Evaluating an AI Marketing Mix Model's Performance

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Objective

The goal was to evaluate how well the AI revenue prediction model performs compared to actual revenue, using metrics and visuals to identify accuracy, bias, and areas for improvement.

Table of contents

01
Why It Matters

Forecasting with AI

AI Modeling Matters

Purpose of MMM

- Estimate each channel's contribution to sales

- Guide where to spend the next dollar for maximum ROI

AI Modeling: Pros

- Captures nonlinear relationships

- Works at granular (hourly) resolution

- Automates model updates and adaptation

AI Modeling Matters

AI Modeling: Cons

- "Black box" interpretability challenge

- Harder to explain *why* a model made a prediction

Why This Matters

- Transparency is critical to trust

- Businesses need to understand both performance and drivers of predictions

02

Model Performance Overview

KPI Overview

	Production	Development
MAE	$1,105.19	$1,299.81
RMSE	$2,158.41	$2,168.12
MAPE	20.80%	10.27%

What Does it Mean?

Average Error

On Average, the model's predicted revenue is off by $1,105.19 from the actual revenue in *production less than development's* $1,299.81.

Largely Weighted Mistakes

Larger Errors in the model predictions can deviate from actual revenue predictions by $2, 158.41 in *production less than development's* $2,168.12.
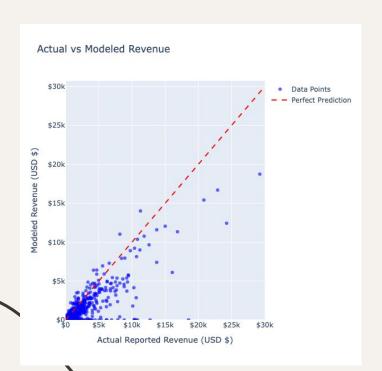
Percentage of Error

On Average, the model is off about 20.80% of actual revenue i*n production more than double* compared to development's 10.27%, Both good in terms of forecasting.
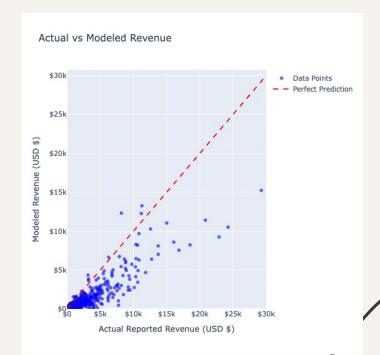
03

Accuracy & Trends

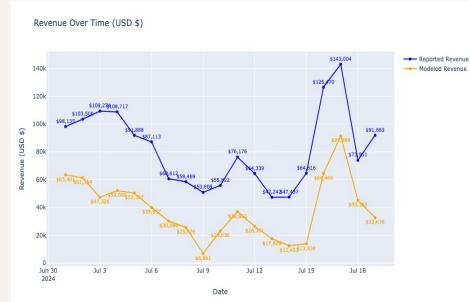# Most Points lie Under the diagonal : Underestimation

Production

Development

The beginning and end of July have **Huge Lags** in prediction

Production

Development

04

Error Analysis
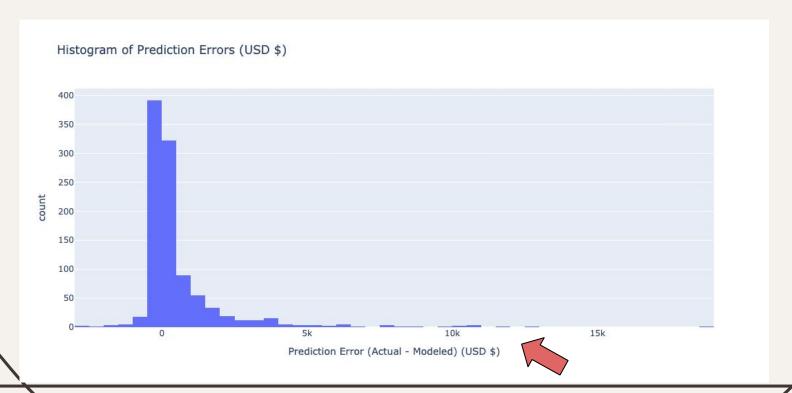
Around 4 instances of error Over $1,000

Production

Residual (Actual - Modeled) Over Time (USD $)

Around 4 instances of error Over $1,000

Development

Residual (Actual - Modeled) Over Time (USD $)
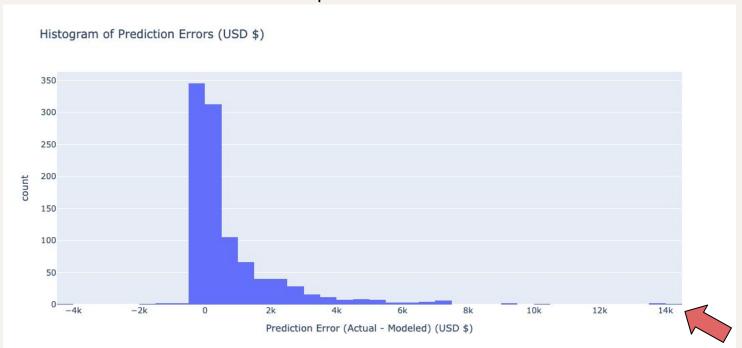
Prediction Errors Center at 0 but huge tail indicated

Production

Histogram of Prediction Errors (USD $)

Prediction Errors less centered at 0 but huge tail indicated

Development

Histogram of Prediction Errors (USD $)
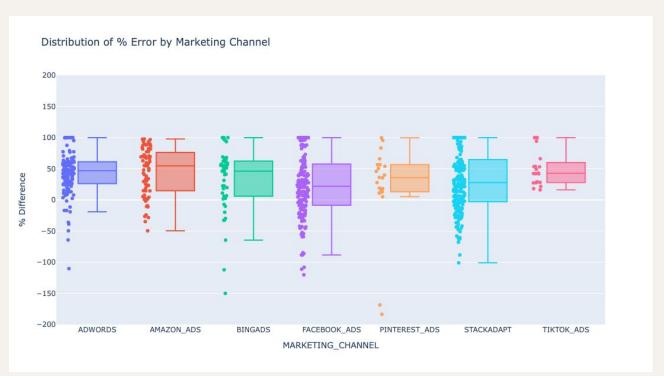
05

Channel & Feature Insights

Wide Distributions of Error Across Channels

Production

Distribution of % Error by Marketing Channel
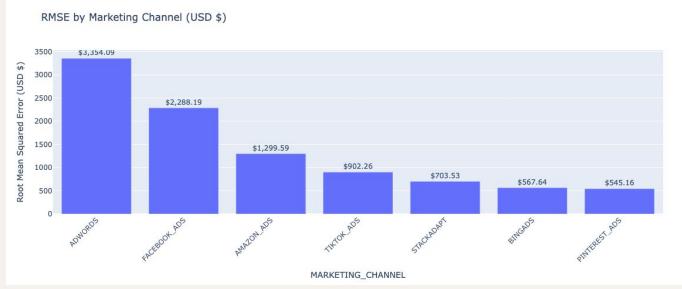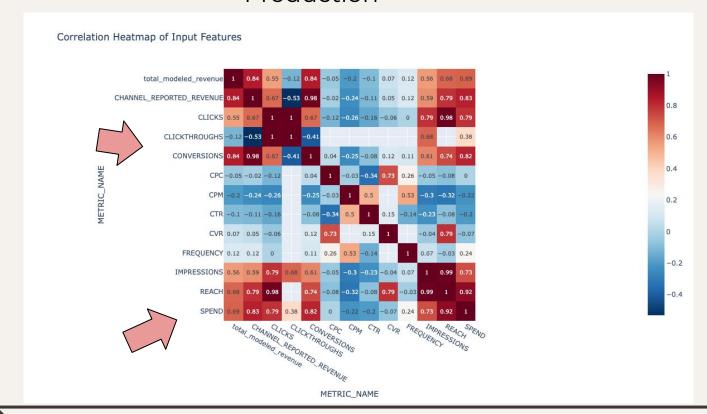
Adwords and **Facebook ADS** Have the highest unpredictability

Production

RMSE by Marketing Channel (USD $)

Highly Correlated between Spend, Reach, and Conversions

Production

Correlation Heatmap of Input Features

06

Recommendations

Whats Next?

Reduce Errors & Enhance Features:

Tune model, explore alternative algorithms, and add features like seasonality or promotional events to better capture revenue patterns.

Improve Data Quality & Granularity:

Ensure accurate, consistent data and test predictions at different aggregation levels (daily/hourly vs. weekly/monthly).

Increase Interpretability & Monitoring:

Apply explainable AI techniques to understand channel contributions and continuously track model performance over time.