

# Data Request

## Product Goal:

Develop a system to measure and forecast the sales impact of marketing events for restaurants.

- Use external marketing platform data (Instagram, Facebook, Yelp) and correlate it with historical and real-time sales data.
- Integrate a causal modeling framework to estimate the effect size and optimize future marketing investment.

## Core Causal Framework

We aim to answer questions like:

- *“Did this marketing event cause an increase in sales?”*
- *“By how much?”*
- *“Which types of events yield the highest return?”*

### Causal Structure:

- **Treatment:** Marketing events (post type, timing, influencer type)
- **Outcome:** Sales
- **Confounders:** Seasonality, day of week, weather

### Causal Roles by Category:

Category	Causal Role
Event Timing	Treatment Timing
Post Type	Treatment Heterogeneity
Engagement	Treatment Strength / Intermediate Variable
Influencer Info	Treatment Modifier
Budget / Targeting	Treatment Attributes
Social Feedback	Outcome Proxy / Spillover Effect
Sales Data	Outcome
Confounders	Covariates / Adjustment Variables

## Causal Application Example

- **Goal: Estimate the impact of June 1st Instagram Reel**
- 1. **Treatment Period:** Event date and a window after (e.g., June 1 - 7)
- 2. **Baseline Period:** Similar days/weeks before event (e.g., May 24 - 31)
- 3. **Feature Usage:**
  - Engagement metrics → treatment intensity
  - Influencer type, budget → treatment heterogeneity
  - Yelp / Social Proof → delayed / indirect effect modeling
- 4. **Outcome:**
  - Estimated uplift in daily or weekly sales
  - ROI metrics, meta-features for forecasting (e.g., cost per uplifted sale)

## Required Data & Sources

Category	Details	Example	Source/API
Event Timing	Post upload time	2025-06-01 15:00, Reel	Instagram Graph API  Meta Ads API
	Campaign start/end time		
	Platform type		
	Timezone		
Engagement Metrics	Impressions	12002 views	Instagram Insights  Facebook Page Insights
	Likes	2130 likes	
	Comments		
	Shares		
	Saves		
	Profile Clicks		

<b>Influencer Metadata</b>	Follower Count	30k followers	Instagram Graph API
	Post Type	Reel	Manual annotations
	View count	In-store review	
	Engagement	15k views	
	Visit Type		
	Sponsorship Disclosure		
<b>Ad Investment</b>	Influencer payment	\$300	Meta Marketing API
	Ad spend	Women	
	Target audience (age, location, etc.)	Age of 25-34	
	Target geo	LA	
<b>Social Proof</b>	Pre/Post ratings	4.1 → 4.3	Yelp Fusion API
	Review Count	25 new reviews	
	Photo Reviews		
	Keywords		

## Reason for Each Data Types

Data Type	Purpose	Role in Prediction Model
Event Timing	Align time series with sales	Analyze lag between marketing and sales spikes
Engagement Metrics	Measure campaign intensity	Use engagement to estimate potential sales uplift
Influencer Info	Qualitative event signal	Understand what type of influencer drives results
Budget/Ad Info	ROI evaluation	Measure cost-effectiveness across campaigns
Yelp/Social Feedback	Branding & Indirect effects	Capture longer-term brand or perception shifts

## System Flow Overview

- 1. Event Registration**
  - Store post time, influencer info, investment details
- 2. Automated Data Collection**
  - Pull performance metrics from Instagram, Facebook, Yelp
- 3. Feature Engineering**
  - Create features like “Event Strength,” “Post Type,” “Cost per Engagement”
- 4. Modeling**
  - Compare sales before/after event to estimate sales uplift
- 5. Event-Based Forecasting**
  - Input planned events → forecast expected impact on sales

# Detailed Data Types for Marketing Impact Forecasting

## 1. Event Timing Data

- Purpose:
  - Align marketing actions with time-series sales data for lag/impact analysis

Field	Description	Example
post_timestamp	Exact time the Instagram/Facebook post went live	2025-06-01 15:00
event_start_date	When the campaign/promotion officially began	2025-06-01
event_end_date	When the campaign ended	2025-06-05
platform	Marketing channel/platform name	IG, FB, Yelp
post_type	Type of content used	Reel, Story, Feed, Yelp Review
timezone	Timezone of post/campaign	America/Los_Angeles

## 2. Engagement & Performance Metrics

- Purpose:
  - Quantify how engaging or viral each campaign was

Field	Description	Example
impressions	Number of times the post was shown	12,000
reach	Number of unique users who saw the post	9,500
likes	Number of likes	2,100
comments	Number of comments	150
shares	Number of shares or re-posts	300
saves	Number of times post was saved/bookmarked	450
profile_visits	Clicks to profile	200
website_clicks	Clicks to external URL (e.g., menu/reservation link)	17.5%

### 3. Influencer/Creator Metadata

- **Purpose:**
  - Capture context of who delivered the message and how credible/influential they are

Field	Description	Example
influencer_name	Instagram or Facebook handle	@foodie_jane
follower_count	Number of followers at posting time	35,000
influencer_type	Categorization (macro, micro, nano, celebrity)	Micro
post_style	How content was made (in-store visit, unboxing, etc.)	In-store visit + review
location_tagged	Whether the restaurant was tagged	Yes
sponsorship_disclosed	Was #ad or partnership disclosed	Yes
view_count	Views on influencer's post	15,003
engagement	Combined engagement metrics	2,500 likes + 300 shares

### 4. Investment & Targeting Data

- **Purpose:**
  - Link budget and campaign scope to returns and optimize future ROI

Field	Description	Example
influencer_payment	Amount paid to the influencer	\$350
ad_spend	Paid advertising budget for promotion	\$500
total_campaign_cost	Total investment (sum of above + misc.)	\$850
target_age_range	Age group targeted by ads	25-34
target_gender	Gener(s) targeted	Female
target_region	Geographic region targeted	Los Angeles, CA
ad_objective	Ad campaign goal (e.g., awareness, conversion)	Store Visits

## 5. Social Proof & Review Data (Yelp/Facebook/Google)

- **Purpose:**
  - Detect brand perception shifts or organic buzz correlated with campaign

Field	Description	Example
avg_rating_before	Yelp/Facebook rating before event	4.1
avg_rating_after	Rating after campaign ends	4.3
review_count_before	Number of reviews before event	180
review_count_after	Number of reviews after event	205
photo_review_count	Number of photo reviews during event period	20
keyword_mentions	Keywords mentioned in new reviews	“promotion” “influencer”, etc.