: Dimensions from publishers list.  
Found and removed Dead or Alive 5 from publishers list.  
Found and removed Dead or Alive 5 Ultimate from publishers list.  
Found and removed Dead or Alive 5 Last Round from publishers list.  
Found and removed Armor Mayhem from publishers list.  
Found and removed Brawlhalla from publishers list.  
Found and removed Guilty Gear Dust Strikers from publishers list.  
Found and removed Jump Super Stars from publishers list.  
Found and removed Jump Ultimate Stars from publishers list.  
Found and removed Armajet from publishers list.  
Found and removed Brawlout from publishers list.  
Found and removed Cartoon Network: Punch Time Explosion from publishers list.  
Found and removed DreamMix TV World Fighters from publishers list.  
Found and removed Kirby Fighters 2 from publishers list.  
Found and removed Konjiki no Gash Bell!! Go! Go! Mamono Fight!! from publishers list.  
Found and removed Kung Fu Panda: Showdown of Legendary Legends from publishers list.  
Found and removed Lethal League from publishers list.  
Found and removed MultiVersus from publishers list.  
Found and removed Neon Genesis Evangelion: Battle Orchestra from publishers list.  
Found and removed Nickelodeon All-Star Brawl from publishers list.  
Found and removed One Piece: Gear Spirit from publishers list.  
Found and removed ARMS from publishers list.  
Found and removed Barbarian from publishers list.  
Found and removed The Grim Adventures of Billy & Mandy (video game) from publishers list.  
Found and removed Groove Adventure Rave: Fighting Live from publishers list.  
Found and removed JoJo's Bizarre Adventure: Eyes of Heaven from publishers list.  
Found and removed Kung Fu Chaos from publishers list.  
Found and removed Power Stone from publishers list.  
Found and removed Power Stone 2 from publishers list.  
Found and removed Poy Poy from publishers list.  
Found and removed Poy Poy 2 from publishers list.  
Found and removed ARMS from publishers list.  
Found and removed Castlevania Judgment from publishers list.  
Found and removed Demon Slayer: Kimetsu no Yaiba - The Hinokami Chronicles from publishers list.  
Found and removed Dissidia: Final Fantasy from publishers list.  
Found and removed Dissidia 012 Final Fantasy from publishers list.  
Found and removed Dragon Ball Z: Budokai Tenkaichi (series) from publishers list.  
Found and removed Dragon Ball: Raging Blast from publishers list.  
Found and removed Dragon Ball: Raging Blast 2 from publishers list.  
Found and removed Dragon Ball Xenoverse from publishers list.  
Found and removed Dragon Ball Xenoverse 2 from publishers list.  
Found and removed The Grim Adventures of Billy & Mandy (video game) from publishers list.  
Found and removed Groove Adventure Rave: Fighting Live from publishers list.  
Found and removed Godzilla video games from publishers list.  
Found and removed Bleach: The Blade of Fate from publishers list.  
Found and removed Bleach: Dark Souls from publishers list.  
Found and removed Guilty Gear from publishers list.  
Found and removed Guilty Gear Isuka from publishers list.

Found and removed Guilty Gear: Dust Strikers from publishers list.  
Found and removed Battle Stadium D.O.N from publishers list.  
Found and removed Cartoon Network: Punch Time Explosion from publishers list.  
Found and removed DreamMix TV World Fighters from publishers list.  
Found and removed Kirby Fighters 2 from publishers list.  
Found and removed Konjiki no Gash Bell!! Go! Go! Mamono Fight!! from publishers list.  
Found and removed Lethal League from publishers list.  
Found and removed MultiVersus from publishers list.  
Found and removed Neon Genesis Evangelion: Battle Orchestra from publishers list.  
Found and removed Nickelodeon All-Star Brawl from publishers list.  
Found and removed One Piece: Gear Spirit from publishers list.  
Found and removed ARMS from publishers list.  
Found and removed Destrega from publishers list.  
Found and removed The Grim Adventures of Billy & Mandy from publishers list.  
Found and removed Groove Adventure Rave: Fighting Live from publishers list.  
Found and removed JoJo's Bizarre Adventure: Eyes of Heaven from publishers list.  
Found and removed Naruto: Clash of Ninja (series) from publishers list.  
Found and removed Naruto: Clash of Ninja 2 from publishers list.  
Found and removed Naruto: Clash of Ninja Revolution from publishers list.  
Found and removed Naruto: Clash of Ninja Revolution 2 from publishers list.  
Found and removed Naruto: Gekitō Ninja Taisen! 3 from publishers list.  
Found and removed Naruto: Gekitō Ninja Taisen! 4 from publishers list.  
Found and removed 10... Knock Out! from publishers list.  
Found and removed 3D Boxing from publishers list.  
Found and removed 3D World Boxing Champion from publishers list.  
Found and removed 4-D Boxing from publishers list.  
Found and removed 4D Sports Boxing from publishers list.  
Found and removed ABC Wide World of Sports Boxing from publishers list.  
Found and removed Animal Boxing from publishers list.  
Found and removed ARMS from publishers list.  
Found and removed Barry McGuigan World Championship Boxing / Star Rank Boxing from publishers list.  
Found and removed Best Bout Boxing from publishers list.  
Found and removed Boxing from publishers list.  
Found and removed Boxing from publishers list.  
Found and removed Boxing Angel from publishers list.  
Found and removed Boxing Fever from publishers list.  
Found and removed Boxing Legends of the Ring from publishers list.  
Found and removed Black & Bruised from publishers list.  
Found and removed By Fair Means or Foul / Pro Boxing Simulator from publishers list.  
Found and removed Canimals Boxing Championship from publishers list.  
Found and removed Def Jam: Icon from publishers list.  
Found and removed Devastating Blow from publishers list.  
Found and removed Evander "Real Deal" Holyfield's Boxing from publishers list.  
Found and removed FaceBreaker from publishers list.  
Found and removed Final Blow from publishers list.  
Found and removed Fight Night from publishers list.  
Found and removed Fight Night from publishers list.  
Found and removed Fight Night 2004 from publishers list.  
Found and removed Fight Night Round 2 from publishers list.  
Found and removed Fight Night: Round 3 from publishers list.  
Found and removed Fight Night Round 4 from publishers list.  
Found and removed Fight Night Champion from publishers list.  
Found and removed Foes of Ali from publishers list.  
Found and removed Frank Bruno's Boxing from publishers list.  
Found and removed George Foreman's KO Boxing from publishers list.  
Found and removed Greatest Heavyweights of the Ring from publishers list.  
Found and removed Hajime no Ippo: Road to Glory from publishers list.  
Found and removed Heavyweight Champ from publishers list.  
Found and removed Knockout from publishers list.  
Found and removed Knockout Kings from publishers list.  
Found and removed Legend of Success Joe from publishers list.  
Found and removed Muhammad Ali Heavyweight Boxing from publishers list.  
Found and removed Neutral Corner / USA Boxing from publishers list.  
Found and removed Online Boxing from publishers list.  
Found and removed Poli Diaz from publishers list.

Found and removed Power Punch II from publishers list.  
Found and removed Pro Boxing from publishers list.  
Found and removed Boxing Manager from publishers list.  
Found and removed Ringside Seat from publishers list.  
Found and removed TKO Professional Boxing from publishers list.  
Found and removed The Boxer (game) from publishers list.  
Found and removed World Championship Boxing Manager from publishers list.  
Found and removed World Championship Boxing Manager Online from publishers list.  
Found and removed Super Pro Wrestling from publishers list.  
Found and removed 3 Count Bout / Fire Suplex from publishers list.  
Found and removed All Japan Pro-Wrestling: Soul of Champion from publishers list.  
Found and removed All Star Pro-Wrestling from publishers list.  
Found and removed American Tag Team Wrestling / Tag Team Wrestling from publishers list.  
Found and removed Backyard Wrestling from publishers list.  
Found and removed Backyard Wrestling: Don't Try This at Home from publishers list.  
Found and removed Backyard Wrestling 2: There Goes the Neighborhood from publishers list.  
Found and removed Backyard Wrestling 2K8 from publishers list.  
Found and removed The Big Pro Wrestling! / Tag Team Wrestling from publishers list.  
Found and removed Blazing Tornado from publishers list.  
Found and removed Body Slam / Dump Matsumoto from publishers list.  
Found and removed Championship Wrestling (video game) from publishers list.  
Found and removed Def Jam Vendetta from publishers list.  
Found and removed Fire Pro Wrestling from publishers list.  
Found and removed Fire Pro Wrestling Combination Tag from publishers list.  
Found and removed Fire Pro Wrestling 2nd Bout from publishers list.  
Found and removed Super Fire Pro Wrestling from publishers list.  
Found and removed Thunder Pro Wrestling Biographies / Fire Pro Wrestling Gaiden from publishers list.  
Found and removed Fire Pro Wrestling 3 Legend Bout from publishers list.  
Found and removed Super Fire Pro Wrestling 2 from publishers list.  
Found and removed Super Fire Pro Wrestling 3 Final Bout from publishers list.  
Found and removed Super Fire Pro Wrestling 3 Easy Type from publishers list.  
Found and removed Fire Pro Women: All Star Dream Slam / Fire Pro Joshi: All Star Dream Slam from publishers list.  
Found and removed Super Fire Pro Wrestling Special from publishers list.  
Found and removed Wrestling Universe: Fire Pro Women: Dome Super Female Big Battle: All Japan Women VS J.W.P. from publishers list.  
Found and removed Super Fire Pro Wrestling: Queen's Special from publishers list.  
Found and removed Fire Pro Another Story: Blazing Tornado from publishers list.  
Found and removed Super Fire Pro Wrestling X from publishers list.  
Found and removed Fire Pro Wrestling: Iron Slam '96 from publishers list.  
Found and removed Super Fire Pro Wrestling X Premium from publishers list.  
Found and removed Fire Pro Wrestling S: 6 Men Scramble from publishers list.  
Found and removed Fire Pro Wrestling G from publishers list.  
Found and removed Fire Pro Wrestling for WonderSwan from publishers list.  
Found and removed Fire Pro Wrestling i from publishers list.  
Found and removed Fire Pro Wrestling D from publishers list.  
Found and removed Fire Pro Wrestling from publishers list.  
Found and removed Fire Pro Wrestling J from publishers list.  
Found and removed Fire Pro Wrestling 2 from publishers list.  
Found and removed Fire Pro Wrestling Z from publishers list.  
Found and removed Fire Pro Wrestling Returns from publishers list.  
Found and removed Fire Pro Wrestling World from publishers list.  
Found and removed ECW Anarchy Rulz from publishers list.  
Found and removed ECW Hardcore Revolution from publishers list.  
Found and removed WWF SmackDown! from publishers list.  
Found and removed WWF SmackDown! 2: Know Your Role from publishers list.  
Found and removed WWF SmackDown! Just Bring It from publishers list.  
Found and removed WWE SmackDown! Shut Your Mouth from publishers list.  
Found and removed WWE SmackDown! Here Comes The Pain from publishers list.  
Found and removed WWE SmackDown! vs. RAW from publishers list.  
Found and removed WWE SmackDown! vs. RAW 2006 from publishers list.  
Found and removed WWE SmackDown vs. Raw 2007 from publishers list.  
Found and removed WWE SmackDown vs. Raw 2008 from publishers list.  
Found and removed WWE SmackDown vs. Raw 2009 from publishers list.

Found and removed WWE SmackDown vs. Raw 2010 from publishers list.  
Found and removed WWE SmackDown vs. Raw 2011 from publishers list.  
Found and removed WCW Backstage Assault from publishers list.  
Found and removed WCW Mayhem from publishers list.  
Found and removed WCW Nitro from publishers list.  
Found and removed WCW/nWo Revenge from publishers list.  
Found and removed WCW/nWo Thunder from publishers list.  
Found and removed WCW SuperBrawl Wrestling from publishers list.  
Found and removed WCW: The Main Event from publishers list.  
Found and removed WCW vs. nWo: World Tour from publishers list.  
Found and removed WCW vs. the World from publishers list.  
Found and removed WCW Wrestling from publishers list.  
Found and removed Windjammers from publishers list.  
Found and removed Windjammers from publishers list.  
Found and removed Windjammers 2 from publishers list.  
Found and removed Akatsuki EN-Eins from publishers list.  
Found and removed Arcana Heart from publishers list.  
Found and removed BlazBlue from publishers list.  
Found and removed BlazBlue: Cross Tag Battle from publishers list.  
Found and removed Chaos Code from publishers list.  
Found and removed Dragon Ball Z: Super Butōden 2 from publishers list.  
Found and removed Dragon Ball Z: Super Butōden 3 from publishers list.  
Found and removed Dragon Ball Kai: Ultimate Butoden from publishers list.  
Found and removed Dragon Ball Z: Extreme Butōden from publishers list.  
Found and removed Dragon Ball Z: Supersonic Warriors from publishers list.  
Found and removed Fist of the North Star: The Twin Blue Stars of Judgment from publisher s list.  
Found and removed Guilty Gear from publishers list.  
Found and removed Guilty Gear: The Missing Link from publishers list.  
Found and removed Guilty Gear X from publishers list.  
Found and removed Guilty Gear X2 from publishers list.  
Found and removed Guilty Gear Isuka from publishers list.  
Found and removed Guilty Gear Dust Strikers from publishers list.  
Found and removed Jump Super Stars from publishers list.  
Found and removed Jump Ultimate Stars from publishers list.  
Found and removed JoJo's Bizarre Adventure: Heritage for The Future from publishers lis t.  
Found and removed Melty Blood from publishers list.  
Found and removed Melty Blood: Type Lumina from publishers list.  
Found and removed Nitroplus Blasterz: Heroines Infinite Duel from publishers list.  
Found and removed Persona 4 Arena from publishers list.  
Found and removed Persona 4 Arena Ultimax from publishers list.  
Found and removed Phantom Breaker from publishers list.  
Found and removed Skullgirls from publishers list.  
Found and removed Tatsunoko Fight from publishers list.  
Found and removed Under Night In-Birth from publishers list.  
Found and removed Battle Stadium D.O.N. from publishers list.  
Found and removed DNF Duel from publishers list.  
Found and removed Dragon Ball FighterZ from publishers list.  
Found and removed Dream Mix TV World Fighters from publishers list.  
Found and removed Granblue Fantasy Versus from publishers list.  
Found and removed Guilty Gear from publishers list.  
Found and removed Guilty Gear Xrd from publishers list.  
Found and removed Guilty Gear -Strive- from publishers list.  
Found and removed One Piece: Grand Battle! from publishers list.  
Found and removed One Piece: Gear Spirit from publishers list.  
Found and removed Tatsunoko vs. Capcom from publishers list.  
Found and removed Dead or Alive (franchise) from publishers list.  
Found and removed Demon Slayer: Kimetsu no Yaiba - The Hinokami Chronicles from publishe rs list.  
Found and removed Dragon Ball GT: Final Bout from publishers list.  
Found and removed Dragon Ball Z: Budokai (series) from publishers list.  
Found and removed Dragon Ball Z: Budokai Tenkaichi (series) from publishers list.  
Found and removed Dragon Ball Z: Burst Limit from publishers list.  
Found and removed Dragon Ball Z: Infinite World from publishers list.  
Found and removed Dragon Ball: Raging Blast from publishers list.

Found and removed Dragon Ball: Raging Blast 2 from publishers list.  
Found and removed Dragon Ball Xenoverse from publishers list.  
Found and removed Dragon Ball Xenoverse 2 from publishers list.  
Found and removed Fate/unlimited codes from publishers list.  
Found and removed Groove Adventure Rave: Fighting Live from publishers list.  
Found and removed Hokuto no Ken: Raoh Gaiden - Ten no Haoh from publishers list.  
Found and removed JoJo's Bizarre Adventure: All Star Battle from publishers list.  
Found and removed JoJo's Bizarre Adventure: Eyes of Heaven from publishers list.  
Found and removed J-Stars Victory VS from publishers list.  
Found and removed Jump Force from publishers list.  
Found and removed Kill la Kill the Game: IF from publishers list.  
Found and removed Naruto: Clash of Ninja (series) from publishers list.  
Found and removed Naruto: Ultimate Ninja Storm from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm 2 from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm Generations from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm 3 from publishers list.  
Found and removed Naruto Shippuden: Ultimate Ninja Storm Revolution from publishers list.  
Found and removed One Piece: Burning Blood from publishers list.  
Found and removed One Piece: Grand Adventure from publishers list.  
Found and removed One Piece: Grand Battle from publishers list.  
Found and removed One-Punch Man: A Hero Nobody Knows from publishers list.  
Found and removed Saint Seiya: Soldiers' Soul from publishers list.  
Found and removed Super Dragon Ball Z from publishers list.  
Found and removed Yu Yu Hakusho: Dark Tournament from publishers list.  
Found and removed Aquapazza: Aquaplay Dream Match from publishers list.  
Found and removed Battle Stadium D.O.N. from publishers list.  
Found and removed Blade Strangers from publishers list.  
Found and removed BlazBlue: Cross Tag Battle from publishers list.  
Found and removed Bounty Battle from publishers list.  
Found and removed Brawlhalla from publishers list.  
Found and removed Brawlout from publishers list.  
Found and removed Capcom Fighting Evolution from publishers list.  
Found and removed Marvel vs. Capcom from publishers list.  
Found and removed SNK vs. Capcom from publishers list.  
Found and removed Super Gem Fighter: Mini Mix from publishers list.  
Found and removed Tatsunoko vs. Capcom from publishers list.  
Found and removed Cartoon Network: Punch Time Explosion from publishers list.  
Found and removed Dead or Alive from publishers list.  
Found and removed Dead or Alive 4 from publishers list.  
Found and removed Dead or Alive: Dimensions from publishers list.  
Found and removed Dead or Alive 5 from publishers list.  
Found and removed Dead or Alive 6 from publishers list.  
Found and removed Dengeki Bunko: Fighting Climax from publishers list.  
Found and removed DreamMix TV World Fighters from publishers list.  
Found and removed Fight of Gods from publishers list.  
Found and removed Fighters Megamix from publishers list.  
Found and removed Fighting EX Layer from publishers list.  
Found and removed Injustice: Gods Among Us from publishers list.  
Found and removed Injustice 2 from publishers list.  
Found and removed J-Stars Victory VS from publishers list.  
Found and removed Jump Force from publishers list.  
Found and removed Jump Super Stars from publishers list.  
Found and removed Marvel Nemesis: Rise of the Imperfects from publishers list.  
Found and removed Mashbox from publishers list.  
Found and removed Mortal Kombat from publishers list.  
Found and removed Mortal Kombat vs. DC Universe from publishers list.  
Found and removed Mortal Kombat from publishers list.  
Found and removed Mortal Kombat X from publishers list.  
Found and removed Mortal Kombat 11 from publishers list.  
Found and removed MultiVersus from publishers list.  
Found and removed NeoGeo Battle Coliseum from publishers list.  
Found and removed Nickelodeon All-Star Brawl from publishers list.  
Found and removed Nitroplus Blasterz: Heroines Infinite Duel from publishers list.  
Found and removed Phantom Breaker from publishers list.

Found and removed PlayStation All-Stars Battle Royale from publishers list.  
 Found and removed Samurai Shodown from publishers list.  
 Found and removed SNK Gals' Fighters from publishers list.  
 Found and removed SNK Heroines: Tag Team Frenzy from publishers list.  
 Found and removed Soulcalibur from publishers list.  
 Found and removed Soulcalibur II from publishers list.  
 Found and removed Soulcalibur Legends from publishers list.  
 Found and removed Soulcalibur IV from publishers list.  
 Found and removed Soulcalibur: Broken Destiny from publishers list.  
 Found and removed Soulcalibur V from publishers list.  
 Found and removed Soulcalibur VI from publishers list.  
 Found and removed Battle Raper from publishers list.  
 Found and removed Battle Raper from publishers list.  
 Found and removed Battle Raper 2 from publishers list.  
 Found and removed Armored Warriors from publishers list.  
 Found and removed Cyberbots: Full Metal Madness from publishers list.  
 Found and removed Gundam: Battle Assault (Series) from publishers list.  
 Found and removed Joy Mech Fight from publishers list.  
 Found and removed Mighty Morphin Power Rangers: The Fighting Edition from publishers list.  
 Found and removed Neon Genesis Evangelion: Battle Orchestra from publishers list.  
 Found and removed One Must Fall: 2097 from publishers list.  
 Found and removed Power Quest from publishers list.  
 Found and removed Godzilla video games from publishers list.  
 Found and removed Dissidia: Final Fantasy from publishers list.  
 Found and removed Dissidia 012 Final Fantasy from publishers list.  
 Found and removed Dissidia Final Fantasy NT from publishers list.  
 Found and removed DNF Duel from publishers list.  
 Found and removed Draglode from publishers list.  
 Found and removed Dragon Ball Xenoverse from publishers list.  
 Found and removed Dragon Ball Xenoverse 2 from publishers list.  
 Found and removed Flying Dragon from publishers list.  
 Found and removed Granblue Fantasy Versus from publishers list.  
 Found and removed Marvel Avengers: Battle for Earth from publishers list.  
 Found and removed Persona 4 Arena from publishers list.  
 Found and removed Persona 4 Arena Ultimax from publishers list.  
 Found and removed Legend of Legaia from publishers list.  
 Found and removed Legaia 2: Duel Saga from publishers list.  
 Found and removed Red Earth from publishers list.  
 Found and removed Battle Arena Toshinden from publishers list.  
 Found and removed Battle Arena Nitoshinden from publishers list.  
 Found and removed Exteel from publishers list.  
 Found and removed Fate/tiger colosseum from publishers list.  
 Found and removed Flying Dragon from publishers list.  
 Found and removed SD Hiryū no Ken from publishers list.  
 Found and removed SD Hiryū no Ken Gaiden from publishers list.  
 Found and removed SD Hiryū no Ken SD Hiryū no Ken Gaiden 2 from publishers list.  
 Found and removed Flying Dragon from publishers list.  
 Found and removed SD Hiryū no Ken Densetsu from publishers list.  
 Found and removed SD Hiryū no Ken EX from publishers list.  
 Found and removed Glove On Fight from publishers list.

## Extracting the Dataset: Publisher Entries 1.1

An issue has arisen, publisher data includes great amounts of unnecessary data. Manual cleaning is unnecessary as the list has roughly 260 elements. In this case, my solution is to generate a dictionary of all publishing companies as keys and compare them to the publishers array. For each mention of the key, the dictionary entry value will be updated +1

Chose the following for reasons:

- Bandai - one of the biggest publishers

- SNK - Used to be the 2nd biggest publisher, sole publisher of all KOF & Fatal Fury games
- Capcom - Used to be the biggest publisher, still a big name
- Konami - another big name in the genre
- EA - biggest sports fighting game publisher
- Spike - Massive company that published a large number of titles. They would finance many projects including fighting games and a large roster of the pro-wrestling subgenre
- Ubisoft - massive company, responsible for a few alternative fighters such as "For Honor"
- Midway - Big publisher responsible for Mortal Kombat series
- NetherRealm - NetherRealm studios is the spiritual successor to Midway
- Nintendo - same as Bandai. Furthermore, they used to be the (almost) sole publisher of games on their own consoles during the 90's
- Sega - same as Nintendo, although they do not make consoles anymore, they are still active developers
- Warner - giant company, published many fighting games including Midway projects
- Arc - Arc System Works - biggest anime fighter publisher
- Type-Moon - big publisher with many fighting games under their belt, famous for the Melty Blood series and Fate series
- CyberConnect2 - biggest arena fighter publisher
- Human - Massive third-party publisher during the 80's and 90's

```
In [11]: #Sticking to one word in order to count variations i.e. "EA Chicago", "EA Canada"
publisherDict = {
    "Bandai": 0,
    "SNK":0,
    "Capcom":0,
    "Konami":0,
    "EA":0,
    "Spike":0,
    "Ubisoft":0,
    "Midway":0,
    "NetherRealm":0,
    "Nintendo":0,
    "Sega":0,
    "Warner": 0,
    "Arc": 0,
    "Type-Moon":0,
    "CyberConnect2":0,
    "Human": 0,
    "Others": 0 }

for entry in publishers:
    #create list from entry.
    #Example: entry = "a b c"; entryList = ["a", "b", "c"]
    entryToList = entry.split(' ')
    keyFound = False
    for key in publisherDict.keys():
        if key in entryToList:
            publisherDict[key]+=1
            keyFound = True
    if keyFound == False:
        publisherDict["Others"]+=1

#Remove Comments for testing purposes
#print(publisherDict)
```

## Extracting the Dataset: Series



This section will focus on creating a dictionary to count each entry of the most popular series. For this the allEntries list will be used in conjunction with a dictionary.

Each time the term "series" is mentioned, the series name (without series) will be added into the dictionary with a value of 0. If the series named is mentioned again - the value will be incremented by 1.

Dictionary will have some default series manually added.

```
In [12]: #init series dict
seriesDict = {
    "Street Fighter": 0,
    "Mortal Kombat": 0,
    "Persona": 0,
    "Guilty Gear": 0,
    "BlazBlue": 0,
    "Dragon Ball": 0,
    "Naruto": 0,
    "Fight Night": 0,
    "WWE": 0,
    "WWF": 0,
    "WCW": 0,
    "Fire Pro Wrestling": 0,
    "Tekken": 0
}

#loop through all entries
for entry in allEntries:
    #split entry into string list and look for mention of "series"
    entryToList = entry.split(' ')
    if "series" in entryToList:
        entryToList.remove("series")
        key = " ".join(entryToList)#i.e. ["a", "game"] => "a game"
        if (key in seriesDict.keys()) == False:
            seriesDict[key] = 0
    #Count each mention if "series" not in entry
    else:
        for key in seriesDict.keys():
            if key in entry:
                seriesDict[key]+=1

#Remove Comments for testing purposes
#print(seriesDict)
```

## Data Analysis

This is the beginning of the data analysis process. It will cover ways of presenting data and formatting it where necessary.

## Data Analysis - Naming Conventions - Formatting Data

This section will get all entries and analyse any naming conventions. To make the work smoother and more streamlined, I will build some string parsing functions. They help a dictionary that works on a simple premise: Key = word, value = times mentioned.

When word processing one must be aware of the impact punctuation marks have. Therefore a simple form of input cleaning would be to transform punctuation marks into whitespaces. If my separator is a whitespace, This would turn them into an empty string, which can easily be deleted.

The plan is the following:

- Implement string parsing functions
- Loop through main entries and add keys/values to counter dictionary
- Review results
  - if results are not satisfactory - implement further input cleaning
  - if satisfactory - move on to data representation in the next sub-section.

```
In [13]: #Creating the string parsing functions
#They all work to separate a string into a list, removing unnecessary characters and wor

def ReplaceAllCharOccurs(toReplace, string):
    #iterates over string and adds only desireable characters into the new string
    newStr = ""
    for char in string:
        if char == toReplace or char.isdigit() == True:
            #undesirable character occurances are turned to whitespaces
            newStr += ' '
        else:
            newStr += char
    return newStr

def CleanStrList(strList, toReplace):
    #vars for while
    listLen = len(strList)
    i = 0
    while i < listLen:
        #used as junk words are lowercase
        lowered = strList[i].lower()
        if lowered == toReplace or len(lowered) < 3:
            strList.remove(strList[i])
            #restarts loop to avoid index out of range
            i = 0
            listLen-=1
        else:
            i+=1
    return strList

def GetStrListClean(string):
    #Array of unwanted characters
    junkChars = [',', '.', ':', ';', '?', '!', '-', '—', '½', '&', '/', '\\', '(', ')']

    for junk in junkChars:
        if junk in string:
            string = ReplaceAllCharOccurs(junk, string)

    stringList = string.split()

    #Array of unwanted words
    junkWords = ['a', 'an', 'and', 'as', 'the', 'at', 'but', 'by', 'for', 'from', 'in',
                  'into', 'either', 'neither', 'nor', 'of', 'off', 'on', 'onto', 'or',
                  'out', 'since', 'so', 'throughout', 'to', 'up', 'with', 'yet', 'are',
                  'won\\'t', 'that', 'is', 'was', 'were']

    for junk in junkWords:
        stringList = CleanStrList(stringList, junk)
```

```

        return stringList

#Remove Comments for testing purposes
# testStr = "Test String"
# testList = GetStrListClean(testStr)
# print("Test Input clean: " + str(testList))

# testStr = "either a!Test - String,With.:Junk?Data;"
# testList = GetStrListClean(testStr)
# print("Test Input junk: " + str(testList))
#Edit: "or" statements added to ReplaceAllCharOccurs and CleanStrList after testing

```

```

In [14]: #Creating word counter dict

wordCounter = {}

#get parsed data and add to dict

for entry in allEntries:
    entryList = GetStrListClean(entry)
    for string in entryList:
        if string in wordCounter.keys():
            wordCounter[string] += 1
        else:
            wordCounter[string] = 1

#Remove Comments for testing purposes
# print(wordCounter)

```

```

In [15]: #sorting dictionary by values descending
#lambda gotten from source:
#https://miguendes.me/how-to-sort-a-dict-in-descending-order-by-value-with-python#headin

sortLambda = lambda kVP: kVP[1]
#sorts by values descending as reverse=True
wordCounter = dict(sorted(wordCounter.items(), key = sortLambda, reverse=True))

#Remove Comments for testing purposes
#print(wordCounter)

```

## Data Analysis - Naming Conventions - Representing Data

```

In [16]: #representing sorted data
import pandas as pd
#NC = naming conventions
dataNC = {
    'Words': list(wordCounter.keys()),
    'Repetitions': list(wordCounter.values())
}

dfNC = pd.DataFrame(dataNC)

#Remove Comments for testing purposes
#print(dfNC)

```

```

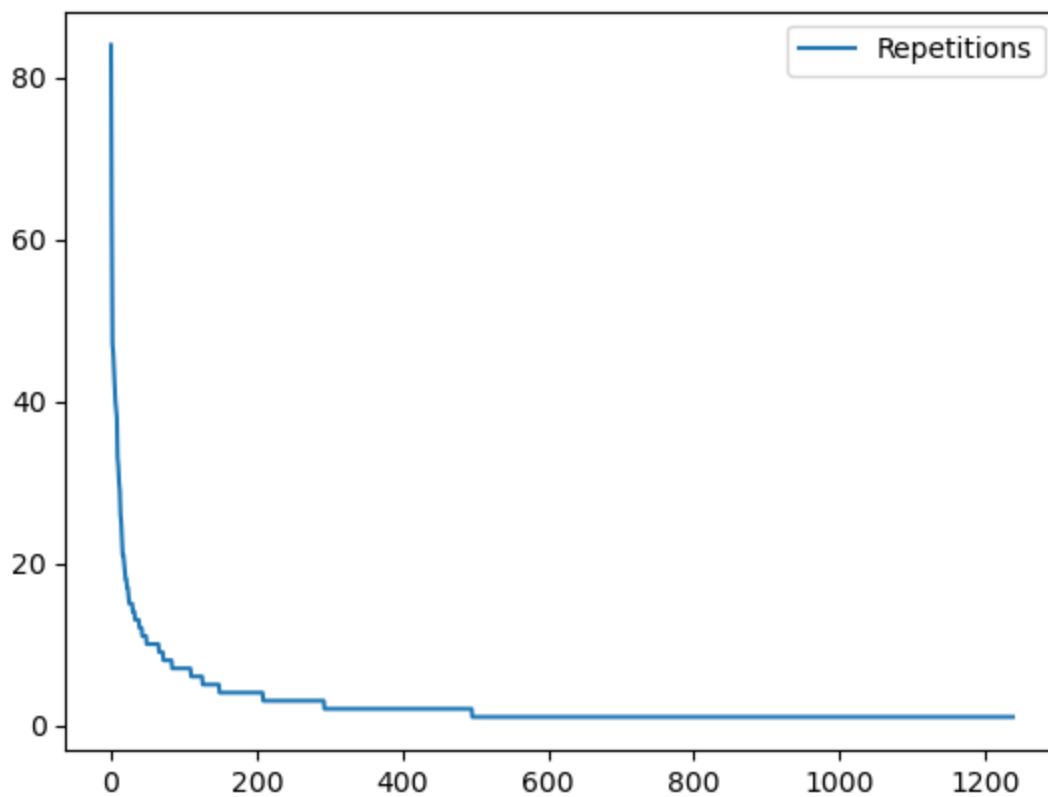
In [17]: #example of plotting the whole chart (not good, does not give any insights):
dfNC.plot(y="Repetitions")

```

```

Out[17]: <Axes: >

```

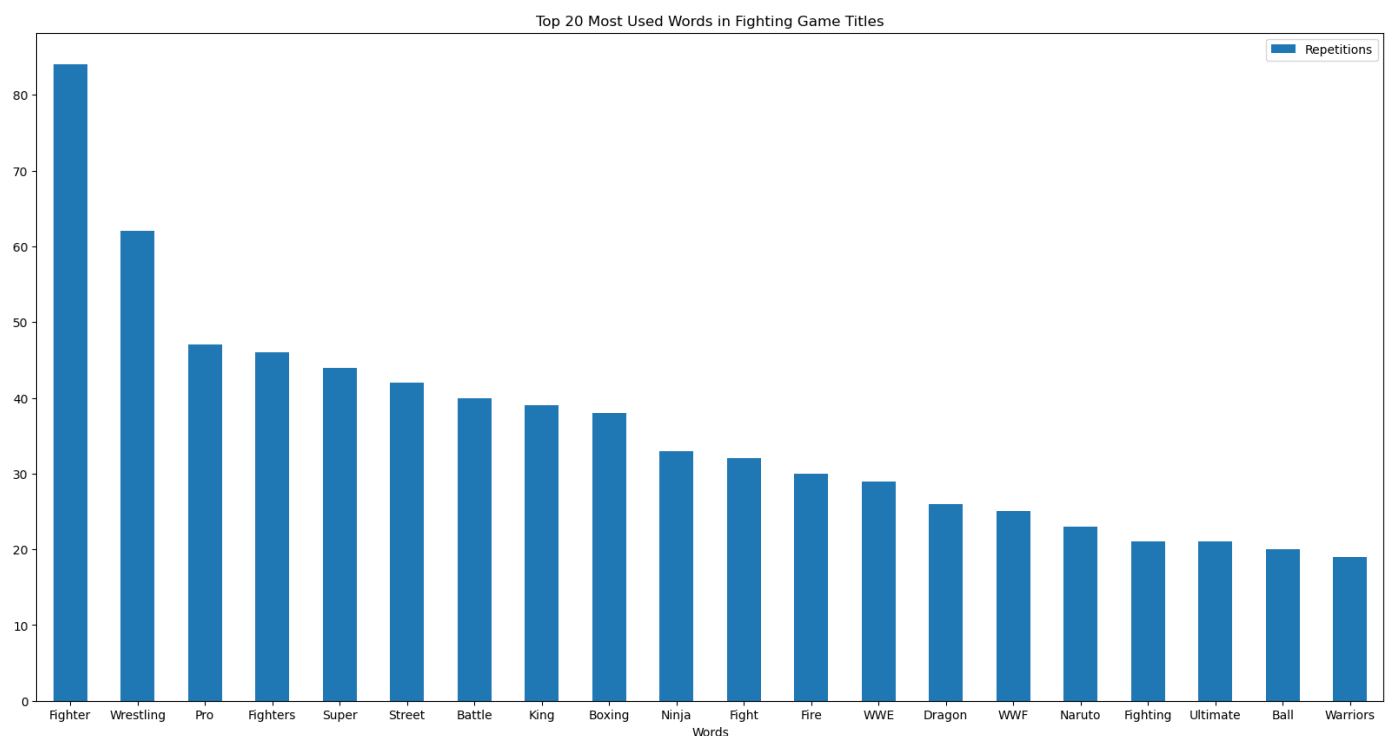


## Abstract

The findings show pretty much nothing as the words are specific, what is needed is a bar or pie chart with X labels represented as their proper values

```
In [18]: #plotting top 20 words instead
dfNC.iloc[0:20].plot.bar(x='Words',y='Repetitions', rot = 0, figsize = (20,10), title =
```

```
<Axes: title={'center': 'Top 20 Most Used Words in Fighting Game Titles'}, xlabel='Words'>
```



# Abstract

The bar chart with labeled X axes can show the findings more accurately and allow insights to be drawn better.

Findings:

- Unsurprisingly, the words "Fighter" and "Fighters" are amongst the top 5 most used words in game title names
- Surprisingly, placed at second place is "Wrestling". "WWE" sits at number 13 and "WWF" at 15. This shows a great presence of games from the professional wrestling subgenre.
- Furthermore, "Pro" at number 3 and "Fire" at number 12 may indicate that a great number of pro-wrestling games are from the "Fire Pro Wrestling" franchise. It has a great fanbase in Japan but outside of the domestic market it has garnered a cult following. The sheer number of games in the series is surprising.
- The mention of "Boxing" at number 9 is interesting. The last AAA attempt at a boxing game was the "Fight Night" series which rarely if ever use the word "Boxing" in their titles. This may point to a great presence of boxing games from the 80's, 90's and early 2000's
- Near the end of the top 20 sit the words "Dragon", "Ball" and "Naruto". Apart from one 2.5D fighter "Dragon Ball FighterZ" by ArcSys, the Dragon Ball and Naruto series are dominated by simpler more casual-oriented 3D arena fighting games. The number of games from these 2 series only show a big presence of the subgenre.

Takeaways:

- The word Fighter greatly outnumbers all others
- Great presence of pro-wrestling oriented words
- Some names of others licensed franchises dominate the rest of the word pool
- Words that allude to the sports subgenre have a great presence as well

```
In [19]: #plotting bottom 20 words leads to no significant results as 20+ words are repeated once
#Remove comments to see the bar chart
#dfNC.iloc[len(dfNC)-20:len(dfNC)].plot.bar(x='Words',y='Repetitions', rot = 0, figsize
```

```
In [20]: #plotting how many words are repeated X times
#repTracker dict: key = word repeated X times, value = number of words
repTracker = {}

for reps in wordCounter.values():
    key = str(reps) + ' reps'
    if key in repTracker:
        repTracker[key] += 1
    else:
        repTracker[key] = 1

#Remove Comments for testing purposes
# print(repTracker)

dataTR = {
    'Repetition Count': list(repTracker.keys()),
    'Words With This Repetition Count': list(repTracker.values())
}

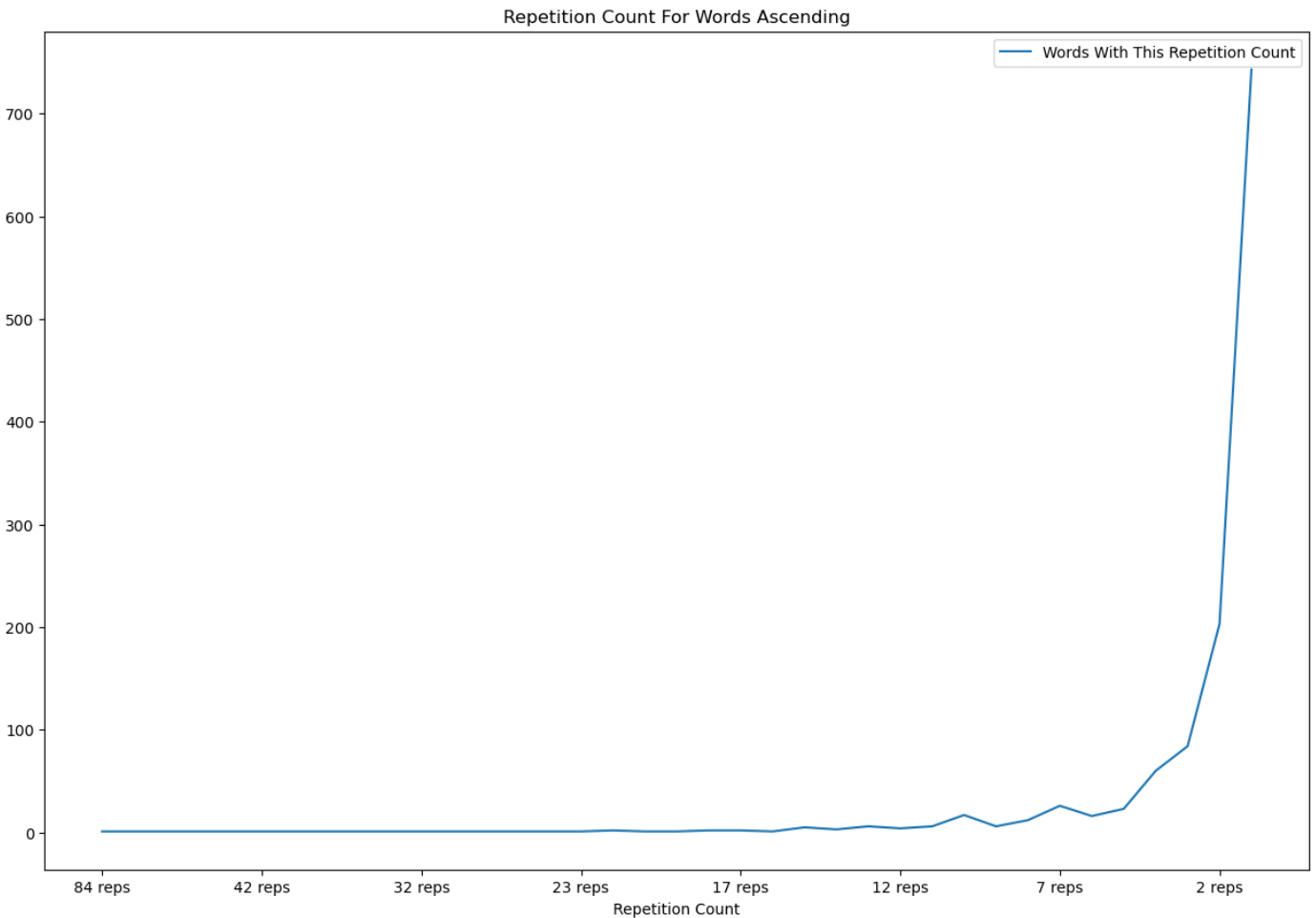
#Remove Comments for testing purposes
# print(dataTR)
```

```

dfTR = pd.DataFrame(dataTR)
#Remove Comments for testing purposes
# print(dfTR)
#graph chart is used as this is looking at trends and not comparing specifics
dfTR.plot(x='Repetition Count',title='Repetition Count For Words Ascending', figsize = (

```

Out[20]: <Axes: title={'center': 'Repetition Count For Words Ascending'}, xlabel='Repetition Count', ylabel='Words With This Repetition Count'>



## Abstract

There are some insights to be drawn from looking at how likely words are to have repetitions. Takeaways:

- As "connecting" words and prefixes such as "a", "an", "the" are removed, this graph shows only specific nouns, adjectives, adverbs and verbs.
- Words with high repetition counts (above 10) make up a significantly tiny amount of the list.
- Words with 1-3 repetitions are several times more prevalent. Having numbers in the hundreds.

## Data Analysis - Publisher Relevance - Representing Data

This will show publishers and how many entries (games) they have released in the genre. A bar chart will be used as it is competitive

```

In [21]: #sorting publisherDict by value descending
#lambda gotten from source:
https://miguendes.me/how-to-sort-a-dict-in-descending-order-by-value-with-python#headin

```

```

sortLambda = lambda kVP: kVP[1]
#sorts by values descending as reverse=True
publisherDict = dict(sorted(publisherDict.items(), key = sortLambda, reverse=True))

#Remove Comments for testing purposes
# print(publisherDict)

```

```

In [22]: #creating dataframe from publishers dictionary

dataPD = {
    'Publisher': list(publisherDict.keys()),
    'Games Published': list(publisherDict.values())
}

dfPD = pd.DataFrame(dataPD)
#Remove Comments for testing purposes
# print(dfPD)

```

```

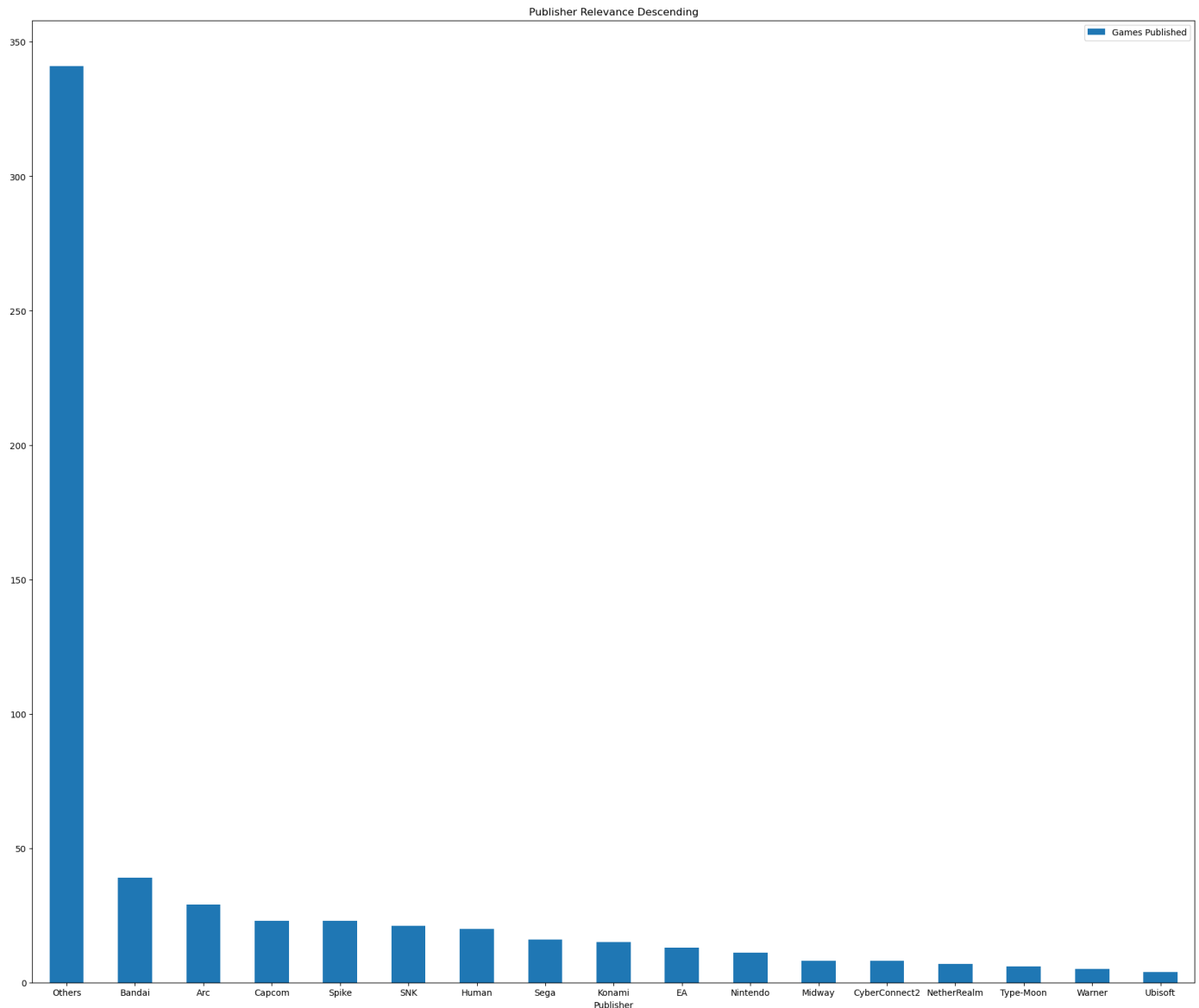
In [23]: #plotting bar chart
dfPD.plot.bar(rot=0,x='Publisher',figsize=(24,20), title = 'Publisher Relevance Descendi

```

```

Out[23]: <Axes: title={'center': 'Publisher Relevance Descending'}, xlabel='Publisher'>

```



# Abstract

## Findings:

- "Others" mark publishers with less of an impact, what is surprising is that their contributions outnumber big studios numerous times.
  - This may be attributed to the fact that an abundance of AAA studios started appearing during the middle of the 2000's whilst a great majority of fighting game titles were made during the 90's with the explosive success of Street Fighter II kickstarting the genre
    - This is further supported by the fact that making games in the 80's and early 90's that were commercially viable was significantly less expensive and small studios had an advantage
- Bandai Namco is ranked the biggest major publisher. This is unsurprising as they have stakes in many subgenres. From owning the Tekken and Soul Calibur franchise, they have a big share in the competitive 3D subgenre, whilst they are also responsible for publishing many arena fighters as well.
- A great surprise was seeing Arc System Works in 2nd place. They are enjoying a new spot in the limelight for their great 2D and 2.5D anime fighters (known to the community as "air-dashers"), yet it is easy to forget that they are a company founded in 1988. Still, their amount of published games is a great surprise as the subgenre they focus on is notoriously complex to develop and balance.
- Capcom at 3rd place is still unsurprising, they own the Street Fighter franchise and that series has an incredible roster of entries. My initial expectations were to see them in the top 3.
- Spike is interesting at 4th place. They were defunct in 2012, yet were an interesting company. Their business model was to both develop and publish video games and they financed many small projects.
- SNK and Human are also unsurprising additions to the top, they are representative of a large roster of 90s games, especially due to the arcade scene at the time.
- Sega having more entries than both Konami, EA and Nintendo came as a surprise. They used to develop their own line of game consoles yet with the unsuccessful run of the Dreamcast, they resorted to only publishing games. As a company that lost in direct competition with Nintendo (keeping in mind Nintendo used to have a policy during the NES and SNES days that it publishes any games for the console regardless of the developer), it is quite interesting to see them rank above them.
- Ubisoft being in the last place was not an upset, they have 1 or 2 niche experimental titles that fall into the fighting game genre but that is not their main focus.

## Takeaways:

- Surprisingly, lesser-known studios dominate the market when it comes to raw numbers of published games.
- Followed by big Japanese studios that mix modern and legacy publishers
- Followed by Western and indie studios

# Data Analysis - Series Entries - Representing Data

Data will once again be represented as a bar chart as data is competitive

```
In [24]: #sorting seriesDict by value descending
#lambda gotten from source:
#https://miguendes.me/how-to-sort-a-dict-in-descending-order-by-value-with-python#headin

sortLambda = lambda kvp: kvp[1]
#sorts by values descending as reverse=True
seriesDict = dict(sorted(seriesDict.items(), key = sortLambda, reverse=True))
```

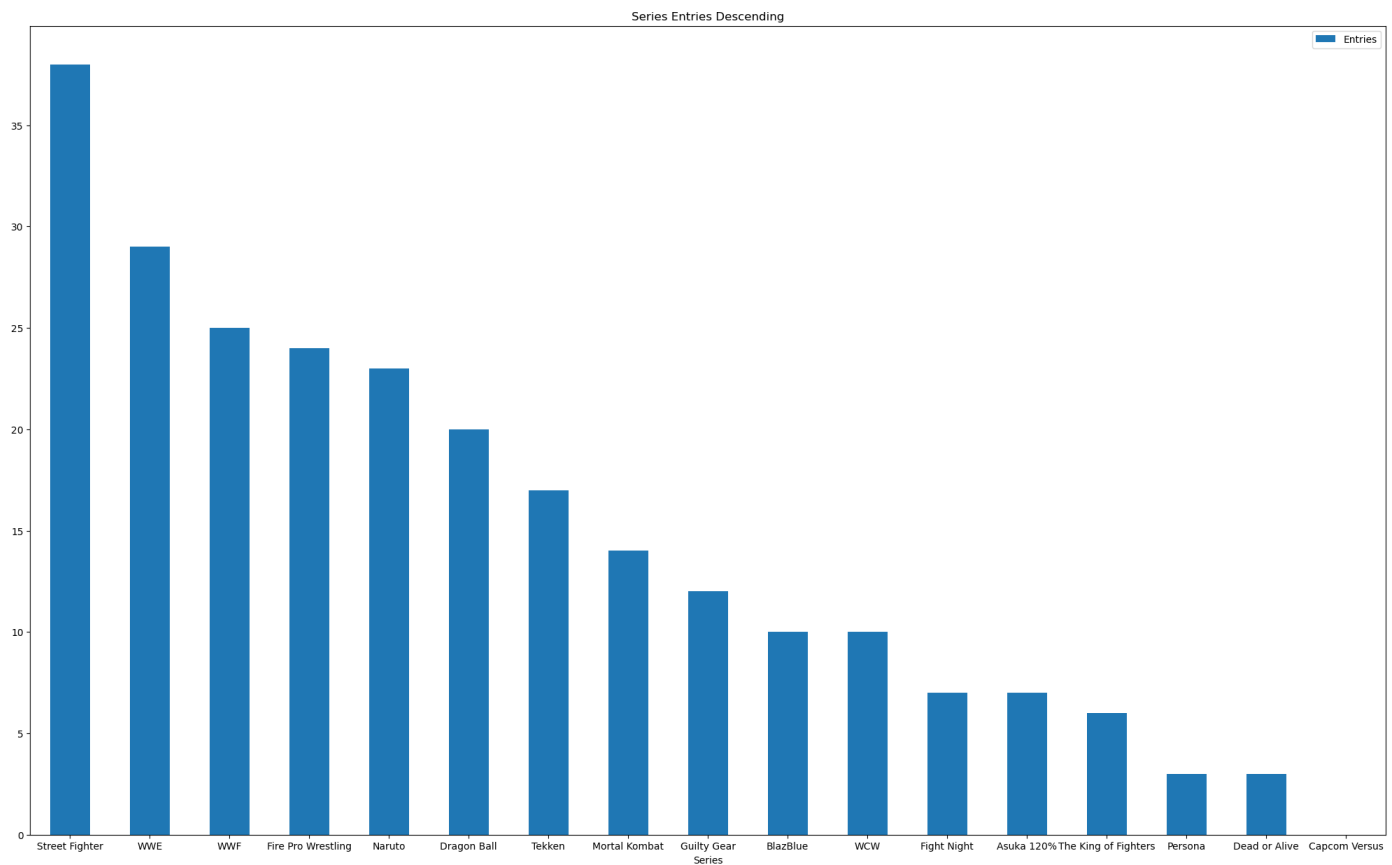


```
#Remove Comments for testing purposes  
# print(seriesDict)
```

```
In [25]: #building seriesDict dataframe  
dataSD = {  
    'Series': list(seriesDict.keys()),  
    'Entries': list(seriesDict.values())  
}  
dfSD = pd.DataFrame(dataSD)  
  
#Remove Comments for testing purposes  
# print(dfSD)
```

```
In [26]: #plotting bar chart  
dfSD.plot.bar(x='Series', rot=0, figsize = (25,15),title='Series Entries Descending')
```

```
Out[26]: <Axes: title={'center': 'Series Entries Descending'}, xlabel='Series'>
```



# Abstract

## Findings:

- Street Fighter having the most entries was expected. However, WWE, WWF and Fire Pro Wrestling occupying spots 2-4 was quite surprising. Naruto and Dragon Ball occupying spots 5 and 6, respectfully, are an interesting sign as well. The top 6 is mostly occupied by games aimed at a more casual audience. This definitely makes sense as they are:
  - More easy to approach for beginners
  - Are tied to already licensed brands, therefore, they bring customers outside of the niche
  - Casual games are easier to develop and cost less money to make
- Tekken at number 7 was expected. The 3D subgenre is underrepresented due to how complex it is.

- Guilty Gear and BlazBlue having more entries than Fight Night, The King of Fighters, Persona and Dead or Alive was surprising as well.

Takeaways:

- Street Fighter is the most popular series as a classical 2D fighter,
- Followed by pro-wrestling games, followed by arena fighters. More casual-oriented games are well-published.
- Followed by every other series not called Street Fighter, representing the more niche competitive entries.

## Feedback and Reflection

This section covers the personal thoughts of the author on how they performed their tasks for this midterm assignment.

- Positives
  - Good topic choice: I was incredibly careful as to which topic to choose as it correlates directly to which website to scrape and did extensive research into the TOS of many online websites in order to settle on this topic. Ethically extracting the data needed was my biggest goal for this segment of my work and I believe I reached that milestone with care, planning and diligence.
  - Well-documented report: I was exhaustive and thorough in each part of the report being sure to explain actions and reasons behind them. Where needed, I have also left a short summary of a larger text. I believe I achieved my goals in providing information with purpose and without being needlessly verbose or the other extreme - use shortspk for everything.
  - Readable Code: My naming conventions are consistent. I settled on using "camelCase" and it is used on all variables I have declared. Code has comments where needed without unnecessary over-explanations or bloat. I have stuck to using clean code principles and relied on functional programming paradigms for this assignment.
  - Responsible referencing: Any amount of borrowed work or external source was referenced.
  - Appropriate data representation: Transforming data to information alludes to representing the data in a manner where it is as objective and comprehensible as possible. I believe my choice of data frame plots was appropriate for their purpose. No amount of data processing was programmed to produce biased outputs.
  - Sticking to the objectives of the report: Each required field was taken into account when completing this assignment.
- Negatives
  - Lack of use of a static input stream such as a CSV: I was unsure whether it would be penalised as the report requirements stated everything used should be in one Jupyter Notebook.
  - Not utilising libraries enough: I have presented custom code for many list and dictionary problem solutions in Python which may have been solved by a single function from a library such as numPy. I am very new to Python and while I am proud of my creative problem-solving, appropriate use of libraries and their functions would definitely make code more compact => more readable.
  - Lack of experience with web-scraping: This is my first attempt at web-scraping outside of the Lab. BS4 is a powerful library and I am sure that my inexperience may have compromised or complicated the extraction process.
- Overall:

- I am overall proud of my work and believe that as a first larger data analysis project it is a commendable effort.
- I believe I have improved in the areas I lack due to challenging myself, however, I will further improve by learning various aspects of Python and some mainstream libraries more in-depth.

## End of Report

Thank you for your time taken to read and review my work.