Netlyse: A Netflix analysis with R and Quarto

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Abstract

Netflix has become one of the most influential global streaming platforms, offering a rapidly expanding catalogue of movies and television shows produced across a wide range of countries. As the platform continues to grow, understanding how its content catalogue evolves over time provides valuable insights into content strategy, internationalisation, and audience engagement. This project presents a data-driven analysis of Netflix's content catalogue using publicly available datasets and reproducible analytical workflows implemented in R and Quarto.

The analysis is based on two complementary datasets: a dataset containing metadata on Netflix movies and TV shows, and a dataset providing audience evaluation metrics from IMDb, including IMDb scores and vote counts. These datasets are combined to enable a comprehensive exploration of both supply-side characteristics, such as content type, release year, and country of production, and demand-side indicators related to audience reception and popularity.

The study adopts an exploratory and descriptive analytical approach. It examines how the size and composition of Netflix's catalogue have changed over time, with a particular focus on the balance between movies and TV shows and the geographical distribution of content production. In addition, the analysis explores patterns in IMDb scores and vote counts to assess how audience evaluation and engagement differ across content types.

Rather than aiming to establish causal relationships, the project seeks to identify trends, distributions, and structural patterns within Netflix's catalogue. By combining descriptive statistics and visual exploration, the analysis provides an overview of Netflix's content evolution and audience response. The findings contribute to a broader understanding of how a global streaming platform curates its content portfolio and how different types of content are perceived by audiences.

Introduction

Over the past two decades, digital streaming platforms have fundamentally transformed the way audiovisual content is produced, distributed, and consumed. Among these platforms, Netflix has emerged as a dominant global actor, reshaping not only viewing habits but also the structure of the entertainment industry itself. With a presence in more than 190 countries and a continuously expanding catalogue of movies and television shows, Netflix offers a unique case for data-driven analysis of global media production and consumption.

The rapid growth of Netflix has been accompanied by significant strategic shifts. These include a transition from licensed content to original productions, an increased emphasis on episodic television formats, and a strong focus on international markets. As a result, Netflix's content catalogue reflects both technological change and broader cultural and economic trends within the global media landscape. Understanding how this catalogue has evolved over time provides valuable insights into platform strategy, audience targeting, and the globalization of media content.

This project aims to analyse the development of Netflix's content catalogue using publicly available datasets and reproducible data analysis methods implemented in R and Quarto. By combining metadata on Netflix titles with audience evaluation data from IMDb, the analysis seeks to explore patterns of content growth, composition, geographical diversity, and audience reception. Rather than focusing on individual titles, the study adopts a macro-level perspective, treating Netflix's catalogue as a dynamic dataset that evolves over time.

A brief History of Netflix

Netflix is a subscription-based video-on-demand streaming service founded in the United States in 1997. Initially, the company operated as a mail-based DVD rental service, offering customers access to a broad catalogue of films without the physical limitations of traditional video rental stores. This business model allowed Netflix to compete directly with established retailers such as Blockbuster by leveraging a so-called "long tail" strategy, in which a large number of niche titles collectively generated significant demand.

In the mid-2000s, advances in internet infrastructure, including increased bandwidth and reduced data transfer costs, enabled Netflix to fundamentally transform its business model. The introduction of online streaming marked a decisive shift away from physical media and positioned Netflix at the forefront of digital content delivery. This transition not only reduced distribution costs but also allowed the company to collect detailed, real-time data on user behaviour.

Over time, Netflix increasingly invested in original content production, launching its first original series in the early 2010s. This strategic move reduced dependence on external content providers and enabled greater control over intellectual property. Simultaneously, Netflix expanded aggressively into international markets, commissioning locally produced content in

multiple languages and targeting diverse regional audiences. These developments have resulted in a highly heterogeneous catalogue, making Netflix an ideal subject for empirical analysis of global content strategies.

An Analytical View

A defining characteristic of Netflix's success lies in its systematic use of data to inform strategic decisions. Unlike traditional broadcasters, Netflix operates in a digital environment that enables continuous monitoring of user interactions, such as viewing duration, content completion rates, and engagement patterns. These data allow Netflix to optimise content recommendations, inform commissioning decisions, and evaluate audience response at scale.

From an analytical perspective, Netflix represents a data-rich ecosystem in which content characteristics, production contexts, and audience evaluations intersect. By analysing metadata such as release year, content type, country of production, and runtime alongside IMDb scores and vote counts, it becomes possible to explore both supply-side and demand-side dimensions of the platform. IMDb scores serve as a proxy for perceived content quality, while vote counts provide an indicator of popularity and audience engagement.

This project adopts a quantitative, exploratory approach to analyse these dimensions. Using structured datasets and reproducible workflows, the analysis seeks to identify trends, distributions, and relationships within Netflix's catalogue. The emphasis is not on causal inference, but on descriptive and comparative insights that contribute to a broader understanding of how a global streaming platform curates and positions its content over time. ## Research Questions

> How has Netflix's content catalogue evolved over time in terms of content type and country of production?

The main research question aims to explore the structural development of Netflix's content catalogue over time. As one of the largest global streaming platforms, Netflix continuously adapts its content strategy to changing market conditions, audience preferences, and international expansion goals. By analysing trends in content growth, content type, and country of production, this study seeks to provide a comprehensive overview of how Netflix has shaped its catalogue and positioned itself within the global entertainment industry.

To address this overarching research question in a structured manner, the following subquestions are formulated. Each sub-question focuses on a specific aspect of Netflix's content strategy and contributes to a deeper understanding of the platform's evolution.

1. How has the total number of Netflix titles changed over time?

This question examines the overall growth trajectory of Netflix's content catalogue. By analysing changes in the number of titles available on the platform across different time periods, the study aims to identify patterns of expansion, acceleration, or potential saturation. Understanding how the catalogue size evolves over time provides important insights into Netflix's investment behaviour, content acquisition strategy, and response to increasing competition within the streaming market.

Additionally, this question helps to contextualise subsequent analyses by establishing a baseline understanding of Netflix's overall growth. A steadily increasing number of titles may indicate aggressive expansion, whereas periods of slower growth may reflect strategic consolidation or shifts in content priorities.

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2. How has the balance between movies and TV shows evolved on Netflix?

This question focuses on changes in the composition of Netflix's catalogue, specifically the relative proportions of movies and TV shows over time. Movies and TV shows differ significantly in production costs, audience engagement, and viewing behaviour, making this distinction particularly relevant for understanding Netflix's strategic focus.

By examining how the balance between these two content types has changed, the study aims to assess whether Netflix has increasingly prioritised episodic content, which often encourages longer viewer engagement, or whether movies continue to play a central role in the platform's offering. This analysis contributes to understanding how Netflix aligns its content portfolio with user consumption patterns and long-term retention strategies.

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3. Which countries contribute the most content to Netflix, and how do their contributions differ across content genres?

This question examines the geographical composition of Netflix's content catalogue with a particular focus on genre distribution. While overall content volume provides an indication of production intensity, analysing genres allows for a more nuanced understanding of how different countries contribute to the diversity of Netflix's offerings.

By investigating which countries dominate the production of specific genres, this question aims to identify potential regional specialisations and production patterns. Such patterns may reflect cultural preferences, industry strengths, or strategic decisions by Netflix to invest in

particular types of content in certain markets. This analysis contributes to a deeper understanding of Netflix's global content strategy and its approach to genre diversification across regions.

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4. How does the distribution of content types differ across producing countries?

Building on the previous question, this question explores whether different countries tend to specialise in particular types of content for Netflix, such as movies or TV shows. Rather than focusing solely on the volume of content, this analysis examines qualitative differences in production patterns across countries.

Understanding how content type distributions vary by country helps to identify regional production characteristics and potential cultural or industrial influences on content creation. This question also supports a more nuanced interpretation of Netflix's international content strategy by highlighting differences not only in quantity but also in the nature of content produced.

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5. How are IMDb scores and IMDb vote counts distributed across Netflix titles, and how do they differ between movies and TV shows?

This question focuses on audience evaluation and popularity of Netflix titles using IMDb data. IMDb scores provide a measure of perceived content quality, while IMDb vote counts reflect the level of audience engagement and visibility of a title. Analysing both variables allows for a more comprehensive understanding of how Netflix content is received by viewers.

By examining the distribution of IMDb scores and vote counts across the catalogue, this question aims to identify general patterns in audience ratings and popularity. Furthermore, comparing movies and TV shows helps to assess whether episodic content and standalone productions differ in terms of viewer reception and engagement levels. This analysis contributes to understanding how content type influences both perceived quality and audience participation.

Together, these research questions provide a structured framework for analysing the evolution of Netflix's content catalogue. They allow for a comprehensive examination of growth patterns, content composition, geographical diversity, and audience targeting, thereby supporting a holistic understanding of Netflix's content strategy over time.

Data Overview

Data Sample

Dataset "Netflix Movies and TV Shows"

```
here() starts at /home/nils/dev/Netlyse

-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr     1.1.4     v readr     2.1.6
v forcats   1.0.1     v stringr   1.6.0
v ggplot2   4.0.1     v tibble    3.3.1
v lubridate 1.9.4     v tidyr     1.3.2
v purrr     1.2.1
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to becor
Start data download...

Download: netflix-shows

Download: netflix-imdb

Finish download data!


Rows: 8807 Columns: 12
-- Column specification --------------------------------------------------------
Delimiter: ","
chr (11): show_id, type, title, director, cast, country, date_added, rating,...
dbl  (1): release_year

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.


# A tibble: 8,807 x 3
   title                          country                        duration
   <chr>                          <chr>                          <chr>
 1 Dick Johnson Is Dead           United States                  90 min
 2 Blood & Water                  South Africa                   2 Seaso~
 3 Ganglands                      <NA>                           1 Season
```

```
 4 Jailbirds New Orleans            <NA>                                1 Season
 5 Kota Factory                     India                               2 Seaso~
 6 Midnight Mass                    <NA>                                1 Season
 7 My Little Pony: A New Generation <NA>                                91 min
 8 Sankofa                          United States, Ghana, Burkina Faso~ 125 min
 9 The Great British Baking Show    United Kingdom                      9 Seaso~
10 The Starling                     United States                       104 min
# i 8,797 more rows
```

Dataset "Netflix IMDB Scores"

```
Rows: 5283 Columns: 11
-- Column specification --------------------------------------------------------
Delimiter: ","
chr (6): id, title, type, description, age_certification, imdb_id
dbl (5): index, release_year, runtime, imdb_score, imdb_votes

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
# A tibble: 5,283 x 3
   title                          type  imdb_score
   <chr>                          <chr>      <dbl>
 1 Taxi Driver                    MOVIE        8.3
 2 Monty Python and the Holy Grail MOVIE       8.2
 3 Life of Brian                  MOVIE        8
 4 The Exorcist                   MOVIE        8.1
 5 Monty Python's Flying Circus   SHOW         8.8
 6 Dirty Harry                    MOVIE        7.7
 7 My Fair Lady                   MOVIE        7.8
 8 The Blue Lagoon                MOVIE        5.8
 9 Bonnie and Clyde               MOVIE        7.7
10 The Professionals              MOVIE        7.3
# i 5,273 more rows
```

Join data

The selection of an appropriate join strategy was a critical component of the data acquisition phase. To ensure the integrity and completeness of the final dataset, the team opted for a Full Outer Join.

This approach was chosen for the following reasons:

- Data Preservation: It ensures that no information is inadvertently lost during the merging process, even if the data is incomplete in one of the source tables.
- Holistic Analysis: It allows for a comprehensive view of the data, enabling the identification of gaps or discrepancies between the merged datasets.

```
source(here("scripts", "01_join_data.R")) # Self build utility script
```

```
Rows: 8807 Columns: 12
-- Column specification --------------------------------------------------------
Delimiter: ","
chr (11): show_id, type, title, director, cast, country, date_added, rating,...
dbl  (1): release_year

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 5283 Columns: 11
-- Column specification --------------------------------------------------------
Delimiter: ","
chr (6): id, title, type, description, age_certification, imdb_id
dbl (5): index, release_year, runtime, imdb_score, imdb_votes

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
joined_data <- read_csv(
    file = here("data", "joined_data.csv"),
    quote = "\""
    )
```

```
Rows: 10343 Columns: 22
-- Column specification --------------------------------------------------------
Delimiter: ","
chr (16): show_id, type.x, title, director, cast, country, date_added, ratin...
dbl  (6): release_year.x, index, release_year.y, runtime, imdb_score, imdb_v...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
# Create a data preview for report
joined_data_preview <- joined_data %>%
    select(
```

```
        c(
            title,
            country,
            duration,
            type.y,
            imdb_score
        )
)

joined_data_preview
```

```
# A tibble: 10,343 x 5
   title                           country           duration type.y imdb_score
   <chr>                           <chr>             <chr>    <chr>       <dbl>
 1 Dick Johnson Is Dead            United States     90 min   MOVIE         7.4
 2 Blood & Water                   South Africa      2 Seaso~ <NA>         NA
 3 Ganglands                       <NA>              1 Season SHOW          7
 4 Jailbirds New Orleans           <NA>              1 Season SHOW          6.6
 5 Kota Factory                    India             2 Seaso~ SHOW          9.3
 6 Midnight Mass                   <NA>              1 Season SHOW          7.7
 7 My Little Pony: A New Generation <NA>             91 min   MOVIE         6.8
 8 Sankofa                         United States, G~ 125 min  MOVIE         7
 9 The Great British Baking Show   United Kingdom    9 Seaso~ SHOW          8.6
10 The Starling                    United States     104 min  MOVIE         6.3
# i 10,333 more rows
```

Due redudant columns (e.g. description.x, desxription.y) , we applied a cleaning step.

```
source(here("scripts", "02_clean_data.R")) # Self build utility script
```

```
Rows: 10343 Columns: 22
-- Column specification --------------------------------------------------------
Delimiter: ","
chr (16): show_id, type.x, title, director, cast, country, date_added, ratin...
dbl  (6): release_year.x, index, release_year.y, runtime, imdb_score, imdb_v...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

Exploratory Data Analysis

```
library(ggplot2)
```

Statistics

Numerical Values

```
clean_data %>%
    select(
        c(
            release_year.x,
            runtime,
            imdb_score,
            imdb_votes
        )
    ) %>% summary()
```

```
 release_year.x    runtime        imdb_score      imdb_votes
 Min.   :1925   Min.   :  0.0   Min.   :1.500   Min.   :      5
 1st Qu.:2013   1st Qu.: 45.0   1st Qu.:5.800   1st Qu.:    521
 Median :2017   Median : 87.0   Median :6.600   Median :   2279
 Mean   :2014   Mean   : 79.2   Mean   :6.533   Mean   :  23407
 3rd Qu.:2019   3rd Qu.:106.0   3rd Qu.:7.400   3rd Qu.:  10144
 Max.   :2021   Max.   :235.0   Max.   :9.600   Max.   :2268288
 NA's   :1493   NA's   :5060    NA's   :5060    NA's   :5076
```

Categorical Values

```
clean_data %>%
    select(
        type.x,
        age_certification
    ) %>%
    lapply(table)
```

```
$type.x

  Movie TV Show
```

```
   6158    2692

$age_certification

    G NC-17    PG PG-13     R TV-14  TV-G TV-MA TV-PG  TV-Y TV-Y7
  105    13   238   424   548   436    72   792   172    94   104
```

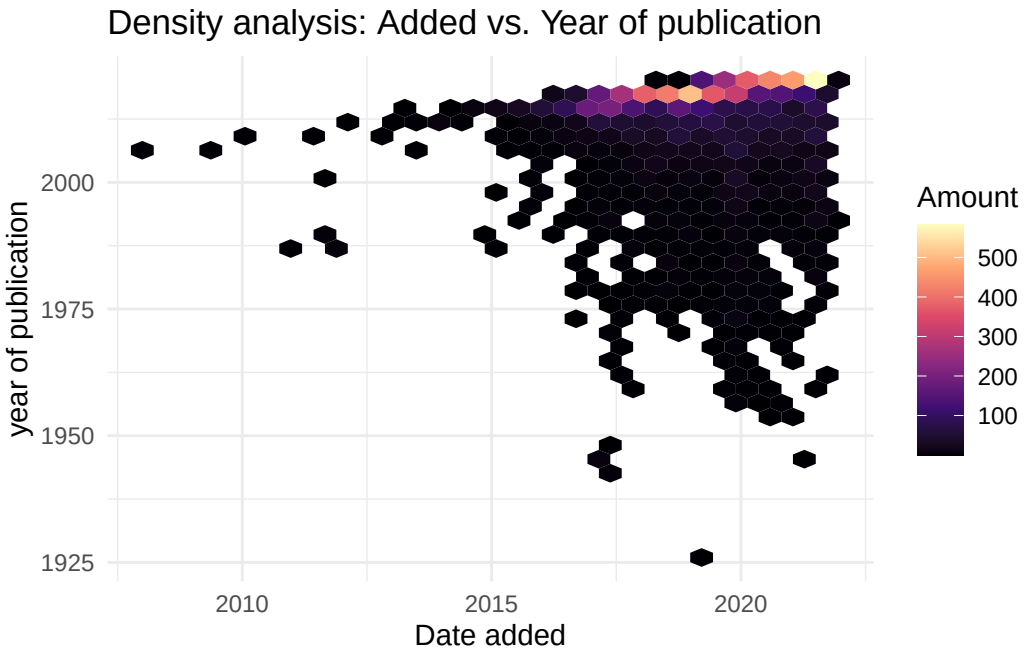
Statistical Analysis & Methodology

Release Date vs. Date added

```
library(lubridate)

release_date_plot <- clean_data %>%
    mutate(
        date_added = mdy(
            str_trim(
                date_added
            )
        )
    ) %>%
    drop_na(
        date_added,
        release_year.x
    ) %>%
    ggplot(
        aes(
            x = date_added,
            y = release_year.x
        )
    ) +
    geom_hex(bins = 30) +
    scale_fill_viridis_c(option = "magma") +
    theme_minimal() +
    labs(
        title = "Density analysis: Added vs. Year of publication",
        x = "Date added",
        y = "year of publication",
        fill = "Amount"
)
```

```
release_date_plot
```



Country and type distribution

In the joined dataset, several variables contain multiple values within a single cell. In particular, the variables *country* and *listed_in* (genre) often include more than one entry, separated by commas. This structure reflects the fact that a single Netflix title can be associated with multiple producing countries and multiple genres. However, such a format is not suitable for aggregation and frequency analysis in its raw form.

To address this issue, the values in these columns are first separated into individual entries. Each country or genre is extracted and treated as a separate observation. This transformation allows for a more accurate representation of how frequently each country and each genre appears across the Netflix catalogue. After splitting the values, records with missing or empty entries are removed to ensure data quality.

Following this preprocessing step, the data is aggregated by counting the number of occurrences of each country and each genre. To improve readability and focus on the most relevant categories, the analysis is restricted to the top fifteen countries and the top fifteen genres based on their frequency. This approach highlights the dominant contributors while avoiding visual clutter caused by less frequent categories.

The resulting summaries are visualised using treemap plots. In these visualisations, the size of each rectangle represents the relative frequency of a country or genre within the dataset. Treemaps are particularly well suited for this purpose, as they provide an intuitive overview of proportional contributions and allow for easy comparison between categories. These visualisations support an exploratory understanding of the geographical and thematic composition of Netflix's content catalogue.

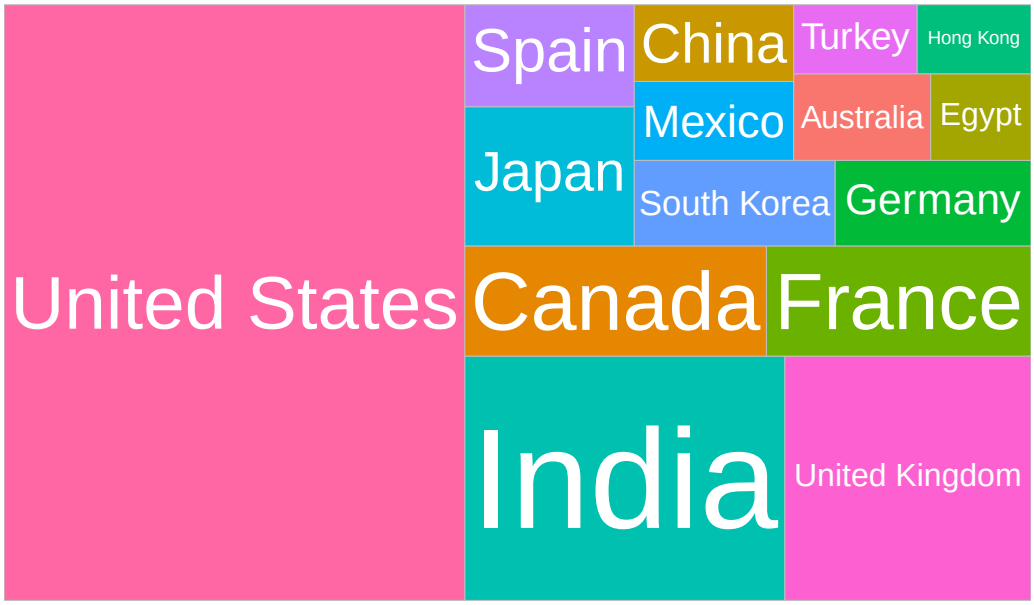
To visualise the most frequent producing countries and content genres, treemap plots are created. For both variables, the multi-value entries are first expanded so that each country or genre appears as a separate observation. The data is then aggregated by counting the frequency of each category, and the analysis is restricted to the top 15 entries to ensure readability of the visualisations.

```
library(treemapify)

tree_plot_countries <- clean_data %>%
  separate_rows(country, sep = ",\\s*") %>% # \\s* removes the space after the comma
  filter(!is.na(country) & country != "") %>% # Exclude NAs or not empty entries
  count(country, name = "count") %>%
  slice_max(count, n = 15) # Select top 15 countries

# Treemap-Plot
ggplot(
    tree_plot_countries,
    aes(
        area = count,
        fill = country,
        label = country)) +
  geom_treemap() +
  geom_treemap_text(
    colour = "white",
    place = "centre",
    grow = TRUE
  ) +
  theme(legend.position = "none") +
  labs(title = "Countries (Treemap)")
```

Countries (Treemap)



The country treemap suggests that Netflix content production is concentrated in a small number of countries. A few countries occupy the largest areas in the visualisation, indicating that they contribute a substantial share of the titles in the dataset. At the same time, the presence of many smaller rectangles highlights the involvement of a wide range of additional countries, each contributing a smaller number of titles. This pattern reflects a combination of dominant production markets and broader international diversity within Netflix's catalogue.

```
tree_plot_genre <- clean_data %>%
  separate_rows(listed_in, sep = ",\\s*") %>% # \\s* removes the space after the comma
  filter(!is.na(listed_in) & listed_in != "") %>% # Exclude NAs or not empty genres
  count(listed_in, name = "count") %>%
  slice_max(count, n = 15) # Select top 15 genres

# Treemap-Plot
ggplot(
    tree_plot_genre,
    aes(
        area = count,
        fill = listed_in,
        label = listed_in)) +
  geom_treemap() +
  geom_treemap_text(
    colour = "white",
```

```
    place = "centre",
    grow = TRUE
  ) +
  theme(legend.position = "none") +
  labs(title = "Genres (Treemap)")
```

The genre treemap indicates that a limited number of genres account for a large proportion of Netflix's content catalogue. These dominant genres form the core of the platform's offering, while numerous other genres appear less frequently. The distribution suggests that Netflix combines widely popular genres with a variety of more specialised categories, contributing to thematic diversity across the catalogue.

Time Series Forecasting

Discussion

Conclusion

References

Appendix