Project Report For CS661: BIG DATA VISUAL ANALYTICS
2024-2025 Semester II

Project Title:

AnimeLens: Visual Analytics System for Exploring Trends, Genres, and Viewer Preferences

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1 Introduction

1.1 Background and Motivation

Anime has transformed from a niche Japanese cultural product into a global entertainment phenomenon with substantial economic and cultural impact. In recent decades, the anime industry has experienced exponential growth, driven by the rise of global streaming platforms such as Crunchyroll, Netflix, and Funimation, which have made anime more accessible to international audiences than ever before. As the diversity and volume of anime content have increased, so has the wealth of associated data—including viewer ratings, genre classifications, studio information, and release patterns—creating a rich foundation for data-driven analysis.

Despite this, extracting meaningful insights and visual narratives from raw anime data remains a challenge. The motivation for *AnimeLens* comes from the recognition that while numerical and categorical data about anime is plentiful, tools that transform this data into interactive, insightful visualizations are lacking. Stakeholders such as content creators, distributors, and researchers need advanced analytics to understand market trends and audience preferences, while anime enthusiasts seek deeper insights into the medium's evolution and the interplay between various aspects of anime production and reception.

1.2 Problem Statement

Although comprehensive anime databases and platforms like MyAnimeList (MAL) exist, most current tools are limited to individual anime lookups or basic static charts. There is a notable absence of systems that enable holistic, interactive, and multi-dimensional exploration of industry-wide trends. Key analytical needs that remain unmet include:

- Tracking the evolution of anime genres over extended periods
- Analyzing seasonal release patterns and their impact on reception
- Exploring specialization and success factors of animation studios
- Investigating the relationship between structural attributes (e.g., episode count) and popularity

- Comparing regional viewing preferences across countries
- Understanding predictive factors for anime success
- Visualizing complex relationships between anime genres

Addressing these needs requires a comprehensive visual analytics approach capable of processing large datasets and presenting them through intuitive, interactive visualizations that support exploration and insight discovery.

1.3 Project Objectives

The *AnimeLens* project aims to address these challenges through the following objectives:

- Design and implement a modular visual analytics system offering multiple perspectives on anime data
- Create interactive visualizations to reveal temporal trends in genre popularity and production volume
- Develop tools to analyze studio specialization, success metrics, and release strategies
- Implement methods to explore relationships between structural attributes (such as episode count) and viewer reception
- Provide geographical analysis of anime preferences across different regions
- Build predictive models to identify factors contributing to anime success
- Visualize genre relationships through network analysis
- Ensure all visualizations support interactive filtering, selection, and exploration
- Create an intuitive, accessible user interface for both casual browsing and in-depth analysis

By achieving these objectives, *AnimeLens* seeks to deliver valuable insights across the anime ecosystem–from content creators and distributors to researchers and dedicated fans–and to advance the understanding of anime's dynamic global landscape.

2 Tasks

2.1 Genre Popularity Over Time

The objective of this task is to track how the popularity of different anime genres (such as Action, Romance, Slice of Life, etc.) has evolved over the years. By analyzing the annual release trends for each genre, we aim to uncover patterns such as the rise of emerging genres or the decline of previously dominant ones, providing insight into the changing landscape of anime production and audience preferences.

2.2 Seasonal Release Patterns

This task focuses on analyzing the distribution of anime releases by season (Winter, Spring, Summer, Fall) and examining how seasonal trends impact anime ratings and popularity. By exploring release patterns and their correlation with audience reception, we aim to uncover the influence of seasonal scheduling on the anime industry's output and viewer engagement.

2.3 Studio Specialization and Success

The goal of this task is to identify animation studios that dominate specific genres and to analyze which studios consistently produce top-rated anime. By investigating studio output and success metrics, we seek to understand the role of studio specialization in shaping genre trends and maintaining high production quality.

2.4 Episode Count vs. Popularity

This task investigates whether long-running anime are more popular than shorter seasonal shows and examines if shorter anime tend to receive higher ratings due to tighter storytelling. By comparing episode counts with measures of popularity and critical reception, we aim to reveal structural factors that contribute to an anime's success.

2.5 Regional Anime Preferences

The objective here is to determine region-wise preferences in anime consumption and to analyze watch-time patterns and genre popularity across different countries. This task seeks to highlight geographical trends in anime viewership and uncover how cultural and regional factors influence anime preferences.

2.6 Success Prediction Model

This task involves developing a machine learning model to predict an anime's success based on factors such as genre, episode count, animation studio, and user reviews. The goal is to identify key predictors of success and provide actionable insights for creators and distributors.

2.7 Genre Co-occurrence Network

The aim of this task is to create a co-occurrence graph to reveal which genres tend to appear together (e.g., Romance + Comedy, Fantasy + Adventure) and understand popular formulae in anime storytelling. By visualizing genre relationships, we can gain insights into common thematic combinations and trends within the medium.

3 Proposed Solution

To enable interactive and insightful exploration of anime data, we developed a web-based dashboard that brings together multiple analytics modules in a single, unified interface. This dashboard allows users to filter, select, and drill down into trends such as genre

popularity, seasonal release patterns, studio specialization, episode count dynamics, and regional preferences. The dashboard is designed to be both accessible for casual users and powerful enough for researchers and industry professionals, offering a seamless experience for data-driven discovery.

3.1 Choice of Plotly and Streamlit

For the dashboard's interactive visualizations, we selected **Plotly** and **Streamlit** as our primary tools. Plotly was chosen because it enables highly interactive and visually appealing charts, including line plots, heatmaps, bar graphs, and network diagrams—all essential for representing complex anime industry data. Its seamless integration with pandas DataFrames and ability to efficiently handle large datasets made it ideal for our needs. Plotly also offers extensive customization, allowing us to fine-tune the appearance and interactivity of each visualization. Its responsive features, such as hover tooltips, zooming, and dynamic legends, enhance user engagement and support exploratory analysis.

Streamlit was selected as the web application framework for its rapid development workflow and Pythonic syntax, which allowed us to build and iterate on the dashboard quickly without requiring front-end web development expertise. Streamlit's support for interactive widgets (like dropdowns, sliders, and checkboxes) empowers users to dynamically filter and explore the data, making the analytics experience both user-friendly and flexible. Its real-time reactivity ensures that visualizations update instantly in response to user input, and its open-source ecosystem provides robust community support and easy deployment options.

3.2 Python Libraries Used and Their Purpose

In addition to Plotly and Streamlit, we leveraged several other Python libraries, each chosen for its specific strengths:

- **Pandas:** Used for data manipulation, cleaning, and transformation. Its DataFrame structure made it easy to handle large, complex anime datasets and perform operations such as grouping, filtering, and aggregation efficiently.
- **NumPy:** Provided fast numerical operations and array handling, supporting efficient computation for statistics and feature engineering.
- **Streamlit:** Provided the web application framework for the dashboard. Streamlit was selected for its simplicity, rapid development workflow, and seamless integration with Python, enabling us to build an interactive web interface without requiring front-end web development skills.
- **Plotly Express:** Enabled rapid creation of standard visualizations with minimal code, making it easy to prototype and iterate on visual analytics modules.
- **Plotly Graph Objects:** Used for advanced or customized visualizations where fine-grained control over chart elements was required.
- **NetworkX:** Utilized for network analysis and visualization, specifically to construct and display genre co-occurrence graphs, which helped uncover relationships between commonly paired anime genres.

- **Scikit-learn:** Used for implementing machine learning algorithms, including model training, validation, and evaluation. Its broad range of tools and reliability made it ideal for predictive analytics within the project.
- **SHAP:** Employed for interpreting machine learning model predictions and understanding feature importance, thus making the predictive analytics more transparent and explainable.
- **Datetime:** Used for handling and processing temporal data, such as release dates and user activity timelines.

3.3 Data Sources and Preprocessing

3.3.1 Data Acquisition

The primary dataset for this project was sourced from **MyAnimeList (MAL)**, one of the largest online anime and manga databases and communities. Specifically, we utilized the "MyAnimeList Dataset" available on Kaggle[1], which contains comprehensive information about anime titles ($N \approx 17{,}500$), user profiles ($N \approx 302{,}000$), and over 80 million user-anime interactions. This dataset represents a snapshot of the MAL database as of January 2019, providing a rich source of information spanning anime releases from the 1940s to 2018. All data was downloaded in CSV format and processed locally for analysis and visualization.

3.3.2 Dataset Structure

The dataset consists of three main components:

- **Anime Table:** Metadata for each anime, including unique ID, English and Japanese titles, type (TV, Movie, OVA, ONA, Special), number of episodes, airing status, start and end dates, rating (1–10), rank, popularity score, number of members and favorites, genres (comma-separated), studios, and source material.
- **User Table:** User information such as username, join date, last online date, gender, birth date, location, anime statistics (watching, completed, on hold, dropped, plan to watch), and days spent watching.
- **User-Anime Interaction Table:** Contains user ratings and status for anime, including username, anime ID, rating (1–10), watching status, number of episodes watched, and last updated timestamp.

3.3.3 Data Preprocessing

Extensive preprocessing was performed to prepare the raw data for analysis and visualization:

- **Handling Missing Values:** Missing genre information (7.2% of entries) was inferred using title keywords and similar anime; missing airing dates (3.5%) were addressed using release year or marked as unknown; missing studio information (5.1%) was labeled as "Unknown Studio."

- **Feature Engineering:** Temporal features (year, season, decade) were extracted from airing dates; episode count bins and composite success metrics (based on rating, popularity, and favorites) were created; genre strings were expanded into binary indicators; and studio names were standardized.
- **Data Integration:** Anime and user-interaction data were merged to compute aggregate metrics, user geographical information was linked for regional analysis, studio-genre relationship tables were created for specialization analysis, and genre co-occurrence matrices were generated for network analysis.
- **Data Cleaning:** Duplicate entries (482 identified) were removed, anime with extremely limited data were filtered out, genre terminology was standardized (e.g., merging "Shounen" and "Shonen"), and rating distributions were normalized to account for inflation over time.
- **Performance Optimization:** Pre-aggregated tables were created for time-series visualizations, caching mechanisms were implemented for frequently accessed data, and sampling strategies were developed for handling large user-interaction datasets.

4 Results

4.1 Homepage Overview

The homepage of the AnimeLens dashboard serves as a welcoming introduction and central navigation hub for the entire analytics system. As shown in Figure 1, the design features a visually appealing anime-inspired background, immediately setting the tone for an engaging user experience.

At the center of the homepage, users are greeted with the **AnimeLens** logo and a concise introduction that invites them to explore the world of anime through interactive data visualizations and machine learning-powered insights. The introduction succinctly explains the purpose of the platform: to help users dive into anime data and uncover trends, patterns, and predictions.

Beneath the introduction, the homepage highlights the main analytical modules available in the dashboard, each represented by a prominent button or label:

- **Trends:** Track how anime genres rise or fade in popularity over time.
- **Genres:** Explore detailed genre analytics and relationships.
- **Studios:** Discover which studios are behind popular genres and analyze their specialization.
- **Predictions:** Access machine learning models that forecast anime success.

A summary section provides a brief description of each core analytic feature, such as genre popularity over time, seasonal release patterns, studio specialization, regional preferences, success prediction, and genre networks. This gives users a clear roadmap of what they can discover using the dashboard.

On the left sidebar, a well-organized navigation menu lists all major analysis modules, allowing users to jump directly to sections like **Genre Popularity Over Time,**

Seasonal Release Patterns, Studio Specialization and Success, Episode Count Analysis, Regional Anime Preferences, Anime Success Prediction, and Genre Cooccurrence Network. This structure ensures that users can easily access the specific insights or tools they are interested in.

Overall, the homepage is designed to be both informative and inviting, guiding users seamlessly into the deeper analytics sections of AnimeLens and providing intuitive links to each task-focused module.

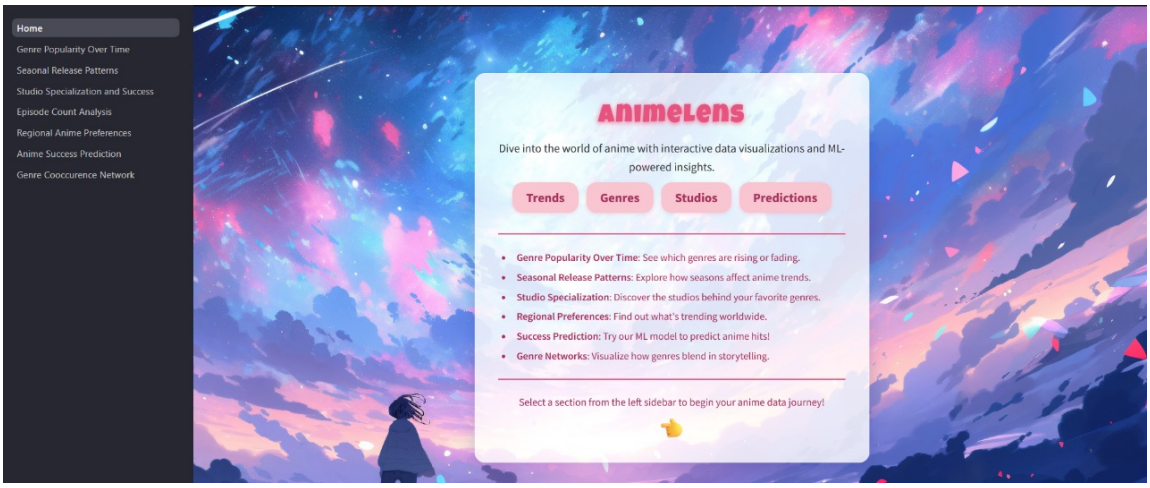

Figure 1: AnimeLens Dashboard Homepage: Introduction, feature overview, and navigation links to all analytics modules.

4.2 Visualizations

The AnimeLens dashboard leverages interactive and visually rich data visualizations to uncover patterns and answer key analytical questions about the anime industry. Each visualization is designed to support exploration and insight discovery, making complex trends accessible to both casual users and researchers.

4.2.1 Genre Popularity Over Time

To address the question of how different anime genres (such as Action, Romance, Slice of Life, etc.) have evolved in popularity over the years, we implemented two complementary visualizations using Plotly:

- **Genre Popularity Heatmap (Figure 2):** This heatmap displays the number of anime released per year for selected genres, with color intensity representing the release volume. Brighter colors indicate years and genres with higher activity. This visualization answers questions such as: *Which genres have seen significant growth or decline? Are there periods where certain genres surged in popularity?*

- **Genre Popularity Trends Line Chart (Figure 3):** This line chart shows the annual trend in the number of anime released for major genres. Each line allows for direct comparison of genre trajectories over time, highlighting long-term shifts in audience and industry preferences.

These visualizations reveal, for example, the rapid rise of the Fantasy genre in recent years, the consistent dominance of Action, and the steadier trends in Magic, Mystery, and Romance. Together, they provide both a macro and micro perspective on how genre popularity has shifted, allowing users to explore the evolution of anime content over decades.

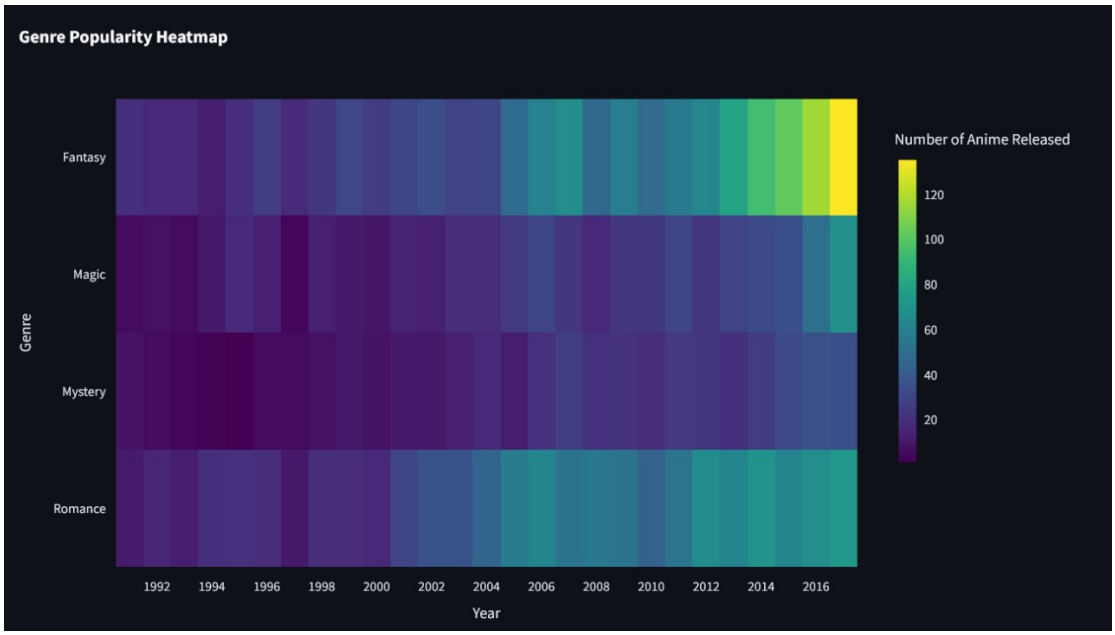

Figure 2: Genre Popularity Heatmap: Number of anime released per year for each genre, shown by color intensity.

4.2.2 Seasonal Release Patterns

To investigate how the timing of anime releases affects both production volume and audience reception, we analyzed the distribution of anime by season (Winter, Spring, Summer, Fall) and studied how seasonal trends impact average ratings and popularity. The dataset was processed to extract the release season and year for each anime, and then aggregated for both counts and average scores.

We created four complementary visualizations using Plotly:

- **Average Anime Score by Season (Figure 4):** This bar chart compares the average rating of anime released in each season across all years. It reveals that, on average, anime released in the Fall tend to receive the highest ratings, while Summer releases have slightly lower average scores.

- **Average Score by Season Over Time (Figure 5):** This line chart tracks the evolution of average anime scores for each season from 1993 to 2018. It answers questions such as: *Are there particular years or periods where certain seasons consistently outperform others in terms of ratings?*

- **Seasonal Anime Releases Over Time (Figure 6):** This line chart shows the number of anime released in each season per year. It highlights trends such as the increasing number of seasonal releases over time and whether certain seasons (e.g., Spring or Fall) have become more dominant in terms of production volume.

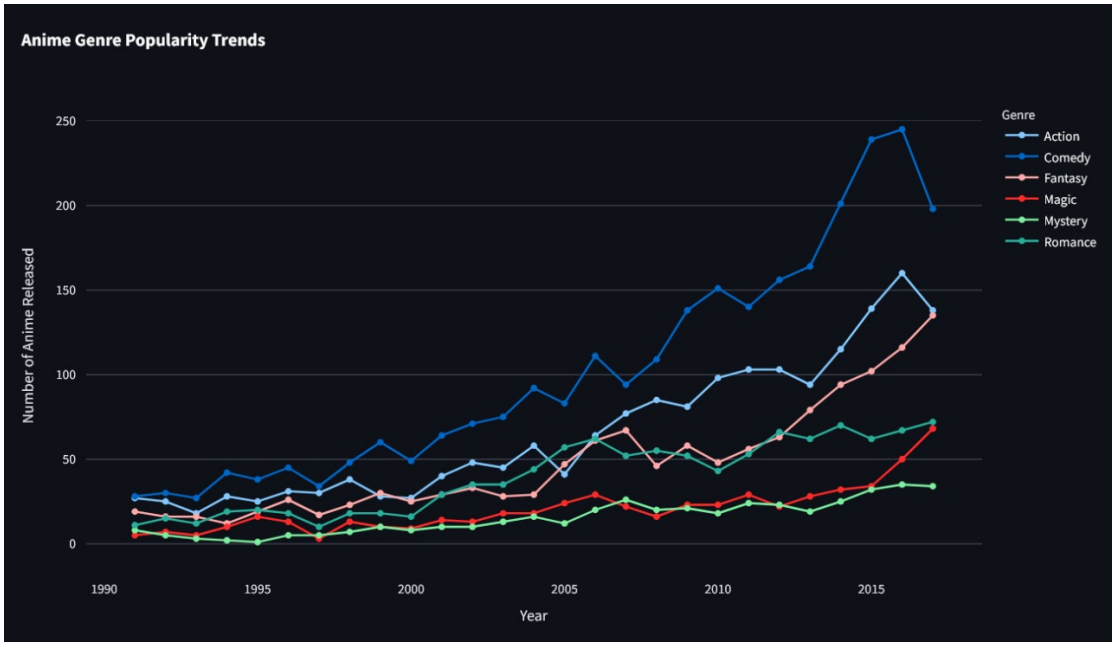

Figure 3: Anime Genre Popularity Trends: Annual release counts for major genres over time.

- **Average Anime Score by Season and Year (Figure 7):** This heatmap displays the average rating for each season-year combination, with color intensity indicating score. It is effective for spotting periods where certain seasons produced exceptionally well-received anime or experienced dips in quality.

Key questions answered by these visualizations:

- How does the volume of anime releases vary across seasons and years?
- Which seasons are associated with higher or lower average ratings?
- Are there notable trends or shifts in seasonal performance over time?
- Do certain seasons consistently yield higher quality or more popular anime?

Collectively, these visualizations reveal that Fall and Spring are often the most prolific and highest-rated seasons for anime releases, while Summer tends to have fewer releases and slightly lower ratings. The heatmap and trend charts also highlight periods of growth and shifts in seasonal preferences within the industry.

4.2.3 Studio Specialization and Success

To analyze how animation studios contribute to the anime landscape, we explored both their productivity (number of anime produced), their genre specialization, and their success in terms of ratings. Multiple advanced visualizations were created to answer the following questions:

- Which studios are the most prolific, and does high productivity correlate with high quality?
- What is the genre spread for top studios—do certain studios dominate specific genres?

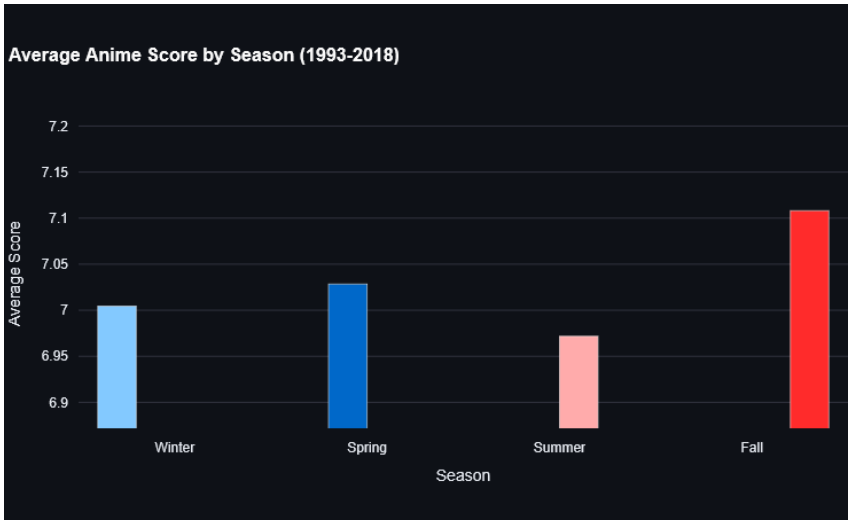

Figure 4: Average Anime Score by Season (1993–2018): Bar chart comparing mean ratings for each season.

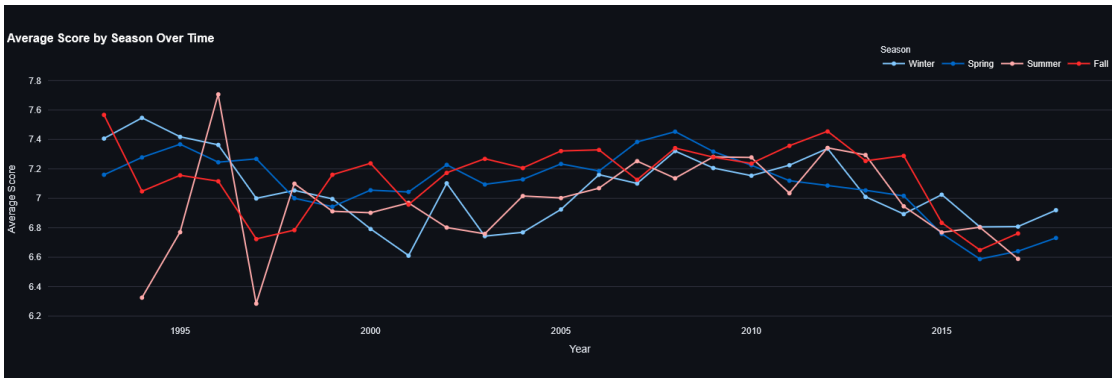

Figure 5: Average Score by Season Over Time: Line chart showing the evolution of average anime ratings by season.

- Which studios are most dominant within each genre?
- Which studios consistently produce top-rated anime, and how do their genre choices relate to their ratings?

Bubble Plot: Productivity vs. Quality (Figure 8)
This bubble plot visualizes the relationship between the number of anime produced by each studio (*anime_count*) and their average anime rating (*score*). Each bubble represents a studio, with its size proportional to its productivity and its color indicating average score. The plot reveals that while some highly productive studios maintain strong average ratings, others do not, highlighting that sheer output does not always equate to higher quality.

Heatmap: Genre Spread of Top Studios (Figure 9)
This heatmap shows the genre distribution for the top 10 studios by anime count. The color intensity reflects the number of anime a studio has produced in each genre. This visualization makes it easy to identify which studios specialize in which genres (for example, Toei Animation's dominance in Action and Adventure, or OLM's focus on Comedy and Kids genres).

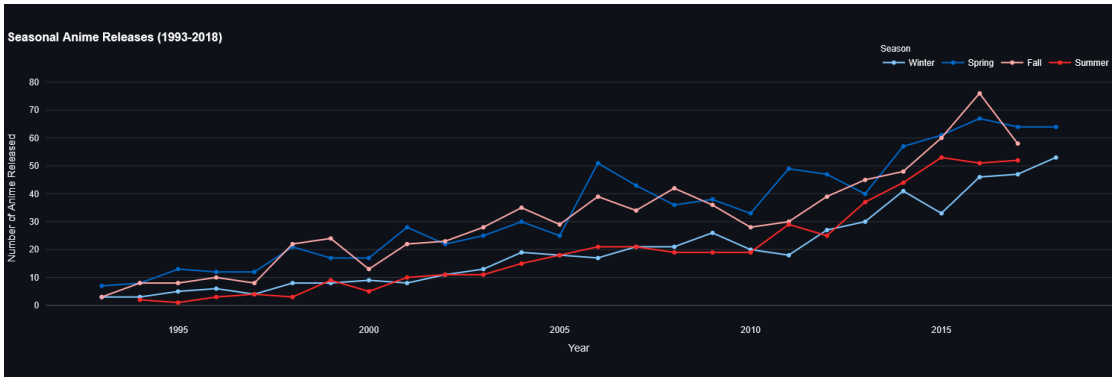

Figure 6: Seasonal Anime Releases (1993–2018): Number of anime released in each season per year.

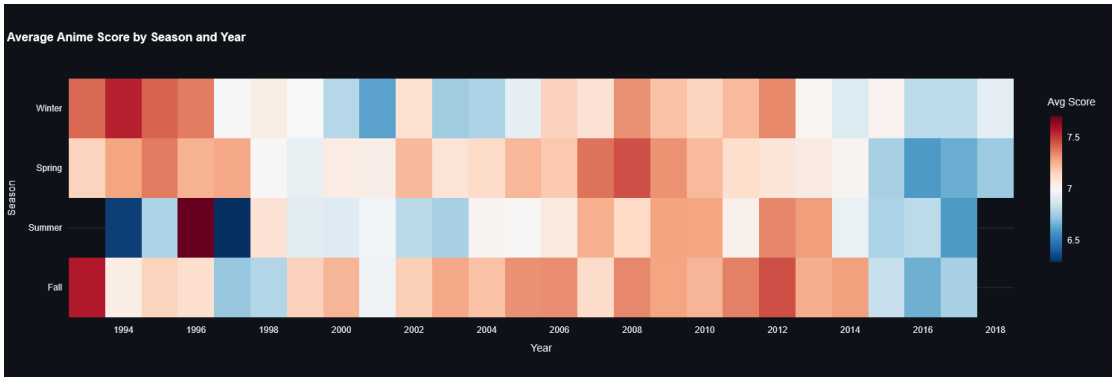

Figure 7: Average Anime Score by Season and Year: Heatmap of mean ratings for each season-year combination.

Treemap: Studio Dominance by Genre (Figure 10)
The treemap provides a hierarchical view of studio dominance within each genre. Each colored block represents a genre, and the size of each rectangle within a block corresponds to the number of anime a studio has produced in that genre. This allows for a quick assessment of which studios are most influential in specific genres.

Sankey Diagram: Studio → Genre → Rating (Figure 11)
This Sankey diagram visualizes the flow from studios (left) to genres (middle) to average ratings (right). The width of each flow represents the number of anime, and the color gradient encodes the rating. This chart answers: Which studios contribute most to each genre, and how do those contributions translate into ratings? It also highlights studios that consistently produce highly-rated anime in particular genres.

Key questions answered by these visualizations:

- Which studios are the most productive, and does productivity correlate with quality?
- What are the genre specializations of leading studios?
- Who dominates each genre, and are some studios genre generalists or specialists?
- How do studio choices impact average anime ratings?

Together, these visualizations provide a comprehensive understanding of studio specialization, productivity, and success, revealing both the breadth and depth of studio influence on the anime industry.

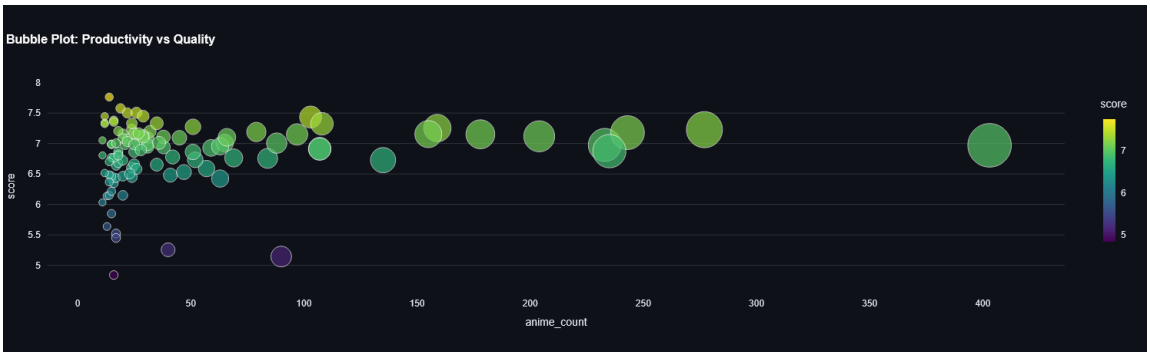

Figure 8: Bubble Plot: Each bubble represents a studio, with size proportional to the number of anime produced (productivity) and color indicating average rating (quality).

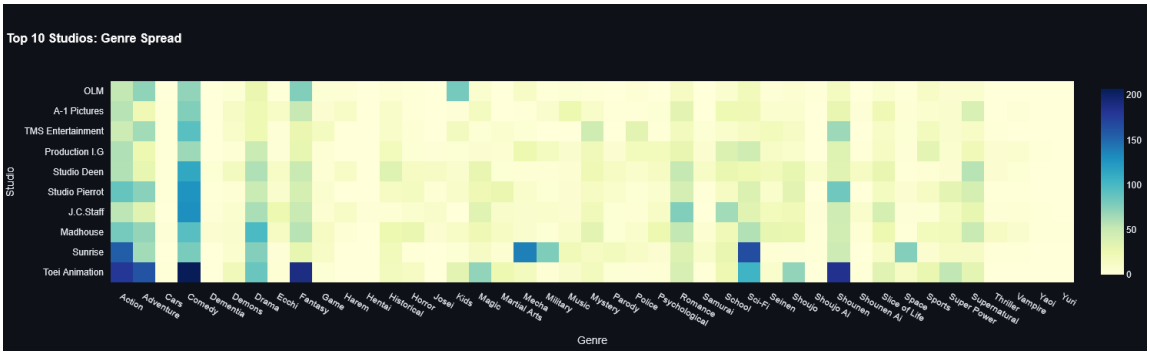

Figure 9: Heatmap: Genre Spread of Top 10 Studios. Color intensity shows the number of anime produced by each studio in each genre.

4.2.4 Episode Count vs. Popularity

To investigate the relationship between episode count and anime popularity, we analyzed both the average and distribution of episode counts across genres and types, and visualized how these structural factors relate to popularity and viewer reception. The analysis addresses key questions such as: Are long-running anime more popular than shorter seasonal shows? Do shorter anime tend to receive higher ratings due to tighter storytelling?

Three complementary visualizations were created using Plotly:

- **Average Episode Count by Genre & Distribution (Figure 12):** The left panel shows the average episode count for each major genre, revealing that genres like Shounen and Adventure typically have longer series, while genres such as Ecchi and Seinen tend to have shorter runs. The right panel displays the distribution of episode counts by genre, highlighting the variance and outliers within each category. This dual view helps identify which genres are more likely to produce long-running or short-form anime.

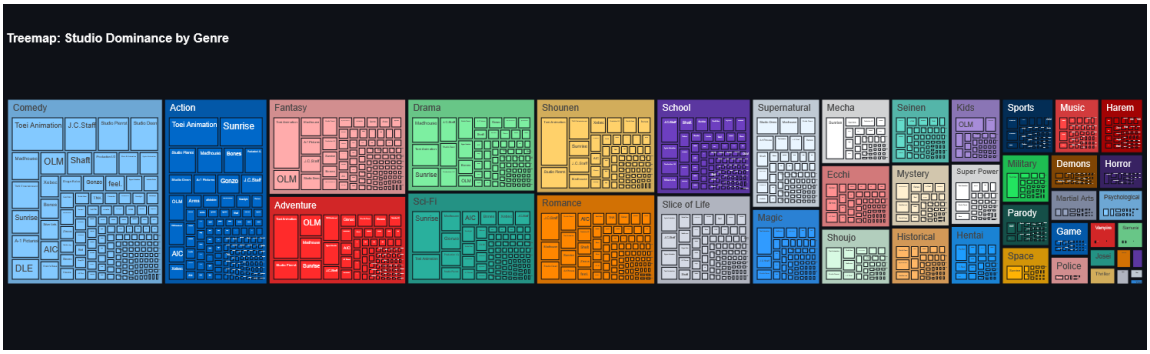

Figure 10: Treemap: Studio Dominance by Genre. Each colored block is a genre; rectangles within show studio contributions by anime count.

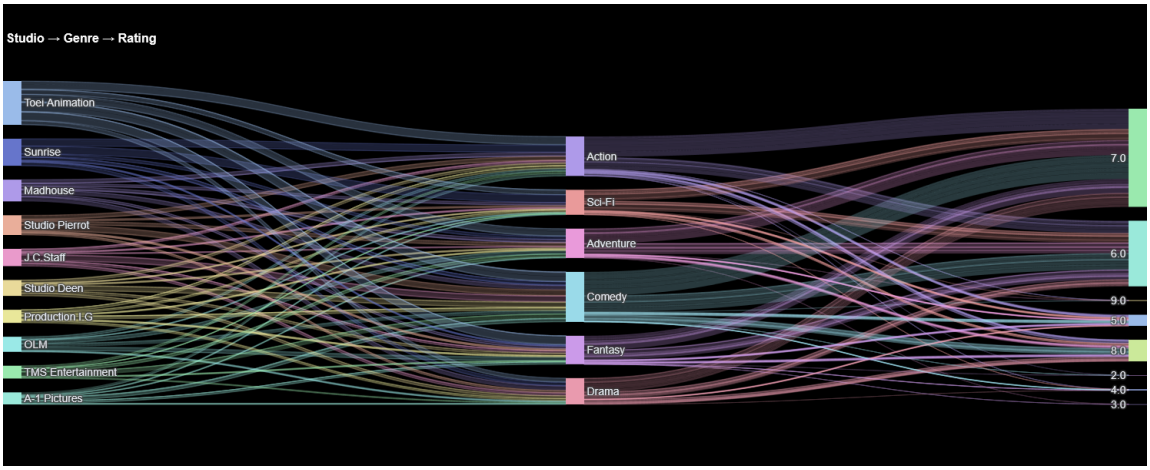

Figure 11: Sankey Diagram: Flow from Studio to Genre to Rating, showing how studio specialization and genre choices relate to average anime ratings.

- **Episode Count by Type (Figure 13):** This plot compares the episode count distributions for the top 10 anime types (e.g., TV, OVA, Movie, Special). It clearly shows that TV anime are most likely to have high episode counts and outliers, while types like OVA, Movie, and Music tend to have much shorter runs.

Key questions answered by these visualizations:

- Which genres and types are associated with longer or shorter anime series?
- Are there genres or types that consistently produce short, tightly written shows?
- How does episode count distribution vary across the anime landscape?
- Where do the outliers (extremely long or short series) appear, and in which categories?

These visualizations reveal that while genres like Shounen and Adventure are more likely to have longer series, many genres and types favor shorter formats. The presence of outliers and the spread in episode counts highlight the diversity of anime production structures, supporting further analysis of how these factors relate to overall popularity and critical reception.

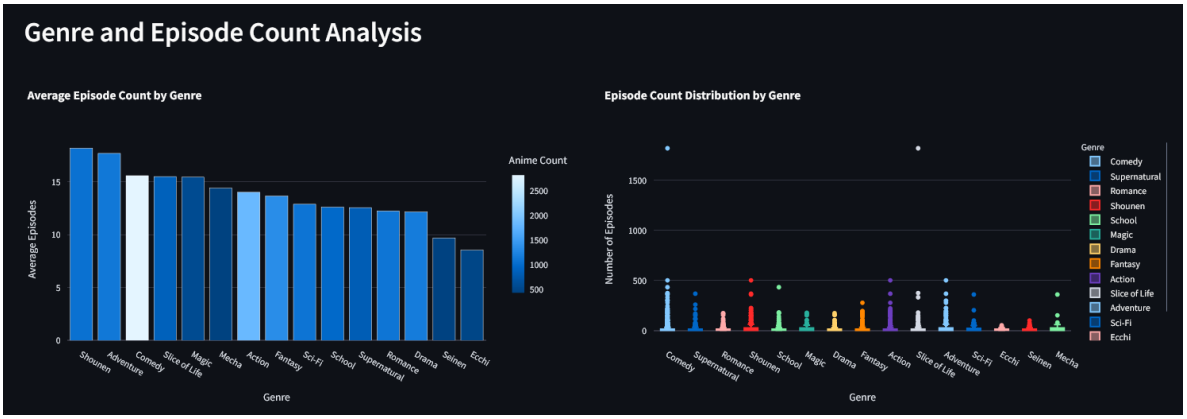

Figure 12: Genre and Episode Count Analysis. Left: Average episode count by genre. Right: Distribution of episode counts by genre, showing variance and outliers.

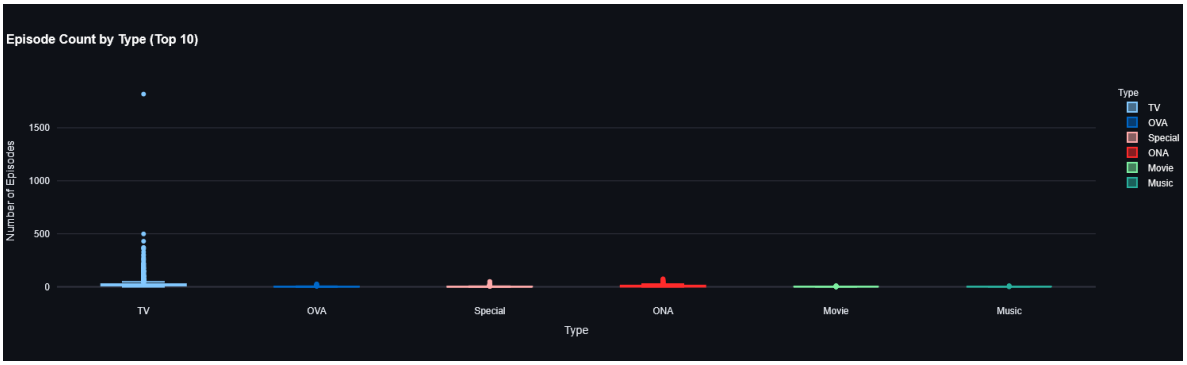

Figure 13: Episode Count by Type (Top 10): Distribution of episode counts for major anime types. TV anime show the widest range and highest outliers.

4.2.5 Regional Anime Preferences

To explore how anime consumption and genre preferences vary across the globe, we analyzed both the total watch-time and the genre distribution by country. This analysis addresses key questions such as: Which countries spend the most time watching anime? How do genre preferences differ by region? Are there notable cultural or regional trends in anime fandom?

Two visualizations were created using Plotly:

- **Total Days Spent Watching Anime by Country (Figure 14):** This horizontal bar chart displays the top 15 countries ranked by the total number of days spent watching anime. Each bar's length and color intensity represent the cumulative watch-time, highlighting not only the leading countries (such as Germany, Poland, Brazil, and France) but also the significant presence of "Unknown" locations, which may represent users who did not specify a country. This visualization answers: *Which countries have the most dedicated anime viewers in terms of total watch-time? Are there unexpected leaders or regional clusters?*

- **Top Genres by Country (Figure 15):** This grouped bar chart compares the popularity of the top five genres (Comedy, Action, Romance, Drama, Supernatural, School, Fantasy, Sci-Fi) across key countries. Each colored bar represents a country's count for a particular genre, allowing direct comparison of genre prefer-

ences between regions. For example, Comedy and Action are consistently popular, but the relative standing of genres like Fantasy and Sci-Fi varies by country. This visualization answers: *What are the favorite genres in different countries? How do genre preferences shift across regions?*

Key questions answered by these visualizations:

- Which countries have the highest anime watch-time and what might explain these patterns?
- How do genre preferences differ between countries and regions?
- Are there cultural or regional trends in anime fandom and genre popularity?

These visualizations reveal that while some countries (such as Germany, Brazil, and France) have particularly high engagement, genre preferences like Comedy and Action remain universally strong. However, regional nuances emerge in the popularity of genres like Fantasy, Sci-Fi, and Supernatural, reflecting cultural influences and local tastes.

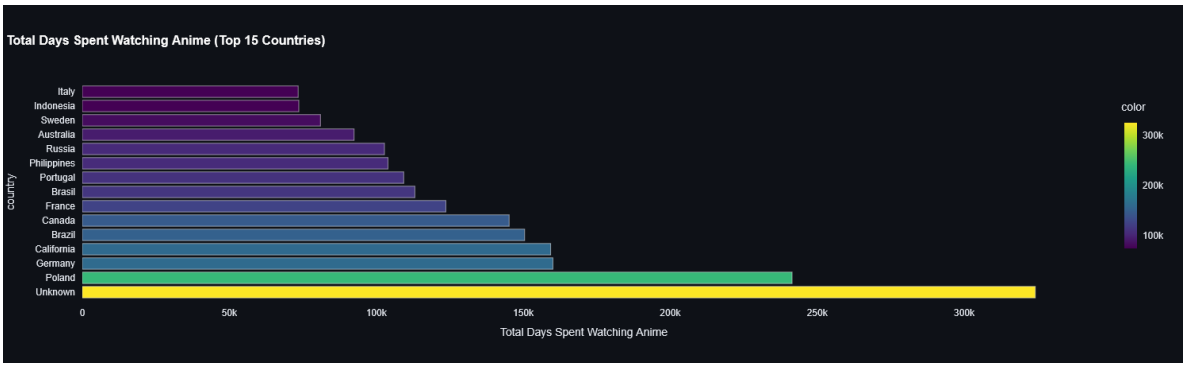

Figure 14: Total Days Spent Watching Anime (Top 15 Countries): Horizontal bar chart showing cumulative anime watch-time by country.

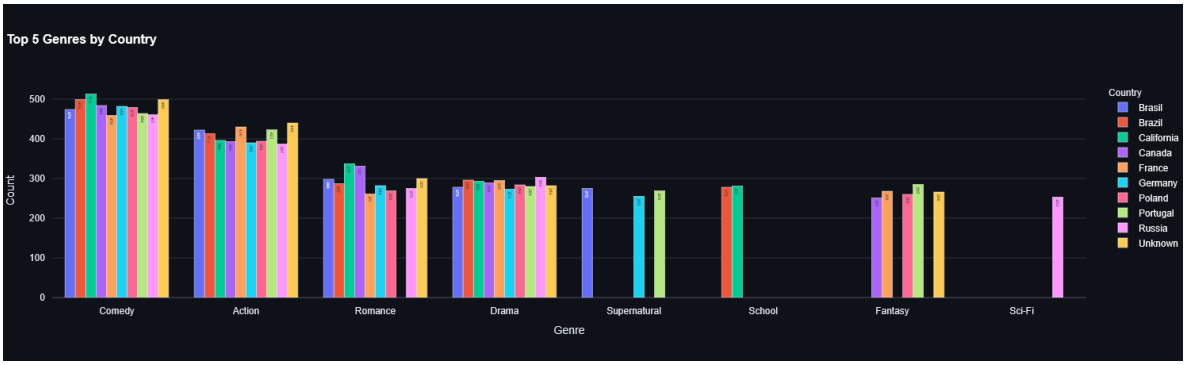

Figure 15: Top 5 Genres by Country: Grouped bar chart comparing genre popularity across major anime-watching countries.

4.2.6 Success Prediction Model

To help predict the potential success of an anime before production, we developed a machine learning model that estimates the likelihood of success based on features such

as episode count, duration, release year, studio, genre, and expected popularity metrics. This interactive module enables both studios and fans to experiment with different anime attributes and immediately see predicted outcomes.

The model's performance is summarized with a **classification report** and a **confusion matrix** (Figure 16). The classification report details precision, recall, and F1-score for both successful and not successful classes, as well as overall accuracy. The confusion matrix visualizes the number of correct and incorrect predictions, helping users assess the reliability of the model.

The dashboard provides an interactive prediction tool (Figure 17), where users can adjust parameters such as number of episodes, episode duration, release year, expected member count, studio, and genres. Upon clicking "Predict Success," the model outputs the probability of success, visualized with a gauge chart and a textual confidence statement. This allows users to explore "what-if" scenarios and understand how different factors influence the likelihood of an anime being successful.

Key questions answered by these visualizations:

- How accurately can we predict anime success based on production and content features?
- What is the expected probability of success for a hypothetical anime with given characteristics?
- How do changes in features such as genre, studio, or episode count affect the likelihood of success?

These tools enable data-driven decision making for studios considering new projects and empower fans to explore the factors that contribute to an anime's success.

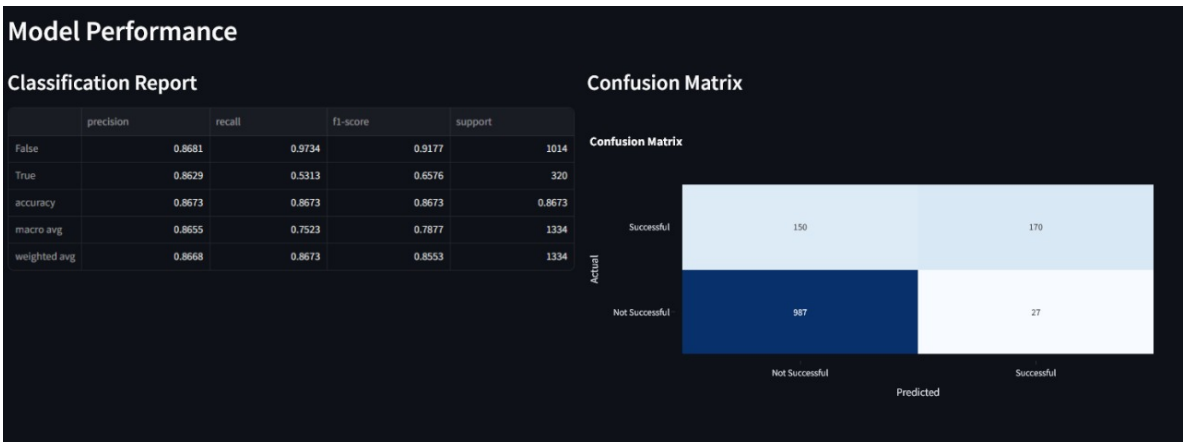

Figure 16: Model Performance: Classification report and confusion matrix for the anime success prediction model.

4.2.7 Genre Co-occurrence Network

To reveal which genres commonly appear together in anime and to understand popular storytelling formulae, we constructed a genre co-occurrence network using data on all genre pairs present in the dataset. This analysis addresses questions such as: Which genre combinations are most frequent? How are genres interconnected within the anime landscape? What clusters or communities of genres emerge from these relationships?

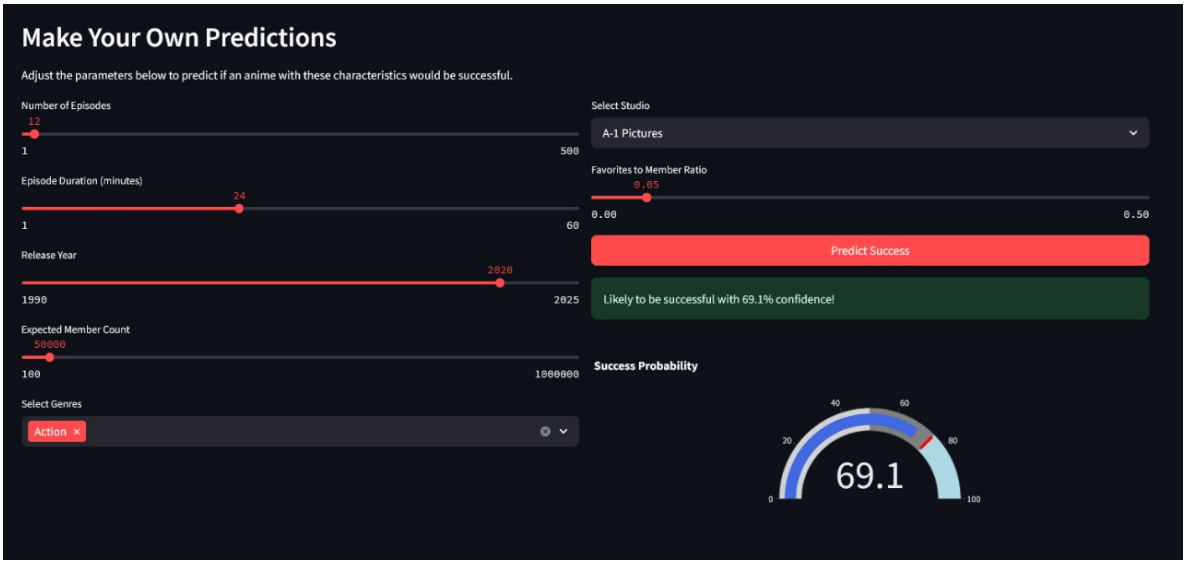

Figure 17: Interactive Success Predictor: Users can input anime characteristics and receive a predicted probability of success.

Two key visualizations were created:

- **Top 15 Genre Combinations (Figure 18):** This horizontal bar chart displays the 15 most frequent genre pairs, ranked by their number of co-occurrences. Each bar's length and color intensity represent the frequency with which a pair appears together in anime titles. The chart highlights that combinations like Comedy + Shounen, Action + Sci-Fi, and Comedy + Romance are especially prevalent, reflecting tried-and-true formulas in anime storytelling.
- **Genre Co-occurrence Network Graph (Figure 19):** This network visualization shows genres as nodes and strong co-occurrences (above a chosen threshold) as edges. The size of each node reflects the number of connections (degree), and the proximity and thickness of edges indicate the strength of the relationship between genres. Central genres such as Action, Comedy, Shounen, and Romance appear as network hubs, while more niche genres are positioned at the periphery. This graph makes it easy to spot genre communities and the most influential genres in terms of cross-genre storytelling.

Key questions answered by these visualizations:

- Which genre pairs are most frequently combined in anime?
- What are the dominant genre clusters and how do they connect?
- Are there genres that act as bridges between different thematic communities?
- How do popular genre combinations reflect storytelling trends in the industry?

These visualizations reveal that genres like Comedy, Action, Shounen, and Romance often serve as the backbone for multi-genre anime, while also highlighting the diversity and interconnectedness of anime storytelling.

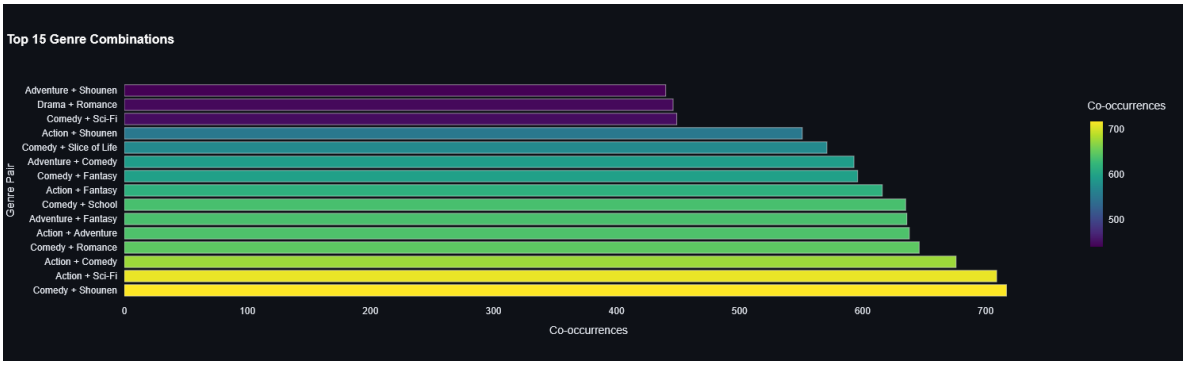

Figure 18: Top 15 Genre Combinations: Horizontal bar chart showing the most frequent genre pairs in anime.

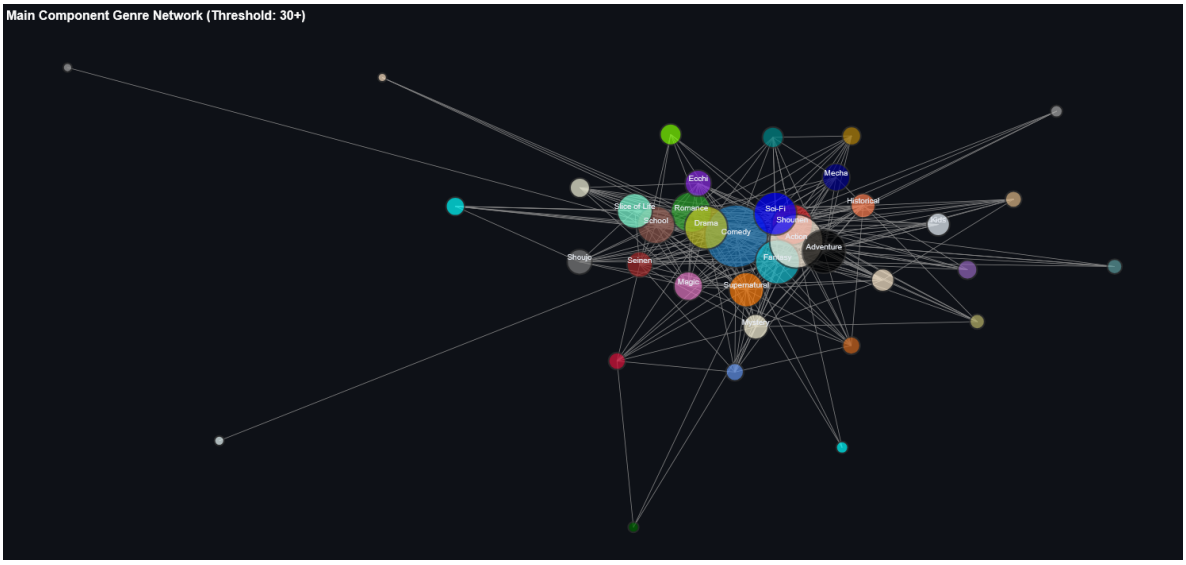

Figure 19: Genre Co-occurrence Network: Nodes represent genres, edges indicate strong co-occurrence, and node size reflects connectivity. Central genres form the core of popular anime storytelling.

5 Conclusion

The AnimeLens project has demonstrated the power of interactive visual analytics in unraveling the complex, evolving landscape of anime as both an art form and a global industry. By integrating seven analytical modules within a unified dashboard, we enabled users to move seamlessly from high-level trends-such as the explosive rise of genres like Fantasy and the seasonal dynamics of anime releases-to deep dives into studio specialization, episode formats, regional preferences, and the intricate web of genre co-occurrence.

Our findings highlight how anime has grown from a niche cultural export into a diverse, hybridized, and internationally celebrated medium. The temporal analyses reveal not only the ascent and decline of genres, but also the increasing experimentation with genre blends, as seen in the prevalence of combinations like Comedy + Shounen and Action + Sci-Fi. Studio-focused visualizations uncovered both the breadth and depth of studio influence, showing that while some studios thrive through specialization, others succeed by spanning multiple genres.

Regional analysis brought to light the global nature of anime fandom, with countries

across continents displaying both shared favorites and unique local tastes. The episode count and popularity studies confirmed that while long-running series remain iconic, shorter, tightly written anime often achieve higher critical acclaim. The genre network and co-occurrence analysis (see Figure 18) mapped the storytelling DNA of anime, exposing the genre pairings and clusters that underpin the industry's most successful works.

A key innovation of this project is the integration of a machine learning-based success prediction tool, allowing users to experiment with hypothetical anime attributes and receive real-time, data-driven forecasts of potential success. This not only supports strategic planning for creators and studios, but also offers fans a window into the factors that drive popularity and acclaim.

5.1 Source Code

The complete source code for the AnimeLens project, along with documentation and reproducibility instructions, is available at the following repository:

`https://github.com/Jain-K/AnimeLens/tree/master`

Individual Contributions

The following outlines the primary contributions of each team member to the AnimeLens project:

References

[1] Myanimelist dataset. `https://www.kaggle.com/datasets/azathoth42/myanimelist`, 2019.

Team Members	Assigned Tasks
Priyanshu Ranjan	Data Identification
Kartik Jain & Vedant Adlak	• Streamlit Setup, Dashboard UI • Genre Popularity Over Time • Seasonal Release Patterns • Anime Success Prediction
Kumar Sambhav & Shishir	• Episode Count Analysis • Regional Anime Preferences • Presentation (PPT)
Keshav Ranjan & Satmeet Singh Saluja	• Studio Specialization and Success Analysis • Genre Co-occurrence Network • Final Report Preparation

Table 1: Individual Contributions and Task Allocation