NETFLIX MOVIES & TV SHOWS CLUSTERING

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Abstract:

Netflix is one of the leading OTT platforms, not only in India but also internationally

Netflix manages a large collection of TV shows and movies, streaming it anytime via online . The success of the OTT platforms depends on two things- the variety of content and appropriate recommendations to the users. This business is profitable because users make a monthly payment to access the platform. Exploratory Data Analysis is done on the dataset to get the insights from the information however the principal invalid qualities are taken care of. There are 12 features and around 7700 observations in the dataset and are mostly textual features. Clustering is a useful technique to achieve the best possible recommendations and increase the viewership of the platform.

1. Problem Statement

In 2018, they released an interesting report which shows that the number of TV shows on Netflix has nearly tripled since 2010. The streaming service's number of movies has decreased by more than 2,000 titles since 2010, while its number of TV shows has nearly tripled. It will be interesting to explore what all other insights can be obtained from the same dataset.

In this project, you are required to do

1. Exploratory Data Analysis

2. Understanding what type content is available in different countries

3. Is Netflix has increasingly focusing on TV rather than movies in recent years.

4. Clustering similar content by matching text-based features

2. Dataset Description

The streaming service's number of movies has decreased by more than 2,000 titles since 2010, while its number of TV shows has nearly tripled. It will be interesting to explore what all other insights can be obtained from the same dataset.

The dataset contains following columns:

- **Show id**: Unique ID for every Movie / TV Show
- **type – Identifier** - A Movie or TV Show

- **title** – Title of the Movie / TV Show
- **director**-director of the content
- **cast** –Actors involved in the movie / show
- **country** – Country where the movie / show was produced
- **date_added** – Date it was added on Netflix
- **release_year** – Actual Release year of the movie / show
- **rating** – TV Rating of the movie / show
- **duration** – Total Duration - in minutes or number of seasons
- **listed_in** – genre
- **description** – The Summary description

3. Steps Involved

1. EDA :

- After mounting our drive and fetching and reading the dataset given, we performed the Exploratory Data Analysis for it.
- To get the understanding of the data and how the content is distributed in the dataset, its type and details such as which countries are watching more and which type of content is in demand etc. has been analyzed in this step.
- The United States is the most prolific generator of Netflix content, with India and the United Kingdom trailing far behind.

2. Handling missing values :

- We will need to replace blank countries with the mode (most common) country.
- It would be better to keep director because it can be fascinating to look at a specific filmmaker's movie. As a result, we substitute the null values with the word 'unknown' for further analysis.
- There are very few null entries in the date_added fields thus we delete them.

3. Duplicate Values Treatment

Duplicate values dose not contribute anything to accuracy of results.
Our dataset dose not contains any duplicate values

4. Clustering :

Clustering (also called cluster analysis) is a task of grouping similar instances into clusters. More formally, clustering is the task of grouping the population of unlabeled data points into clusters in a way that data points in the same cluster are more similar to each other than to data points in other clusters. The clustering task is probably the most important in unsupervised learning, since it has many applications, for example:

- data analysis: often a huge dataset contains several large clusters, analyzing which separately, you can come to interesting insights.
- anomaly detection: as we saw before, data points located in the regions of low density can be considered as anomalies

- semi-supervised learning: clustering approaches often helps you to automatically label partially labeled data for classification tasks.
- Indirectly clustering tasks (tasks where clustering helps to gain good results): recommender systems, search engines, etc.
- directly clustering tasks: customer segmentation, image segmentation, etc .

5. K- means Clustering

K-means clustering is one of the simplest and popular unsupervised machine learning algorithms.

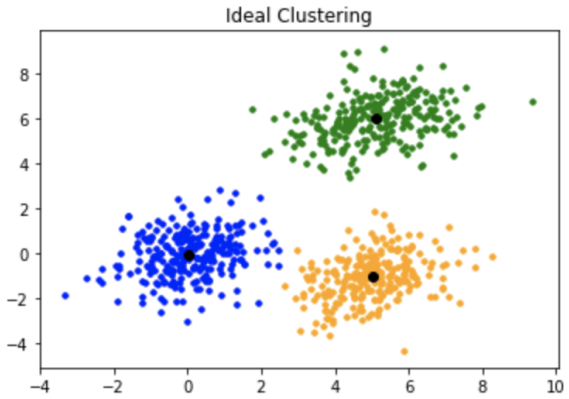
Typically, unsupervised algorithms make inferences from datasets using only input vectors without referring to known, or labelled, outcomes.

K-means algorithm works:

To process the learning data, the K-means algorithm in data mining starts with a first group of randomly selected centroids, which are used as the beginning points for every cluster, and then performs iterative (repetitive) calculations to optimize the positions of the centroids.

It halts creating and optimizing clusters when either:

- The centroids have stabilized — there is no change in their values because the clustering has been successful.
- The defined number of iterations has been achieved.



K-means algorithm is an iterative algorithm that tries to partition the dataset into K pre-defined distinct non overlapping subgroups where each data point belongs to only one group.

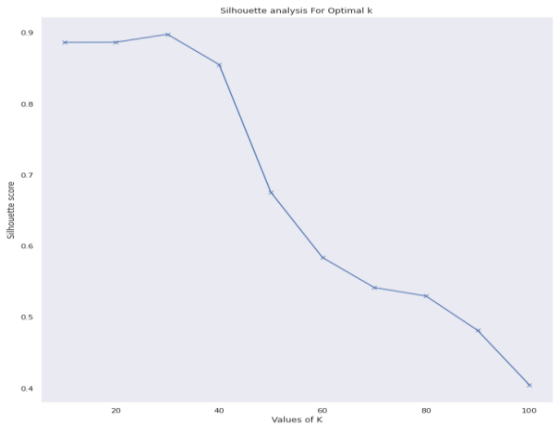
6. Methods to find k value :

1. Sihouette score :

Silhouette score is used to evaluate the quality of clusters created using clustering algorithms such as K Means in terms of how well samples are clustered with other samples that are similar to each other.

Coefficient s for a single sample is then given as:

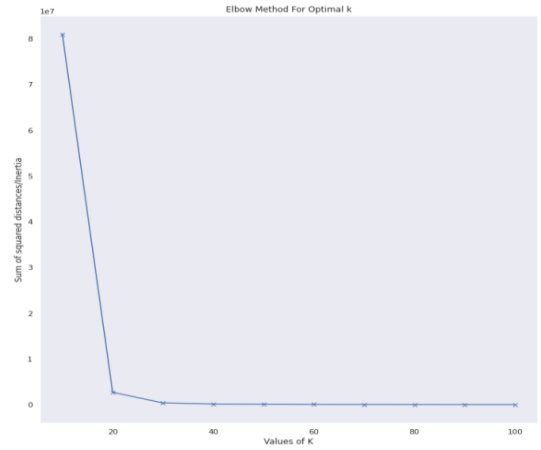
$$\square = \frac{\square - \square}{\square\square\square(\square, \square)}$$



2. Elbow Curve :

The Elbow Curve is one of the most popular methods to determine this optimal value of k.

The elbow curve uses the sum of squared distance (SSE) to choose an ideal value of k based on the distance between the data points and their assigned clusters.



7. Conclusion

- First, we run Data Wrangling on our model to ensure that there are no duplicate entries in our dataset. After checking the duplicates in our dataset we perform analysis for null values in our dataset. Here, we found more than 30% null values in the director's column. Then, we take appropriate action for null values according to the circumstances. We remove null values of the added_date columns because there is no logical way to deal with the null values of the date column.
- In the second step, we perform EDA and Data Visualization on our dataset. Here, we found that the proportion of tv shows in Netflix content is very less as compared to the movies. We can observe that the majority of Netflix material is intended for adults. There is very little content available for teens and kids. The number of movies on Netflix is growing significantly faster than the number of TV shows. Because of covid-19, there is a significant drop in the number of movies and television episodes produced after 2019. Because of covid-19, there is a significant drop in the number of movies and television episodes produced after 2019.
- The United States is the most prolific generator of Netflix content, with India and the United Kingdom trailing far behind. The majority of the content on Netflix in India is comprised of movies. The fundamental reason for the variation in content must be due to market research undertaken by Netflix. It is also interesting to see parallels between culturally comparable nations - the US and UK are closely aligned with their Netflix target ages, but radically different from, for example, India or Japan!
- It is evident that international movies/ tv shows, tv dramas, and tv comedies are the top three genres

with the most content on Netflix. It is interesting that International Movies tend to be Dramas.

- Here, we perform the K-Means clustering on our dataset. Here, we find the optimal value of k is 20. But, if we want to recommend some movies and tv shows then k=20 is not good so in such a case, we take the value of k as 600. The silhouette sscore for k=20 is 0.886575253337518 which is a very good score.