

CONTENT MONETIZATION MODELER

YOUTUBE AD REVENUE

TOOLS USED: PYTHON, PANDAS, NUMPY

MACHINE LEARNING & MODELING



BY PRAVEEN.....

PROBLEM STATEMENT



- YOUTUBE CREATORS AND MEDIA COMPANIES RELY HEAVILY ON AD REVENUE, WHICH FLUCTUATES BASED ON FACTORS LIKE VIEWS, ENGAGEMENT, CTR, AND CPM. TO SUPPORT BETTER PLANNING AND CONTENT STRATEGY, THIS PROJECT BUILDS A MACHINE LEARNING MODEL TO **PREDICT YOUTUBE AD REVENUE** USING KEY VIDEO PERFORMANCE METRICS. THE FINAL PREDICTION SYSTEM IS DEPLOYED AS AN **INTERACTIVE STREAMLIT WEB APPLICATION**, ALLOWING USERS TO ESTIMATE REVENUE INSTANTLY FOR ANY VIDEO.

WORKFLOW OF PROJECT

1. Understanding the Dataset

I loaded the dataset, inspected its structure, explored column types, and validated the presence of key metrics such as views, watch-time, CTR, impressions, CPM, and revenue.

2. Exploratory Data Analysis (EDA)

I performed detailed EDA to identify patterns and relationships, including:

Correlation between features

Revenue drivers (CTR, Watch Time, CPM)

3. Data Preprocessing

I cleaned the dataset by:

Handling missing values, Removing duplicates, Converting object columns into numeric format, Scaling numerical variables using StandardScaler, Ensuring dataset consistency and quality.

4.Feature Engineering

I enhanced the dataset by creating additional meaningful features such as:

Engagement Rate = $(\text{Likes} + \text{Comments}) / \text{Views}$

Transformation of skewed variables using log transformation

These improvements helped the model learn more effectively.

5. Model Building

I experimented with multiple regression models, including:

Linear Regression, Random Forest, XGBoost, Gradient Boosting, AdaBoostRegressor

I compared their performance to select the best predictive model .

6. Model Evaluation

I evaluated all models using standard metrics:

MAE (Mean Absolute Error)

MSE (Mean Squared Error)

R^2 Score

This helped me identify the most accurate and reliable model.

7. Streamlit App Development

I built an interactive Streamlit application that:

Accepts input values for views, comments, watch time, likes, country, etc.

Predicts Ad Revenue in real-time

Displays insights and visualizations

Loads the trained .joblib pipeline for predictions

8. Interpretation & Insights

I analyzed model outputs to identify the top factors influencing revenue:

Higher CTR leads to higher revenue

Watch Time strongly impacts earnings

CTR means **Click-Through Rate**.

CTR measures **how many people clicked your video after seeing it**.

Formula:

$$\text{CTR} = \frac{\text{Clicks}}{\text{Impressions}} \times 100$$

Simple Example:

- Your video thumbnail was shown **1,000 times** (impressions)
- 50 people clicked** your video

$$\text{CTR} = \frac{50}{1000} \times 100 = 5\%$$

BUSINESS USE CASES.

1.Content Strategy Optimization

Helps creators identify which video types and performance factors generate the highest ad revenue.

2. Revenue Forecasting

Allows media companies to estimate future earnings based on expected video performance.

3. Creator Analytics Tools

Can be integrated into platforms to provide revenue insights and decision support for YouTubers.

4. Ad Campaign Planning

Helps advertisers predict ROI by analyzing how content performance impacts ad revenue.

SOLUTIONS TO IMPROVE BUSINESS & INCREASE YOUTUBE INCOME.

1. Improve CTR

- Better thumbnails & titles
- More clicks → more views → more revenue

2. Increase Watch Time

- Engaging intros & storytelling
- Higher watch time boosts ranking and ad earnings

3. Focus on High-CPM Topics

- Finance, Tech, Business, Education

These categories pay higher ad rates

4. Boost Engagement

- Ask viewers to like, comment, share
- More engagement → better visibility → higher revenue

5. Upload Consistently

- Regular uploads attract more viewers
- More videos = more monetization

6. Improve SEO

- Use strong keywords in title & description
- Better search ranking = more views and revenue

7. Follow Ad-Friendly Guidelines

- Avoid restricted/controversial topics
- Ensures more ads and higher earnings

8. Add Extra Income Streams

- Memberships, Super Chat, Affiliate links, Sponsorships
- Helps increase total revenue beyond ads

THANK YOU