**Business Report: Predicting Rotten Tomatoes Movie Ratings Using Machine Learning**

**Executive Summary**

This report outlines the development of a machine learning-based system to predict Rotten Tomatoes movie ratings. By analysing key features such as cast, crew, genre, budget, and release date, the system aims to assist stakeholders in the entertainment industry with data-driven insights into film performance.

**Project Objective**

The primary goal is to construct an accurate, scalable predictive model that estimates Rotten Tomatoes scores prior to a film’s release. This capability is valuable for production companies, investors, marketers, and streaming platforms seeking to forecast film reception and guide strategic decisions.

**Methodology**

**1. Data Acquisition & Preprocessing**

* Collected comprehensive movie datasets with labeled Rotten Tomatoes scores.
* Handled missing data, encoded categorical variables, and performed normalization.

**2. Feature Engineering**

* Created new features to enhance model performance.
* Used label encoding, one-hot encoding, and dimensionality reduction.

**3. Model Development**

* Trained multiple machine learning models:
  + LightGBM
  + XGBoost
  + CatBoost
* Tuned parameters using Optuna.

**4. Evaluation**

* Metrics: R², RMSE, and MAE.

**Key Findings**

* The most effective model achieved strong predictive accuracy (insert R² here).
* Genre, cast popularity, and budget were key predictors.

**Business Impact**

* Supports data-driven film development and marketing decisions.
* Reduces investment risk.
* Optimizes portfolio planning for streaming platforms and studios.

**Recommendations**

* Integrate this tool into project planning and greenlighting.
* Continuously retrain the model with updated data.
* Consider ensemble methods for even better accuracy.