Business Intelligence using Excel

Prepared by Tam Nguyen

I. Performing ETL operation

1. Data Set Link

https://www.kaggle.com/datasets/michaelmatta0/movies-ultimate-metrics-features-and-metadata?resource=download

2. Data Explanation:

- The data set provides general information and financial and performance metrics of 6,500+ movies. However, after removing duplicated movies and movies that don't have enough financial information, the data set used for this assignment contains information on 4,460 unique observations.
- I broke the data set into four different tables

- Cost_Sales: Information on financial performance

	Label	Description
1	Movie ID	Unique identifier for each movie
2	Movie Name	Title of the movie
3	Production Budget (USD)	Estimated cost to produce the movie
4	Domestic Box Office (USD)	Total earnings in the US & Canada
5	International Box Office (USD)	Total earnings from international (excluded US and Canada)
6	Worldwide Box Office (USD)	Total worldwide earnings
7	Est. Domestic DVD Sales (USD)	Estimated DVD sales revenue in US and Canada
8	Est. Domestic Blu-ray Sales (USD)	Estimated Blu-ray sales revenue in US and Canada
9	Total Est. Domestic Video Sales (USD)	Combined video sales revenue
10	Opening Weekend (USD)	Revenue generated during the opening weekend
11	Legs	A measure of how well a movie performed after its opening weekend (domestic box office/biggest weekend))
12	Infl. Adj. Dom. BO (USD)	Domestic revenue adjusted for inflation

- Movie_Infor: General movie information, including production and genre details

	Label	Description
1	Movie ID	Unique identifier for each movie
2	Movie Name	Title of the movie
3	MPAA Rating	Age classification (e.g., PG, R, etc.)
4	Running Time (minutes)	Duration of the movie
5	Franchise	The movie's franchise (if applicable)
6	Keywords	Keywords describing the movie's themes
7	Source	Whether the movie is an original screenplay, adaptation, etc.
8	Genre	Primary genre (e.g., Action, Comedy, Drama)
9	Production Method	Live-action or animated
10	Creative Type	Storytelling category
11	Production/Financing Companies	Studios involved in production
12	Production Countries	Countries where the movie was produced
13	Languages	Languages spoken in the movie

- Release_Infor: Information about Theatrical & Digital Releases

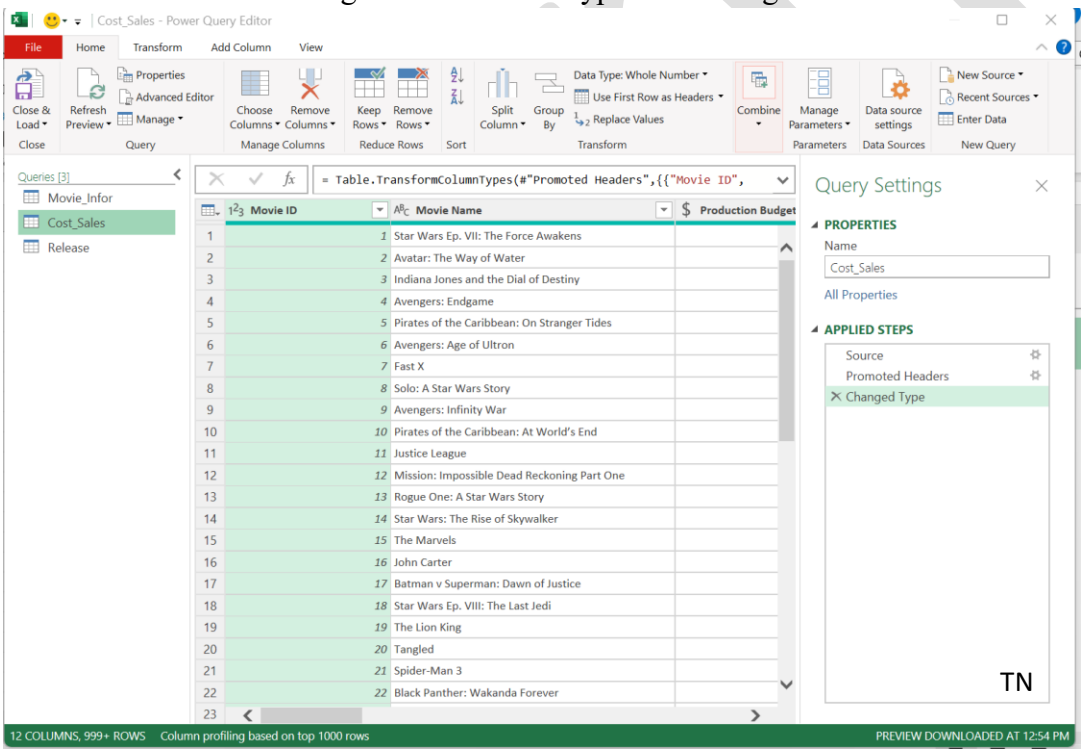
	Label	Description
1	Movie ID	Unique identifier for each movie
2	Movie Name	Title of the movie
3	Release Date	Date when the movie was released in theaters
4	Video Release	Date when the movie was released for home viewing
5	Domestic Releases	Number of domestic releases
6	International Releases	Number of international releases
7	Movie URL	Direct link to the movie's page on The Numbers

- Theater_performance: Information about the number of theaters that show the movie and the average run weeks in theaters of the movie.

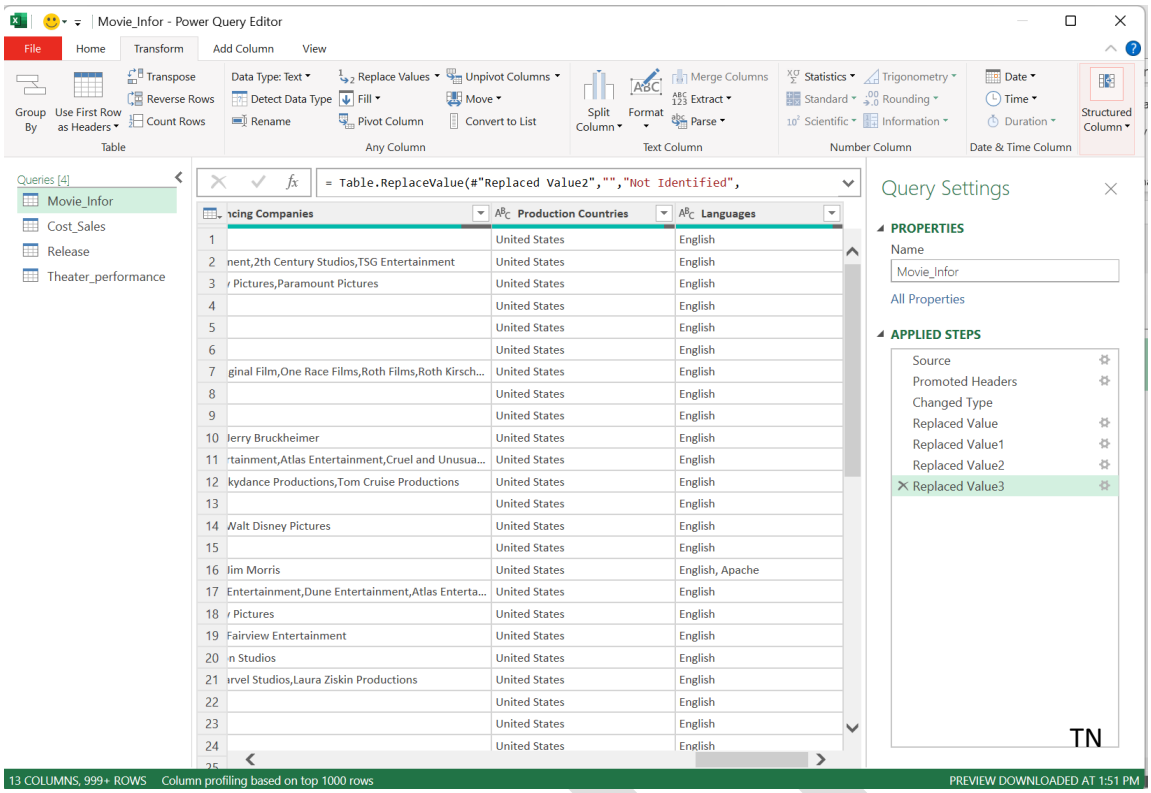
	Label	Description
1	Movie ID	Unique identifier for each movie
2	Movie Name	Title of the movie
3	Theater counts	Number of theaters the movie was released in
4	Domestic Share Percentage	Domestic box office share of total revenue

3. ETL

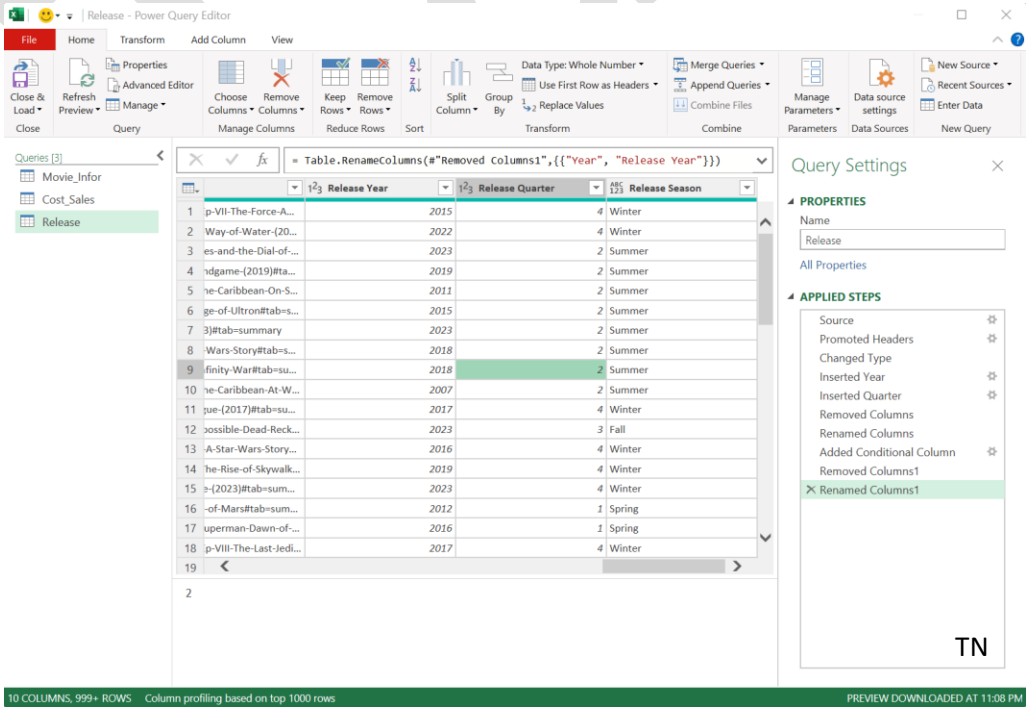
- Cost_Sales tables: Before loading these data sets to the worksheet, I promoted the first row as a label and changed the movie ID type from string to number.



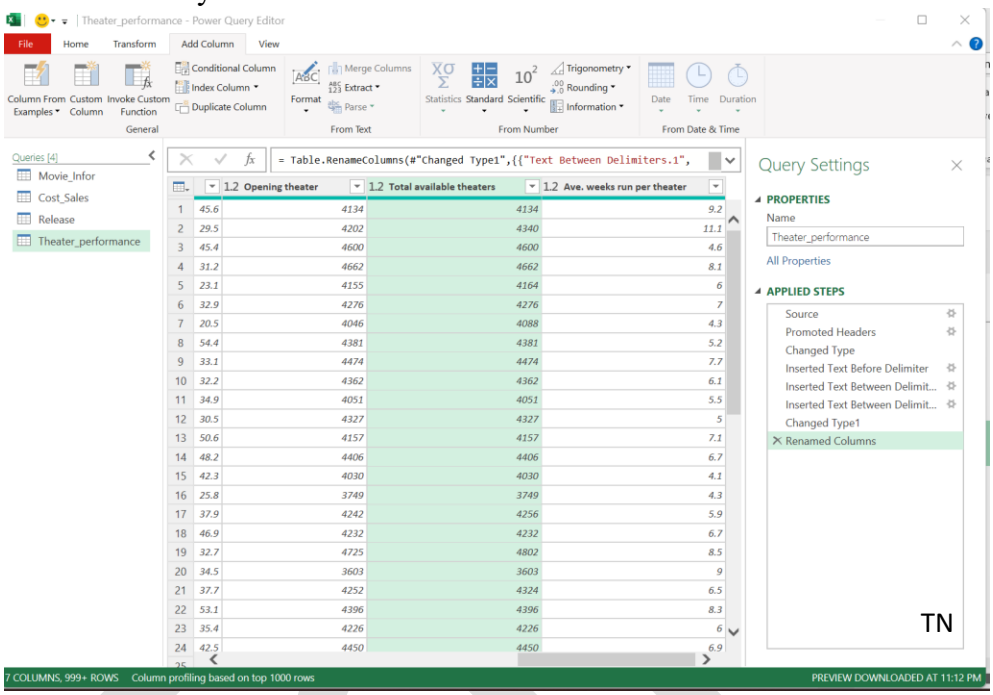
- Movie_Infor Table:
  - Promoted the first row as a label and changed the movie ID type from string to number.
  - Replaced empty cells from "Source", "Production Method", "Creative Type", "Genre" columns to "Not Identified"



- Release Table:
  - Promoted the first row as a label and changed the movie ID type from string to number.
  - Added year/quarter column. Based on the quarter column, I added a conditional column to determine which season that movies are released (Spring/Summer/Fall/Winter)
  - Renamed "Year" to "Release Year" and "Quarter" to "Release Quarter" for more clarification.

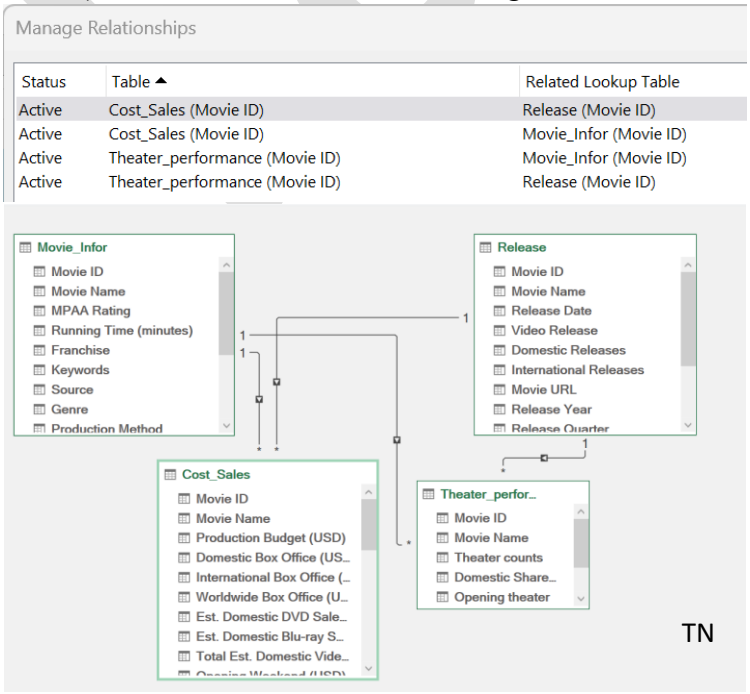


- Theater_Performance Table:
  - Promoted the first row as a label and changed the movie ID type from string to number.
  - Extracted text from the “Theater Counts” column to get information about the number of opening theaters and average weeks run per theater.
  - Renamed newly added columns for more details.



II. Making table relationship with the Data Model

I have two data tables (Cost_Sales and Theater_Performance) and two lookup tables (Movie_Infor and Release). I connected all four tables using Movie ID.



III. Use the pivot table and DAX operation to analyze data and generate three fruitful conclusions.

1. DAX

Manage Measures

New | Edit | Delete

Measure	Formula
Average of Ave. weeks run per theater	AVERAGE([Ave. weeks run per theater])
Average of Domestic Box Office (USD)	AVERAGE([Domestic Box Office (USD)])
Average of Est. Profit	AVERAGE([Est. Profit])
Average of Est. Revenue	AVERAGE([Est. Revenue])
Average of International Box Office (USD)	AVERAGE([International Box Office (USD)])
Average of Production Budget (USD)	AVERAGE([Production Budget (USD)])
Average of ROI	AVERAGE([ROI])
Average of Running Time (minutes)	AVERAGE([Running Time (minutes)])
Average of Worldwide Box Office (USD)	AVERAGE([Worldwide Box Office (USD)])
Count of Movie Name	COUNTA([Movie Name])
Sum of Domestic Box Office (USD)	SUM([Domestic Box Office (USD)])
Sum of Est. Profit	SUM([Est. Profit])
Sum of Est. Revenue	SUM([Est. Revenue])
Sum of International Box Office (USD)	SUM([International Box Office (USD)])
Sum of Opening theater	SUM([Opening theater])
Sum of Production Budget (USD) 2	SUM([Production Budget (USD)])
Sum of Worldwide Box Office (USD)	SUM([Worldwide Box Office (USD)])

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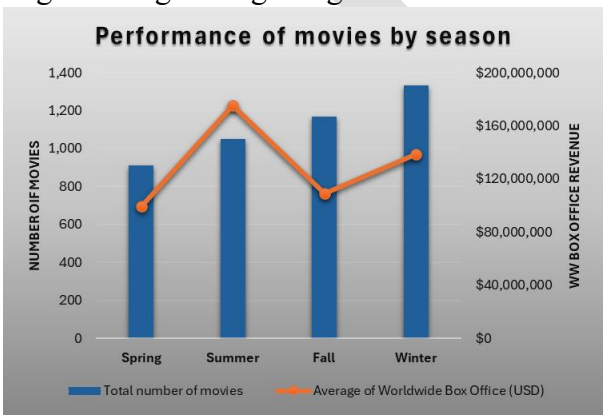
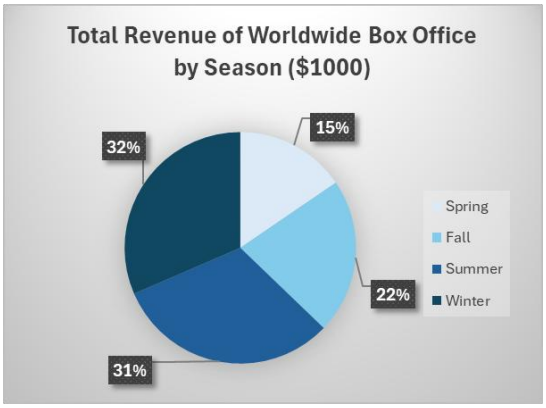
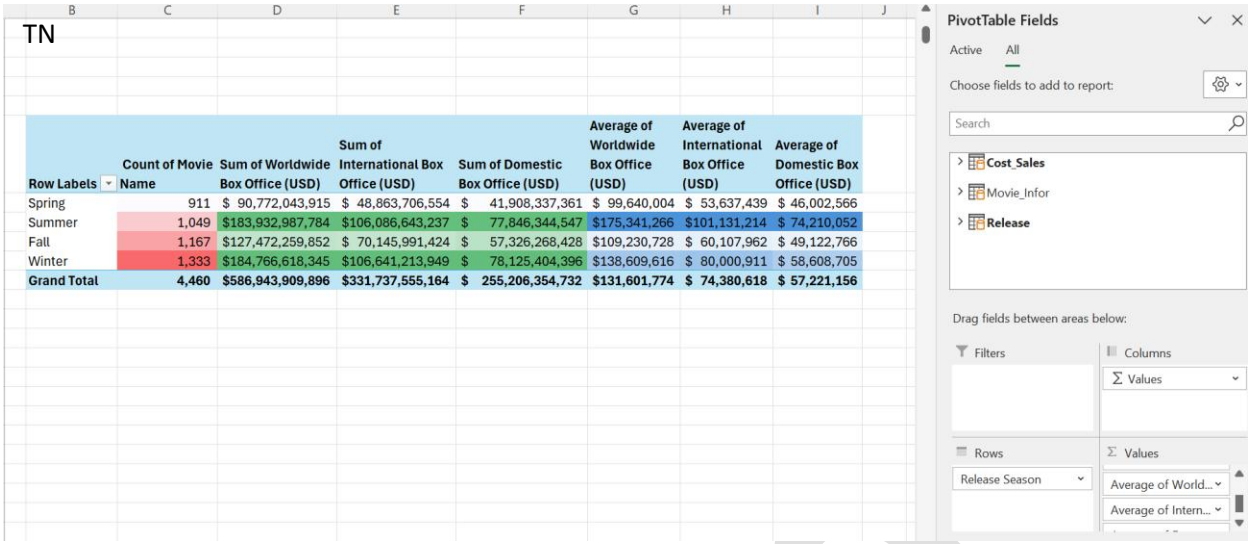
2. Pivot Table and conclusions

- ***Conclusion 1: Financial Performance by Season***

Spring has the fewest movie releases, leading to the lowest box office revenue. Winter sees the highest number of releases (1,333), resulting in the greatest worldwide box office earnings—around $183 billion. Still, movies released in the summer tend to perform better, generating the highest global revenue with an average of about $175 million per movie.



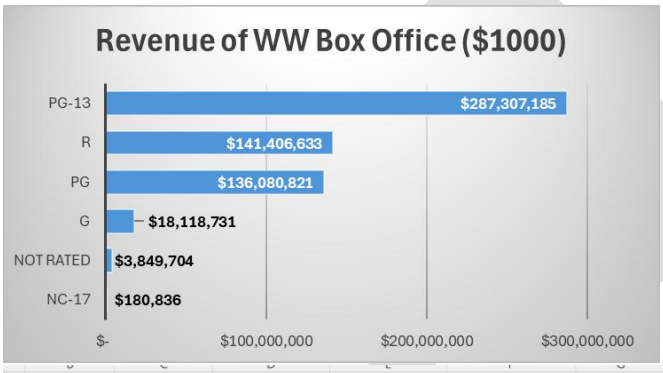


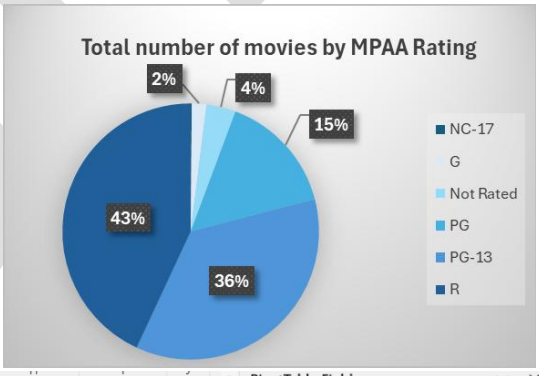


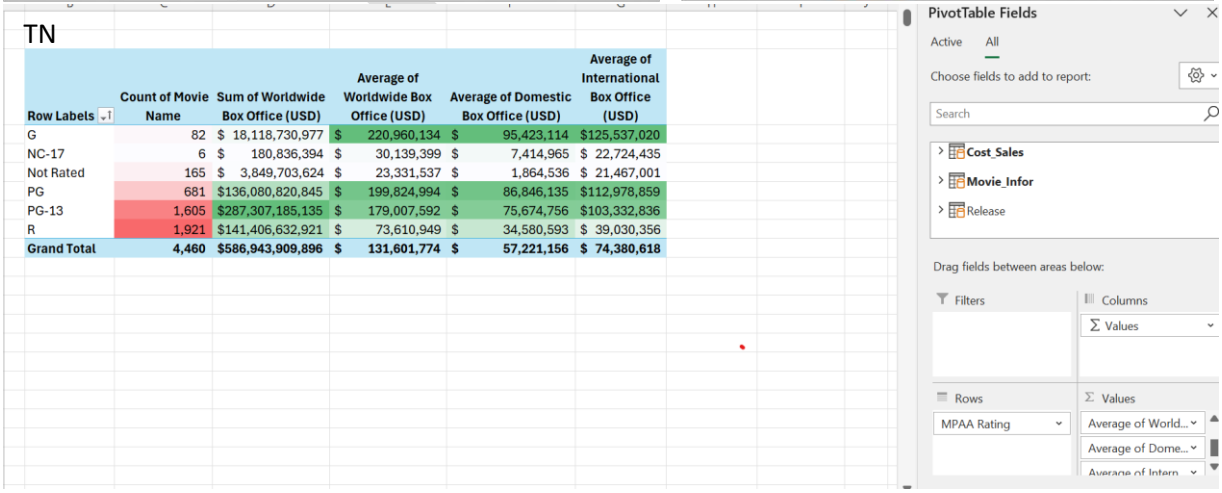
Row Labels	Count of Movie Name	Sum of Worldwide Box Office (USD)	Sum of International Box Office (USD)	Sum of Domestic Box Office (USD)	Average of Worldwide Box Office (USD)	Average of International Box Office (USD)	Average of Domestic Box Office (USD)
Spring	911	$ 90,772,043,915	$ 48,863,706,554	$ 41,908,337,361	$ 99,640,004	$ 53,637,439	$ 46,002,566
Summer	1,049	$183,932,987,784	$106,086,643,237	$ 77,846,344,547	$175,341,266	$101,131,214	$ 74,210,052
Fall	1,167	$127,472,259,852	$ 70,145,991,424	$ 57,326,268,428	$109,230,728	$ 60,107,962	$ 49,122,766
Winter	1,333	$184,766,618,345	$106,641,213,949	$ 78,125,404,396	$138,609,616	$ 80,000,911	$ 58,608,705
Grand Total	**4,460**	**$586,943,909,896**	**$331,737,555,164**	**$ 255,206,354,732**	**$131,601,774**	**$ 74,380,618**	**$ 57,221,156**

- ***Conclusion 2: Financial Performance by MPAA rating***

Movies with an R rating (under 17 requires a parent) make up the largest share of released films, accounting for 43% of the total. However, movies with a G rating (suitable for all ages) perform the best and have the highest average revenue both domestically and internationally (approximately $95 million per G movie domestically, and around $125 million internationally).



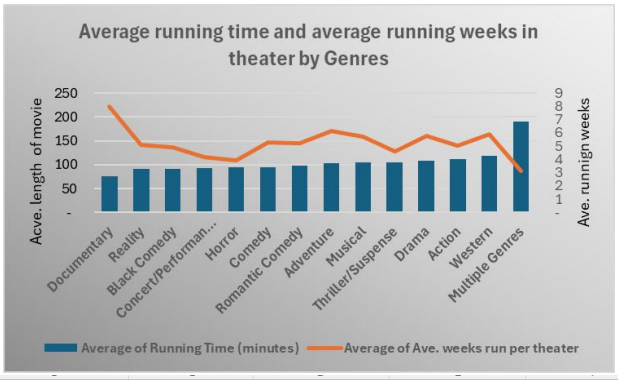


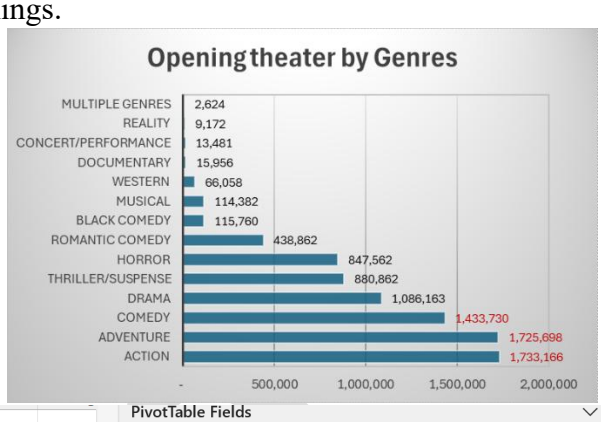


Row Labels	Count of Movie Name	Sum of Worldwide Box Office (USD)	Average of Worldwide Box Office (USD)	Average of Domestic Box Office (USD)	Average of International Box Office (USD)
G	82	$ 18,118,730,977	$ 220,960,134	$ 95,423,114	$125,537,020
NC-17	6	$ 180,836,394	$ 30,139,399	$ 7,414,965	$ 22,724,435
Not Rated	165	$ 3,849,703,624	$ 23,331,537	$ 1,864,536	$ 21,467,001
PG	681	$136,080,820,845	$ 199,824,994	$ 86,846,135	$112,978,859
PG-13	1,605	$287,307,185,135	$ 179,007,592	$ 75,674,756	$103,332,836
R	1,921	$141,406,632,921	$ 73,610,949	$ 34,580,593	$ 39,030,356
Grand Total	**4,460**	**$586,943,909,896**	**$ 131,601,774**	**$ 57,221,156**	**$ 74,380,618**

- ***Conclusion 3: Theater Performance by Genre***

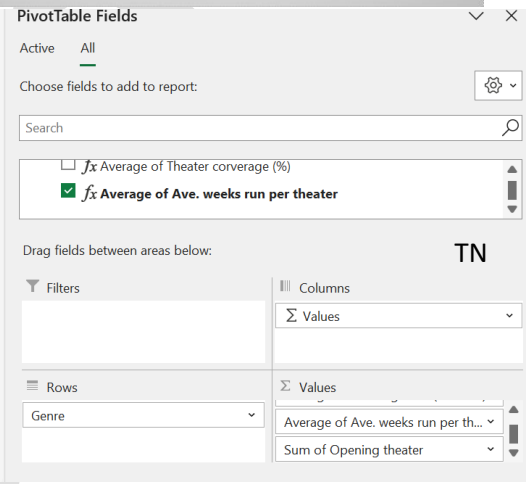
Documentaries tend to run the longest in theaters, averaging about 8 weeks, despite having the shortest runtime at approximately 76 minutes. However, there are few theaters that screen documentaries. Action, Adventure, and Comedy are the top three genres preferred by theaters, with the highest number of openings.





Conclusion 3

Row Labels	Average of Running Time (minutes)	Average of Ave. weeks run per theater	Sum of Opening theater
Action	112	5	1,733,166
Adventure	103	6	1,725,698
Black Comedy	91	5	115,760
Comedy	95	5	1,433,730
Concert/Performance	93	4	13,481
Documentary	76	8	15,956
Drama	108	6	1,086,163
Horror	95	4	847,562
Multiple Genres	191	3	2,624
Musical	105	6	114,382
Reality	91	5	9,172
Romantic Comedy	98	5	438,862
Thriller/Suspense	105	5	880,862
Western	118	6	66,058
Grand Total	**103**	**5**	**8,483,476**



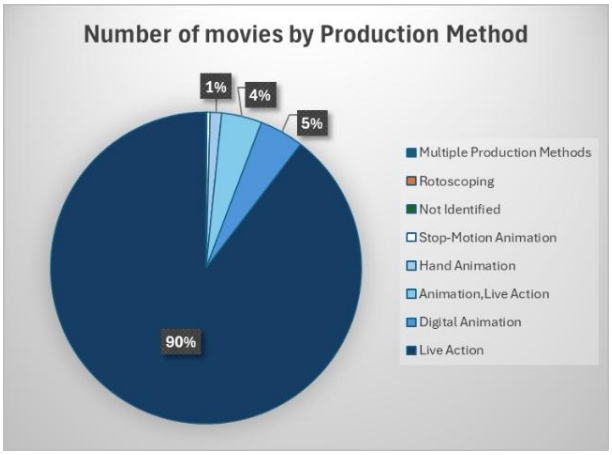
IV. Use the Calculate function and generate at least two meaningful results with justifications.

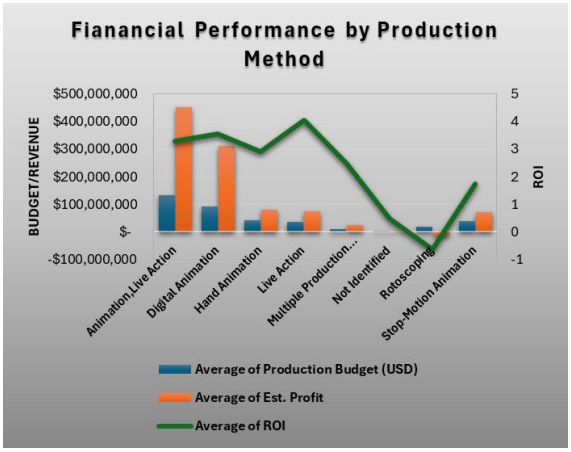
1. Calculated function (3)

- **Est. Profit** = Cost_Sales[Worldwide Box Office (USD)]+Cost_Sales[Total Est. Domestic Video Sales (USD)]
- **Est. Revenue** = Cost_Sales[Worldwide Box Office (USD)]+Cost_Sales[Total Est. Domestic Video Sales (USD)]
- **ROI** = Cost_Sales[Est. Profit]/Cost_Sales[Production Budget (USD)]

2. Conclusion

- ***Conclusion 4: Financial Performance by Production Method***
  In the movie industry, most films use live action as a production method (90% of movies are live-action), and live-action movies have the highest ROI in the industry (about 4%). However, based on the average budget and profit per film, animated movies have the highest production costs and the greatest profits.





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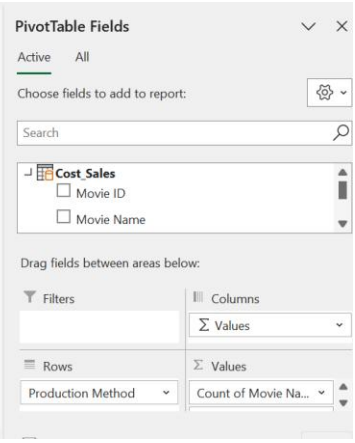
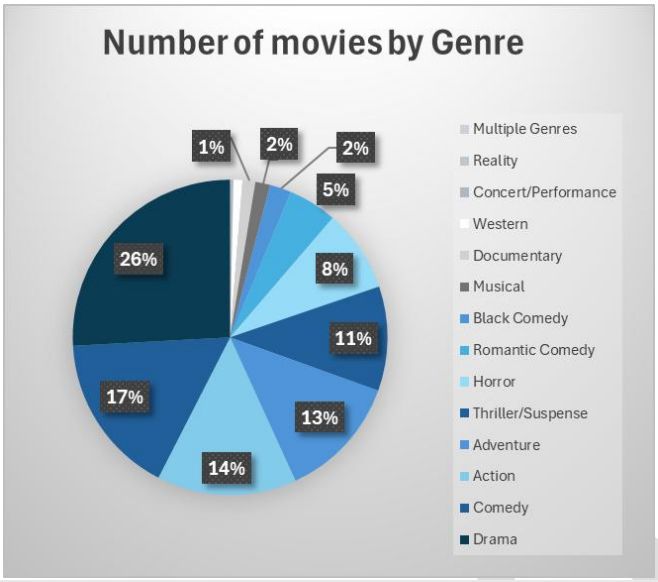
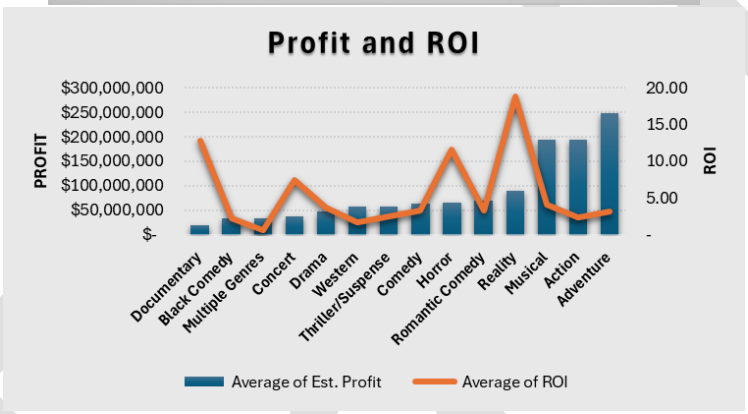
Row Labels	Count of Movie Name	Sum of Production Budget (USD) 2	Average of Production Budget (USD)	Sum of Est. Profit	Average of Est. Profit	Average of ROI
Animation,Live Action	187	$ 25,116,500,000	$ 134,312,834	$ 84,316,515,896	$450,890,459	3.28
Digital Animation	206	$ 18,788,600,000	$ 91,206,796	$ 64,120,144,291	$311,262,836	3.56
Hand Animation	53	$ 2,183,650,000	$ 41,200,943	$ 4,314,397,185	$ 81,403,720	2.92
Live Action	3,995	$144,290,141,584	$ 36,117,682	$301,195,854,609	$ 75,393,205	4.04
Multiple Production Methods	1	$ 10,000,000	$ 10,000,000	$ 24,708,080	$ 24,708,080	2.47
Not Identified	2	$ 2,300,000	$ 1,150,000	$ 750,717	$ 375,359	0.49
Rotoscoping	1	$ 20,000,000	$ 20,000,000	-$ 12,594,916	-$ 12,594,916	- 0.63
Stop-Motion Animation	15	$ 578,000,000	$ 38,533,333	$ 1,088,166,028	$ 72,544,402	1.75
Grand Total	**$ 4,460**	**$190,989,191,584**	**$ 42,822,689**	**$455,047,941,890**	**$102,028,687**	**3.96**



- ***Conclusion 5: Financial performance by Genre***
  The drama genre has the highest number of released films (1,153 movies). However, in terms of profit, adventure is the most profitable genre, with an average of $249 million per movie. In terms of return on investment, reality has the highest ROI, at 18.83%.





Row Labels	Count of Movie Name	Sum of Est. Profit	Average of Est. Profit	Average of ROI
Action	640	$ 124,478,309,125	$ 194,497,358	2.36
Adventure	566	$ 141,049,283,715	$ 249,203,681	3.17
Black Comedy	98	$ 3,197,371,221	$ 32,626,237	2.27
Comedy	741	$ 47,347,941,292	$ 63,897,357	3.26
Concert/Performance	11	$ 399,459,078	$ 36,314,462	7.50
Documentary	59	$ 1,142,135,190	$ 19,358,224	12.84
Drama	1,153	$ 53,422,856,145	$ 46,333,787	3.65
Horror	378	$ 25,039,955,832	$ 66,243,269	11.54
Multiple Genres	1	$ 34,190,589	$ 34,190,589	0.65
Musical	68	$ 13,144,193,410	$ 193,296,962	4.15
Reality	3	$ 267,030,959	$ 89,010,320	18.83
Romantic Comedy	223	$ 15,695,012,134	$ 70,381,220	3.36
Thriller/Suspense	478	$ 27,502,916,111	$ 57,537,481	2.43
Western	41	$ 2,327,287,089	$ 56,763,100	1.70
Grand Total	**4,460**	**$ 455,047,941,890**	**$ 102,028,687**	**3.962429361**

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