# **AI-Powered Trend & Demand Analyzer**

## **🚀 Introduction**

Welcome to the AI-Powered Trend & Demand Analyzer Hackathon! In this challenge, you'll work with simulated fashion e-commerce data to uncover emerging product trends and forecast demand using AI/ML techniques.

## **🎯 Objective**

Build a working prototype of an AI-powered system that can:

* Detect forecasted emerging product trends
* Forecast demand for products, categories, and attributes

by analyzing:

* Customer feedback
* Search behavior
* Sales data

## **🗃️ Dataset Overview**

You will receive **4 CSV files** containing simulated e-commerce data:

| **File Name** | **Description** |
| --- | --- |
| product\_catalog.csv | Catalog of fashion products with attributes, metadata, and descriptions |
| search\_trends.csv | Historical search queries with timestamps and usage frequencies |
| customer\_feedback.csv | Customer reviews with sentiment indicators, noise, and typos |
| sales\_data.csv | Product-level sales records spanning a 12-month period |

## **📂 File Descriptions**

### **1. product\_catalog.csv**

Each row represents a product and its metadata:

| **Column Name** | **Description** |
| --- | --- |
| productId | Unique product identifier (e.g., P1001) |
| title | Generated product title |
| description | Marketing-style product description |
| category | Main product category (e.g., dress, boots) |
| modifiers | Product features or tags (e.g., summer) |
| keywords | SEO-related tags and identifiers |
| releaseDate | Product release date (YYYY-MM-DD) |

### **2. search\_trends.csv**

Represents how users interact with the platform via search queries. Includes occasional noise or typos.

| **Column Name** | **Description** |
| --- | --- |
| query | User-entered search phrase (may include typos/noise) |
| frequency | Number of times the query was used |
| timestamp | Date the query occurred (YYYY-MM-DD) |

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### **3. customer\_feedback.csv**

Simulated user reviews—includes positive, negative, gibberish, and misspelled content.

| **Column Name** | **Description** |
| --- | --- |
| productId | Product being reviewed |
| commentText | Free-form review text |
| rating | Rating out of 5 (may be missing) |
| reviewerName | Simulated reviewer name |
| location | City of the reviewer |
| date | Review date (YYYY-MM-DD) |

### **4. sales\_data.csv**

Product-level daily sales records across one year.

| **Column Name** | **Description** |
| --- | --- |
| productId | ID of the product sold |
| quantitySold | Number of units sold |
| timestamp | Date of sale (YYYY-MM-DD) |

## **➔ Optional Data Enrichment**

Optionally, enrich your analysis using public data sources:

* **Google Trends** – Discover rising search terms in real time
* **SEMrush** – Identify high-traffic ecommerce keywords
* **SpyFu** – Extract competitor keyword insights
* **Social Media Feeds** – Twitter or Instagram buzz for correlation with trends

## **📌 Requirements**

### **Core Functionalities**

1. **Analyze Customer Feedback and Product Reviews**
   * Extract sentiment, recurring keywords, and common pain points from product reviews, and analyze ratings in relation to sales volume.
2. **Identify Emerging Trends**
   * Detect and forecast rising product categories, modifiers, or related keyword combinations by analyzing their search frequency growth over defined periods to identify emerging trends.
3. **Demand Forecasting**
   * Predict future demand for existing products or categories by extracting attribute groups from keywords as weighted attributes prioritizing forecasting demand over a user-defined time period.
4. **Visualization and Insights**
   * Create clear and interactive dashboards or visual summary plots to quickly visualize forecasting insights with reference to historical data.

## **✅ Expected Output**

Your submission must include:

### **Prototype or Notebook**

* Ingests all four datasets
* Detects and ranks trends over a selected period
* Forecasts demand across selected periods
* Make assumptions as needed to proceed with the tasks
* Use appropriate forecasting models (e.g., ARIMA, XGBoost, LSTM) for demand prediction based on historical data

### **Summary Report (README.md)**

* Explains your approach and assumptions made
* Lists tools, libraries, and models used
* Provides clear run instructions

### **Example Output Files (with periodStart and periodEnd inputs)**

#### **1.top\_trending\_keywords.json**

{

"periodStart": "2025-06-01",

"periodEnd": "2025-06-30",

"searchTerms": [

{ "searchTerm": "summer dress", "growthRate": 125.3},

{ "searchTerm": "red dress", "growthRate": 124.3}

]

}

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#### **2.product\_demand\_forecast.json**

{

"periodStart": "2025-06-01",

"periodEnd": "2025-06-07",

"forecast": [

{ "productId": "P1023", "forecastedQuantity": 184 },

{ "productId": "P1051", "forecastedQuantity": 72 }

]

}

#### **3.category\_and\_attribute\_demand\_forecast.json**

{

"periodStart": "2025-06-01",

"periodEnd": "2025-06-30",

"forecast": [

{

"category": "dress",

"color":"navy",

"season": "summer",

"forecastedQuantity": 560

},

{

"category": "boots",

"color":"black",

"season": "leather",

"forecastedQuantity": 320

}

]

}

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## **📦 Submission Deliverables**

* **Source Code**: GitHub repository or zipped folder
* **Presentation Deck**: Max 6 slides outlining your solution, features, and findings
* **Demo**:  
  + Required: Live walkthrough or recorded demo (under 3 minutes)
  + Optional: Hosted web app or interactive dashboard