

Machine Learning Essentials (for Netflix Movies & TV Shows Dataset)

Classification • Clustering • Recommendation System

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Course : Machine Learning Essentials Semester Project

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Introduction to the Project





Project Goal

Extract insights from Netflix dataset.



Key Tasks

Content classification,
clustering, recommendation
system.



Dataset Origin

Kaggle: Netflix Movies & TV Shows metadata.

Understanding the Netflix Dataset

The Netflix dataset is a rich source of information, crucial for our analysis. It contains detailed metadata for each title.

- Key Attributes: Title, type, director, cast, country, release year, rating, duration, genres, description.
- Analytical Potential: Supports diverse analyses including Exploratory Data Analysis (EDA), classification, clustering, and the development of recommendation systems.
- Scale: Over 8,000+ titles, spanning various countries and genres, providing a comprehensive view of Netflix's content library.

CRISP-DM Workflow for Data Mining

01

02



Business Understanding

Improve content discovery on Netflix.

03

Data Preparation

Cleaning, encoding, TF-IDF transformation.

05

Evaluation

Assessing models: Accuracy, F1-score, Silhouette score.

Data Understanding

Explore dataset structure and patterns.

04

Modeling

Classification, clustering, recommendations.

06

Deployment

Saving machine learning models using Joblib.

Exploratory Data Analysis (EDA) Insights

Key observations from initial data exploration:

Content Distribution

More Movies than TV Shows.

Top Content Producers

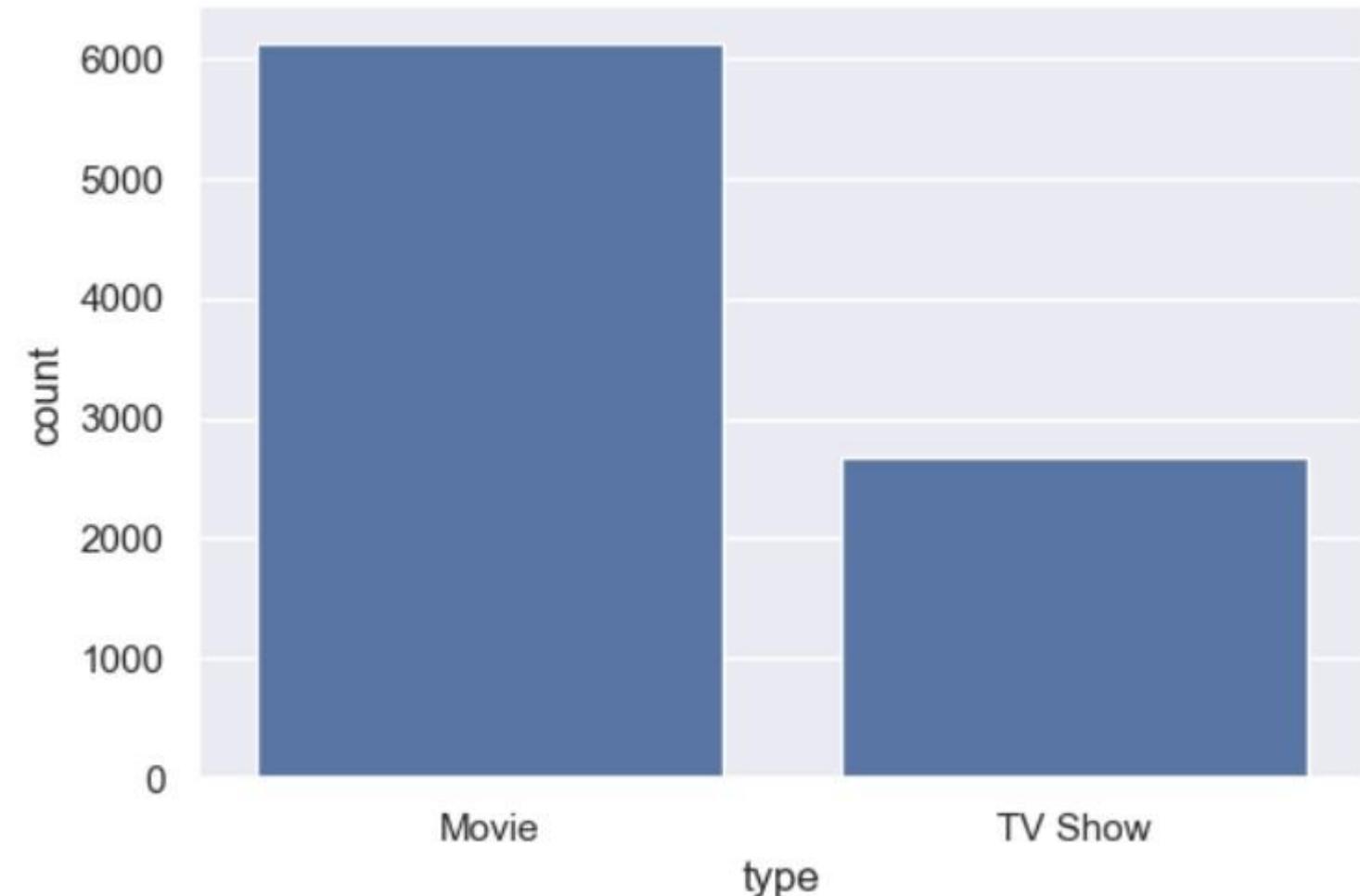
USA, India, UK lead in Netflix content production.

Dominant Genres

Drama, International Movies, Comedies are most popular.

Data Cleaning & Preparation Steps

Count: Movies vs TV Shows



Rigorous preparation ensures data quality for modeling:



1 Handle Missing Values

Strategically filled null entries for completeness.



2 Standardize Durations

Converted "120 min" to numeric minutes for consistency.



3 Encode Categorical Data

OneHotEncoder for features, LabelEncoder for target variables.



4 Text Feature Extraction

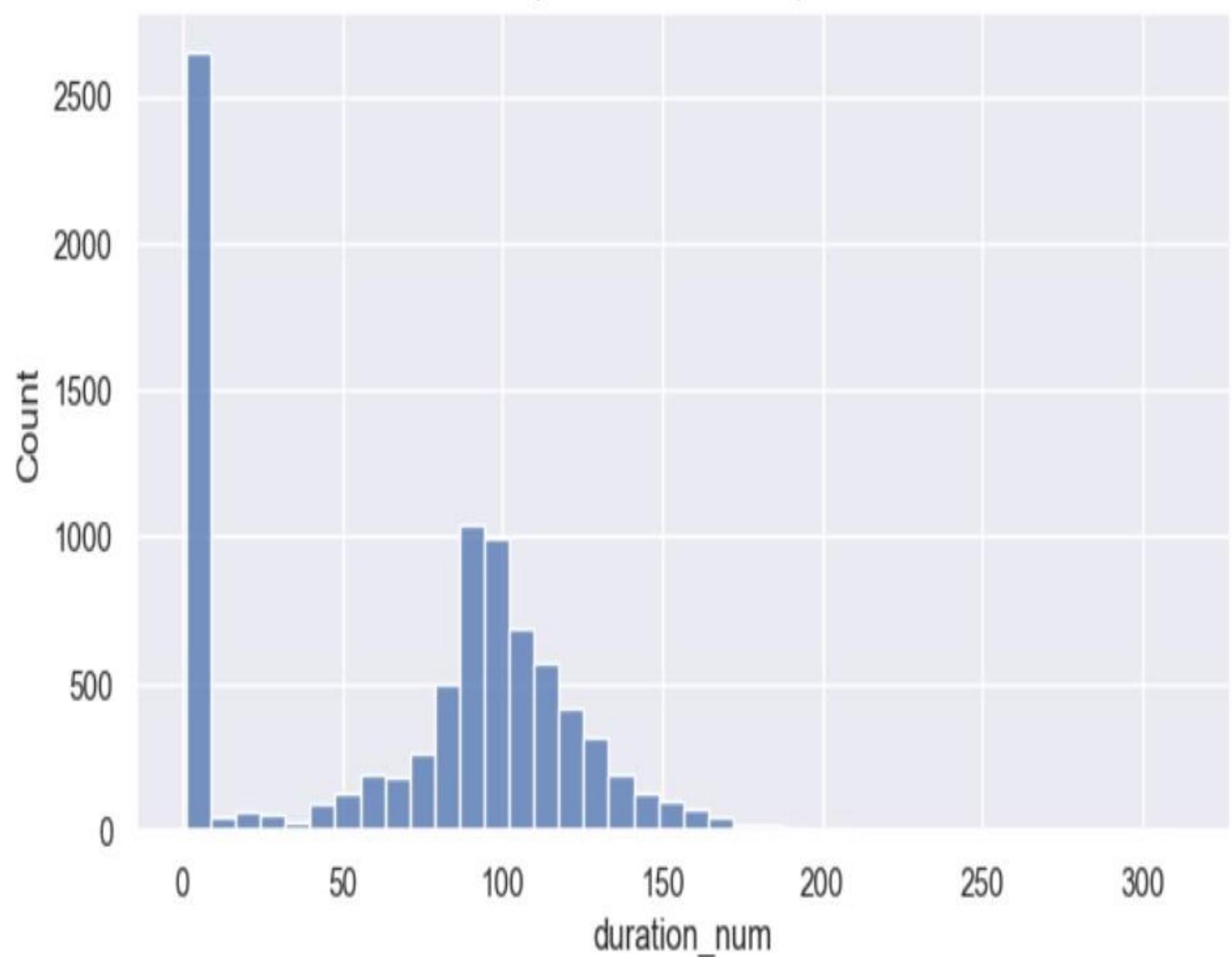
TF-IDF applied to descriptions for semantic representation.



5 Split Dataset

Divided into training and testing sets for model validation.

Duration (minutes or seasons) distribution



Classification Models: Movie vs. TV Show

Three machine learning models were trained to predict content type:



Logistic Regression

A baseline model for binary classification.



Random Forest

Ensemble method for robust prediction.



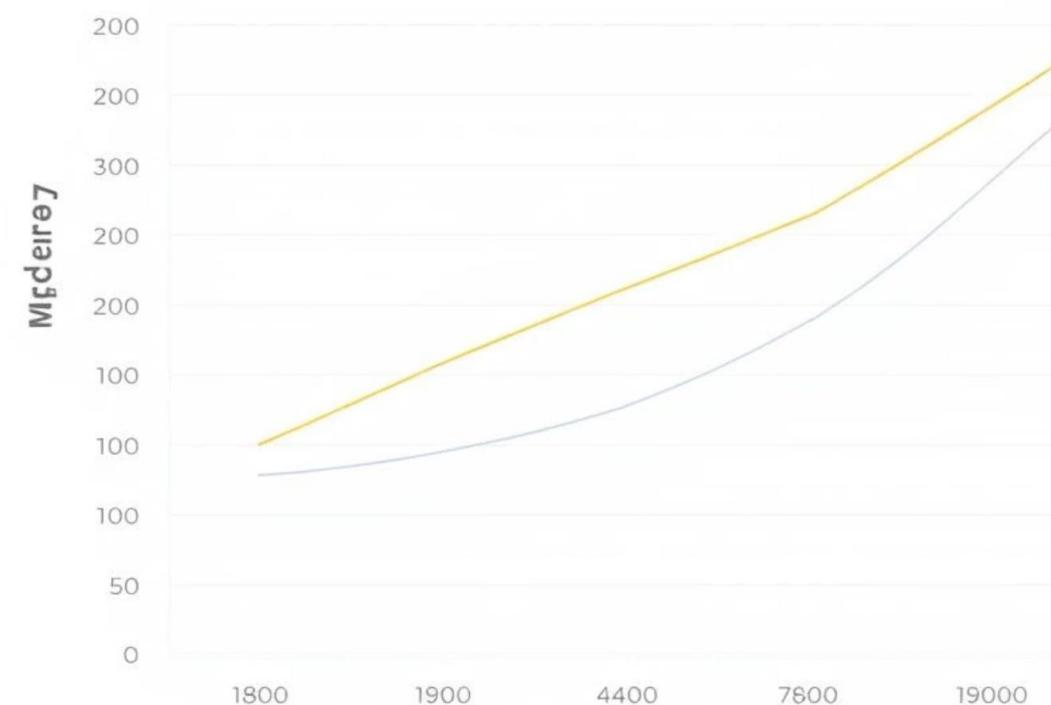
Gradient Boosting

Powerful algorithm for high accuracy.

Evaluation Metrics: Accuracy, Precision, Recall, and F1 Score were used to assess model performance.

The model with the highest F1 Score was selected as optimal.

Machine Learning Classification Chart



Clustering Analysis: Discovering Content Groups

K-Means clustering applied to categorize similar Netflix titles.

- K-Means Algorithm

Clustered TF-IDF vectors derived from content descriptions.

- Dimensionality Reduction

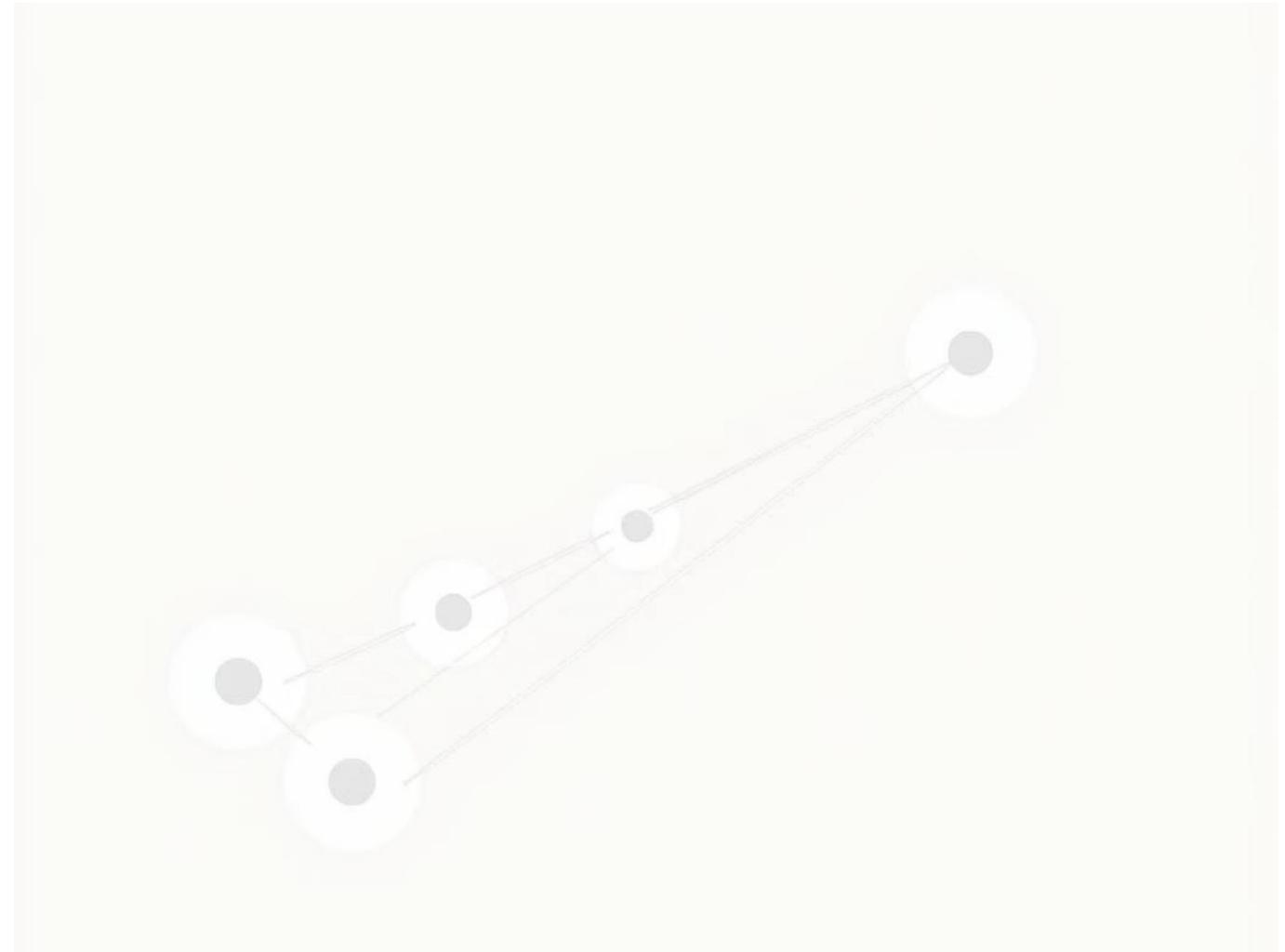
TruncatedSVD used for effective visualization of clusters.

- Identified Clusters

Groups emerged, such as drama-focused, kids' content, and thrillers.

- Cluster Quality

Silhouette score determined the cohesion and separation of clusters.





Content-Based Recommendation System

A personalized recommendation engine built on content similarity.



TF-IDF Vectors

Descriptions transformed into vectors for semantic comparison.



Cosine Similarity

Measures textual similarity between titles.



User Input

System takes a title, finds similar content.

Personalized Suggestions

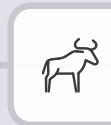
Enhances user experience with Netflix-like personalization.

Deployment: Making Models Accessible

Trained models are saved for seamless integration and reusability.

Saved Models

tfidf.pkl and kmeans.pkl are stored.



Serialization

Joblib used for efficient model saving.

Integration Possibilities:

- Web applications
- Mobile applications
- Recommendation APIs

Ensures that models can be utilized without the need for retraining, streamlining future development and implementation.

THE END

THANK YOU FOR YOUR TIME