

**Report
On
Industry Internship**

Submitted as Partial Fulfillment of
Master of Computer Applications
Semester – IV

Developed at
INFOLABZ I.T. Services PVT. LTD.

Developed by
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Under Guidance of
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Acknowledgment

I would like to express my sincere gratitude to all those who supported me throughout the development of this project, titled "**AI-Driven Revenue Forecasting and Trend Analysis for Business Growth.**" I sincerely thank my mentor **Mr. Meet Thakar** for his invaluable guidance and support throughout the project. I'm grateful to the instructors at **InfoLabz IT Services Pvt. Ltd.** for their expert insights that enriched my learning. Special thanks to **Dr. Devarshi Mehta** (Project Coordinator), **Dr. Harshal Arolkar** (Head of PG Programme), and **Dr. Savita Gandhi** (Dean, PG Programme) for their academic encouragement and for providing this valuable opportunity. This project has significantly enhanced my skills in **Python, machine learning**, and **Streamlit**, marking a key milestone in my professional growth.



Introduction of company and Guide

Infolabz IT Services Pvt. Ltd. is a forward-looking technology solutions provider committed to delivering innovative, scalable, and customized digital services. Founded with the goal of transforming how businesses operate in the digital age, Infolabz specializes in a wide range of IT services including software development, mobile app development, web design, data science, machine learning, cloud computing, IoT solutions, and cybersecurity.

Guide Name: – Mr. Kirit Suthar

Mr. Kirit Suthar, a Senior Developer at Infolabz IT Services Pvt. Ltd., serves as the technical guide and mentor. With extensive experience in software development and project implementation, he provides valuable support and direction throughout the engagement.



Abstract giving brief introduction about role/system

As a Data Analyst, I contributed to building a predictive system using the **Random Forest** algorithm to forecast future revenue trends based on historical data. My responsibilities included **data gathering, cleaning, EDA, feature selection, and model development** for accurate forecasting. I also helped design a **Streamlit-based user interface** that allows users to upload data, visualize trends, detect anomalies, and view forecasts. This project empowered businesses with **data-driven insights** for smarter decisions, better risk management, and sustainable growth.

Project Profile

Project Title	AI-Driven Revenue Forecasting and Trend Analysis for Business Growth
Frontend	Streamlit (Python)
Backend	Python , Machine Learning Models , AI models
Tools	Streamlit, Jupyter Notebook, PyCharm, Matplotlib, Plotly, GitHub
Developed By	Janki Panchal - 202300719010042
Guided By : - Internal at Institute External at Company	Mr. Meet Thakar Mr. Kirit Suthar




Task with description and screenshots

Task Title: AI-Driven Revenue Forecasting and Trend Analysis for Business Growth

Register Page

The Register page enables new users to create an account by providing a username, email, password, and confirming the password. Users must verify their email via an OTP sent to their email address, enter CAPTCHA text for security, and complete the registration process. After successful registration, the user's data is saved, and they are notified of a successful account creation, ready to log in.

 RevTrend AI

 Login

 Register

Create an Account

Username

Email

Password

Confirm Password

Send OTP

Enter the OTP sent to your email

CAPTCHA: 

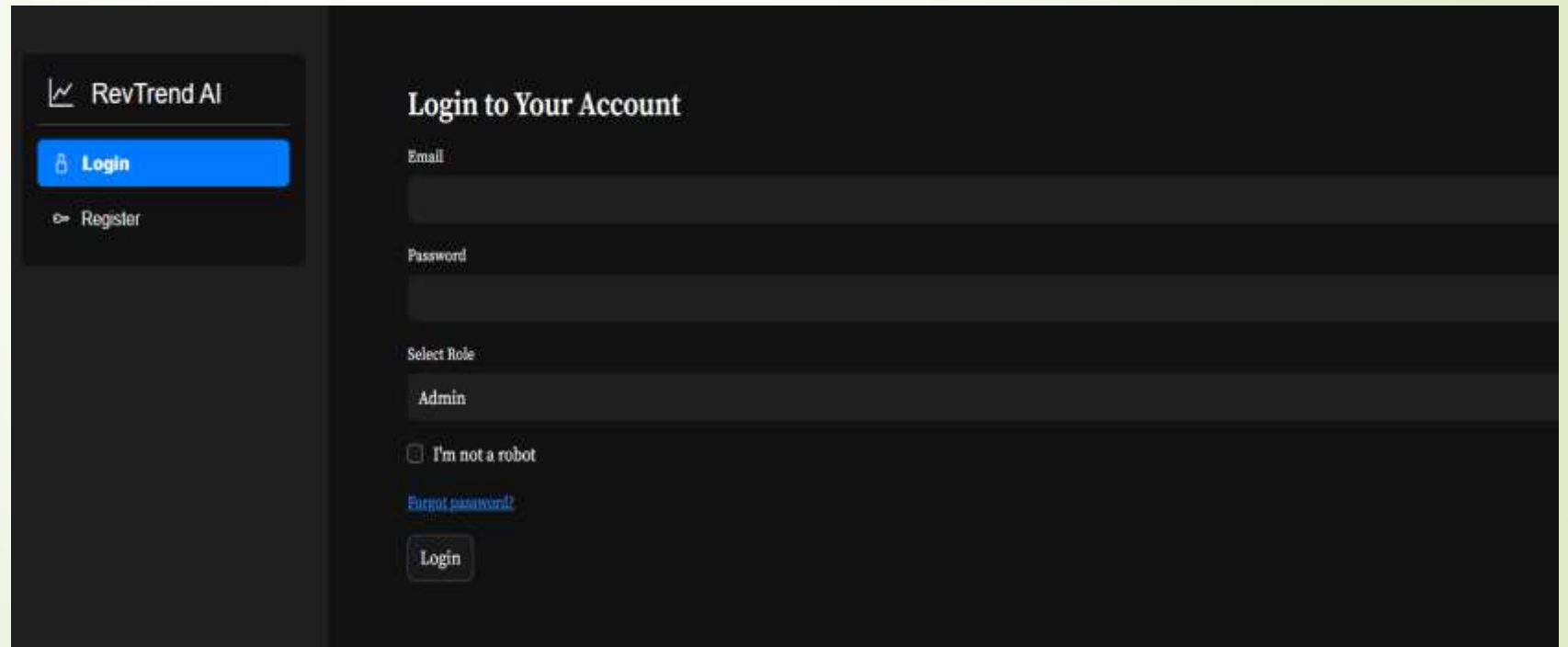
Refresh CAPTCHA

Enter CAPTCHA here


Register

Login Page

The Login page allows users to securely access their accounts by entering their email, password, and selecting their role (Admin, Analyst, or Manager). After successful login, the user is redirected to the "Home" tab, and their session is initialized with the selected role and username.



The screenshot displays the login interface for RevTrend AI. On the left, a dark sidebar contains the RevTrend AI logo, a prominent blue 'Login' button, and a 'Register' link. The main content area, titled 'Login to Your Account', features input fields for 'Email' and 'Password', a 'Select Role' dropdown menu currently set to 'Admin', a checkbox for 'I'm not a robot', a 'Forgot password?' link, and a final 'Login' button.

 RevTrend AI

Login

Register

Login to Your Account

Email

Password

Select Role

Admin

☐ I'm not a robot

[Forgot password?](#)

Login



Data Ingestion & Preprocessing

This module allows users to seamlessly upload their historical revenue data in CSV format for further analysis. It performs essential preprocessing steps such as handling missing values, standardizing date formats, and detecting outliers using Z-score techniques. The goal is to ensure that your dataset is clean, consistent, and structured correctly before feeding it into forecasting models. Through this intuitive interface, users can preview raw and cleaned data, choose to remove anomalies, and download the processed dataset for use in future modules. This step forms the foundation for accurate AI-driven revenue predictions and business insights.

RevTrend AI

Home

Data Ingestion & Preprocessing

Trend Analysis & Visualization

Sales Analysis

Revenue Forecasting

Anomaly Detection

User Dashboard

Settings

Help & Documentation

About Us

Log Out

Data Ingestion & Preprocessing Module

Upload, clean, and prepare your data effortlessly.

This module ensures your revenue data is formatted correctly, detects missing values, and readies it for deep AI analysis.

Upload your historical revenue data (CSV format):



Drag and drop file here

Limit 200MB per file • CSV

Browse files



AI_revenue_forecasting_dataset.csv 13.1MB



File uploaded successfully!

	Date	Product_ID	Product_Name	Category	Subcategory	Revenue	Quantity_Sold	Unit_Price	Region	Store_ID	Customer_Ty
0	2022-06-14	PID45344	Shirts 804	Apparel	Shirts	2379.6	8	297.45	Central	ST016	New
1	2023-02-11	PID19958	Shirts 172	Apparel	Shirts	2680.02	18	148.89	North	ST015	New
2	2023-11-16	PID13673	Fruits 766	Grocery	Fruits	2342.58	6	390.43	West	ST003	New
3	2023-04-23	PID17400	Board Games 816	Toys	Board Games	6810.10	17	401.02	West	ST003	Returning

Preprocessing Steps

1 Handling Missing Values

Great! Your dataset has no missing values. Ready for the next step!

2 Date Formatting

Original 'Date' column preview:

	Date
0	2022-06-14
1	2023-02-11
2	2023-11-16
3	2022-04-22
4	2023-04-05

Date formatting applied successfully!

Formatted 'Date' column (dd-mm-YYYY):



Trend Analysis & Visualization

- This module enables users to uncover valuable insights from their historical revenue data using interactive and dynamic visualizations. It provides multiple tabs for in-depth exploration of key performance indicators such as revenue by product category, region, customer type, and sales channel. Users can analyze the impact of promotions, track seasonal patterns, and detect anomalies with heatmaps.
- From insightful bar charts to geographic map visualizations and donut charts, each visualization helps businesses understand their strengths, bottlenecks, and opportunities. Interactive summary tables accompany each graph to offer quick numerical insights. This module forms a core part of the forecasting pipeline by offering visual clarity into past revenue trends, allowing for informed, data-driven decisions.

Trend Analysis & Visualization

Discover patterns and gain insights from your historical revenue data.

This module highlights key trends, seasonal effects, and anomalies with interactive charts and visual summaries.

[Category Revenue](#) [Region Revenue](#) [Channel Performance](#) [Promotion Impact](#) [Customer Types](#) [Seasonality](#) [Anomaly Trends](#)



Revenue by Product Category and Subcategory

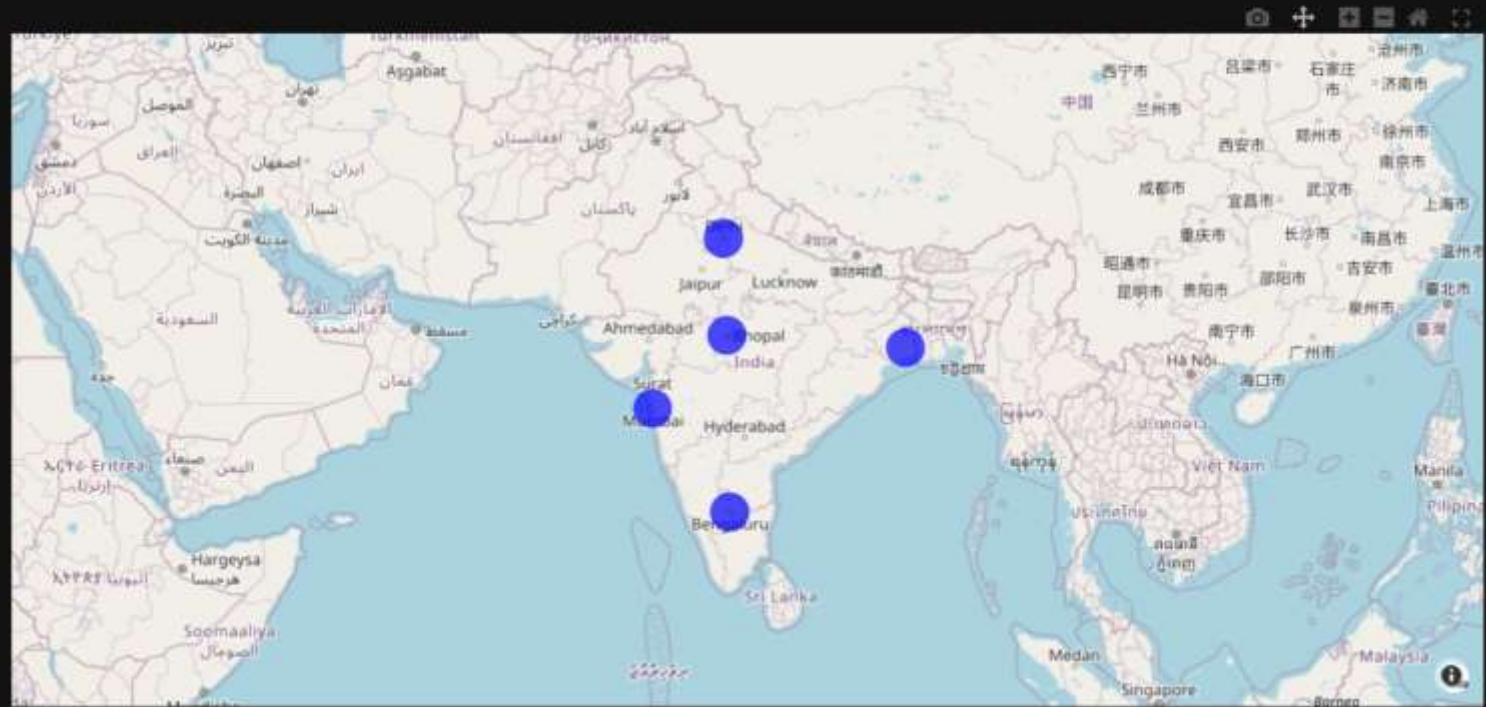
This bar chart helps you understand which product categories and subcategories are generating the highest revenue.

Revenue by Product Category & Subcategory



Revenue by Region

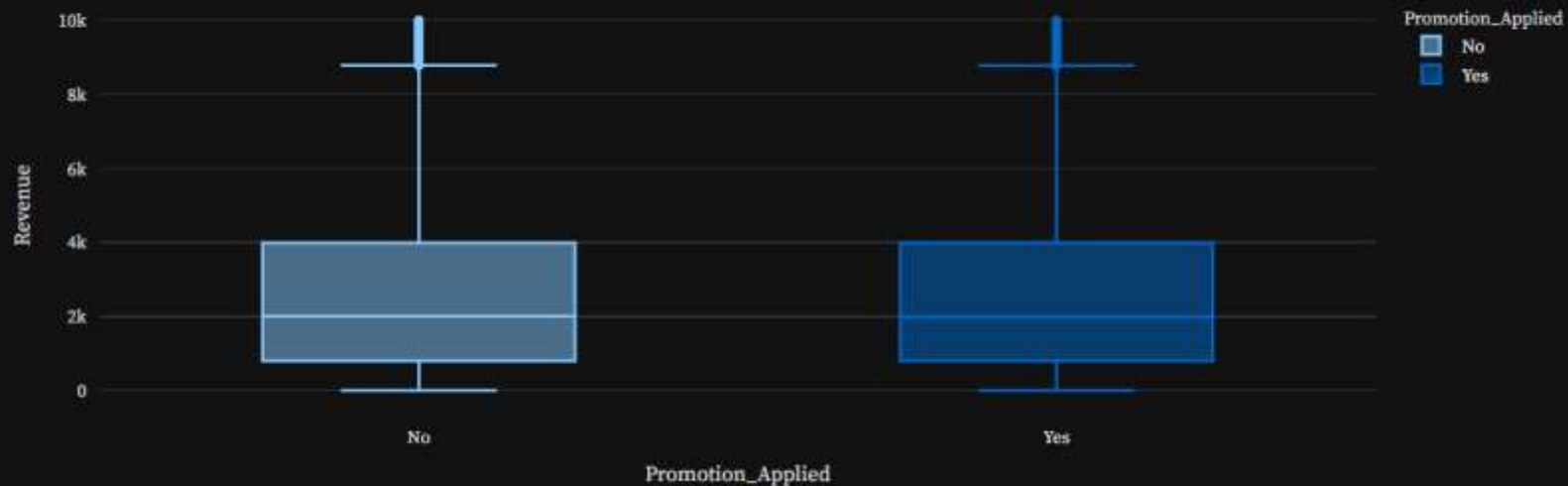
(Map-based visualization to identify regional performance.



Promotion vs Non-Promotion Revenue

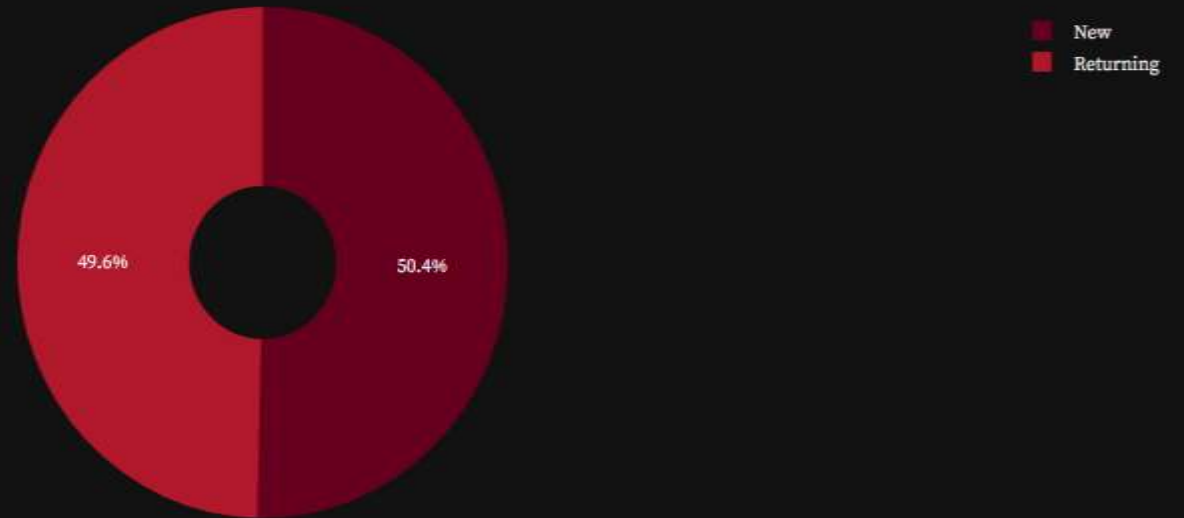
This box plot shows the revenue distribution for transactions with and without promotions.

Revenue Distribution Based on Promotion Application



Category Revenue Region Revenue Channel Performance Promotion Impact Customer Types Seasonality Anomaly Trends

Customer Type Revenue



Category Revenue Region Revenue Channel Performance Promotion Impact Customer Types Seasonality Anomaly Trends

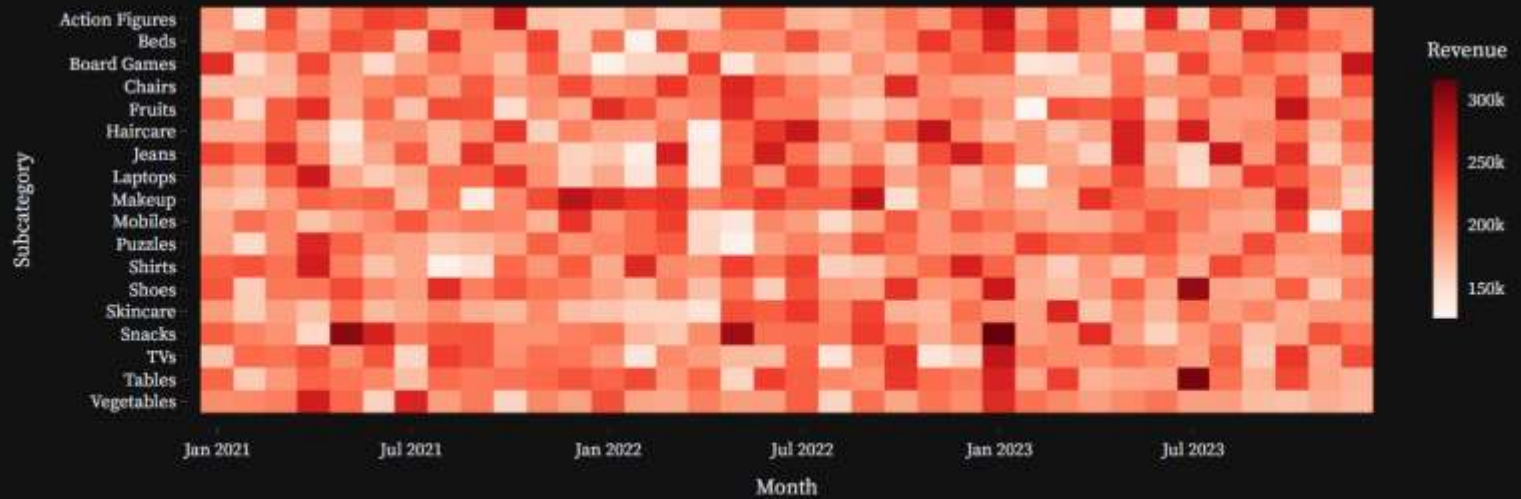
☀ Seasonal Revenue Trends



⚠️ Anomaly Revenue Heatmap

This heatmap shows revenue anomalies over time by subcategory.

Revenue Anomalies Heatmap by Subcategory and Month



Sales Analysis Module Description

The **Sales Analysis** tab empowers users to explore key sales performance metrics and discover meaningful trends from their data. This module includes a set of insightful visualizations and summaries designed to answer core business questions and highlight opportunities for growth. Here's a breakdown of what it offers:

Top Selling Products:

Quickly identify your highest revenue-generating subcategories to understand what's driving your business.

Region-wise Sales Distribution:

Explore how your sales are distributed geographically with an interactive pie chart showing revenue contributions from each region.

Revenue by Customer Type:

Analyze which customer segments (e.g., Retail, Corporate, etc.) are contributing most to your revenue, helping tailor marketing and service strategies.

Daily Sales Trend:

Visualize sales performance over time to detect daily fluctuations, seasonal spikes, or dips using an engaging line chart.

Monthly Sales Trend:

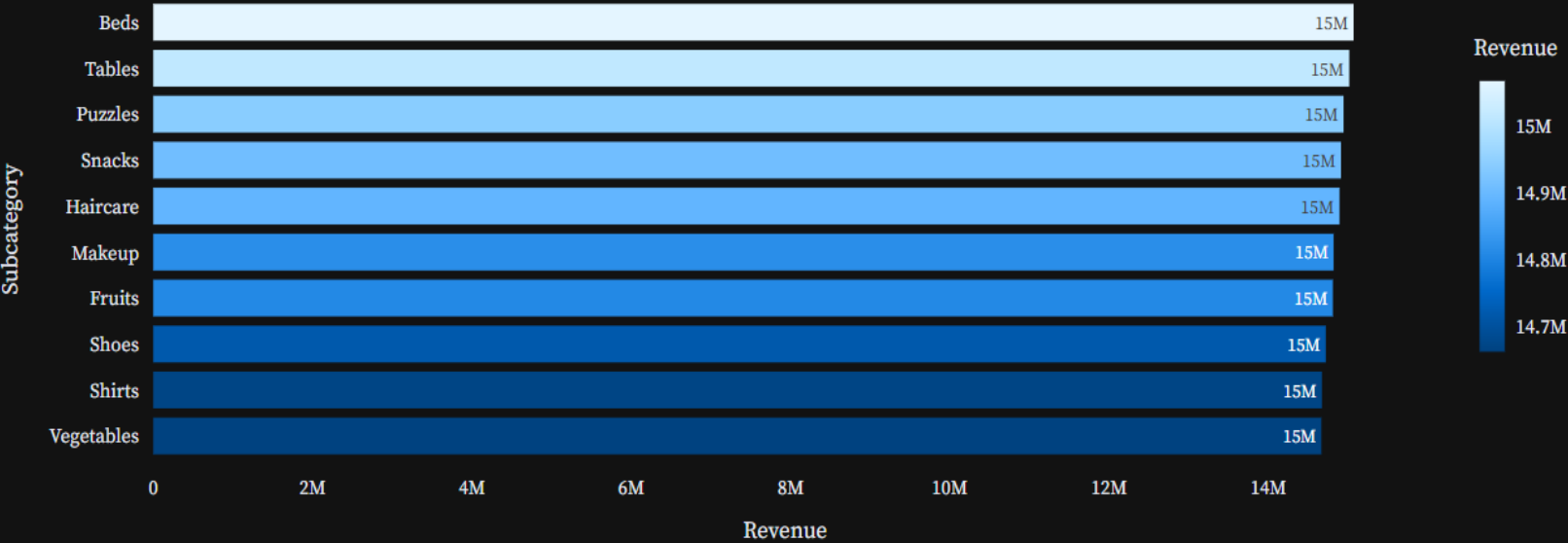
Track broader patterns in monthly revenue to make informed strategic decisions and identify long-term growth trends.

Sales Analysis

Dive deep into your sales data to understand performance drivers.
Analyze top products, regions, time periods, and more to unlock insights for growth.

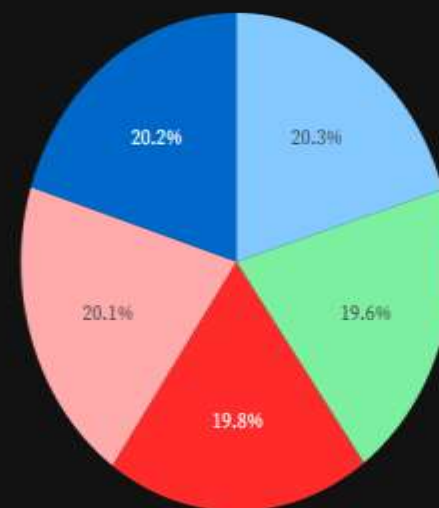
🏆 Top Selling Products






Top 10 Subcategories by Revenue



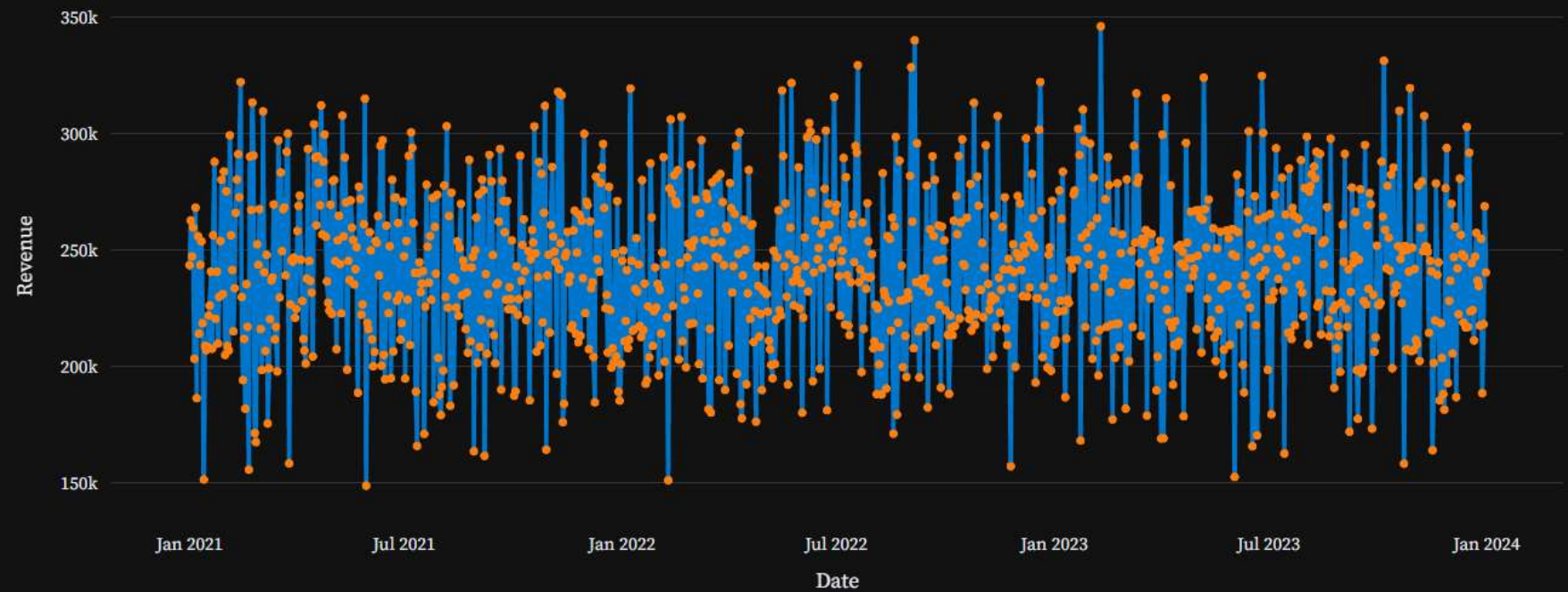
Region-wise Sales Distribution

Revenue by Region



-  North
-  South
-  Central
-  East
-  West

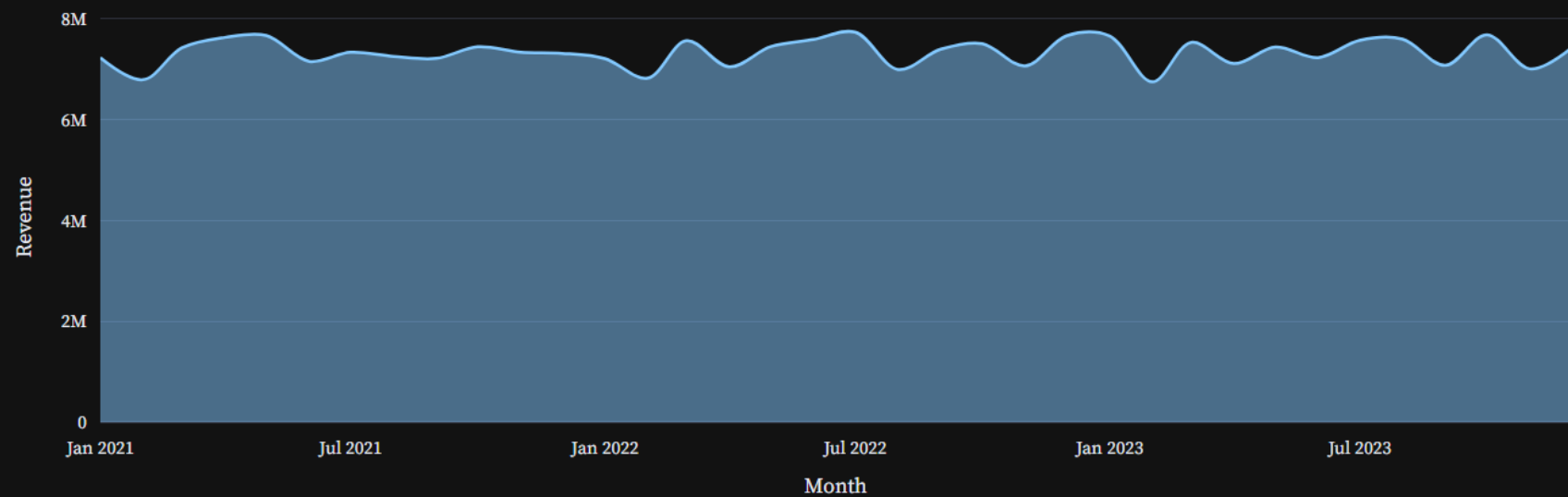
Daily Sales Trend





Monthly Sales Trend

Monthly Revenue Trend





Sales Summary Table

	Category	Subcategory	Region	Customer_Type	Revenue	Quantity_Sold
47	Beauty	Makeup	South	Returning	1763482.7	6934
130	Grocery	Snacks	Central	New	1664197.54	6168
100	Furniture	Chairs	Central	New	1659508.5	6430
34	Beauty	Haircare	North	New	1658179.65	6308
90	Furniture	Beds	Central	New	1648818.03	6353
123	Grocery	Fruits	East	Returning	1629747.83	6477
72	Electronics	Mobiles	East	New	1614449.87	6134
115	Furniture	Tables	North	Returning	1604376.02	6265
14	Apparel	Shirts	North	New	1602118.99	6185
96	Furniture	Beds	South	New	1599900.57	6139



Revenue Forecasting – AI-Driven Predictions for Business Growth

The **Revenue Forecasting** module empowers businesses to anticipate future revenue with precision by leveraging historical sales trends, seasonal patterns, and machine learning techniques. This section provides a user-friendly interface to:

Upload and preprocess data including handling categorical variables and generating useful time-based features (month, day, weekday, lags).

Train a Random Forest Regressor model on historical daily revenue data to capture key patterns and dependencies.


Forecast future revenue for 30, 60, or 90 days ahead, starting from a user-selected forecast date.

Visualize predicted vs. actual revenue trends using interactive line charts built with Plotly for better decision-making.

AI-Powered Revenue Forecasting


Predict future revenue with cutting-edge machine learning models.

This module leverages historical trends, seasonality, and external factors to deliver accurate, data-driven forecasts.


 Forecast Period

30

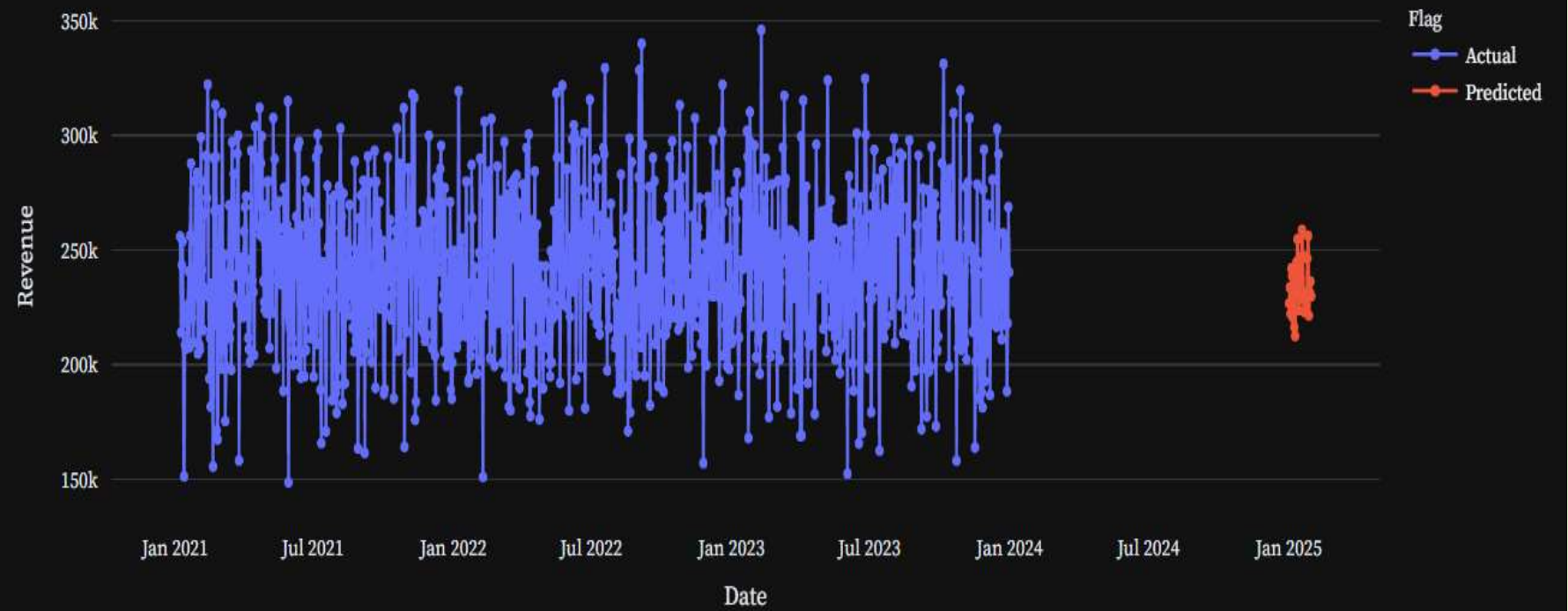


 Select Forecast Start Date

2025/01/01

 Forecast will end on: 2025-01-30

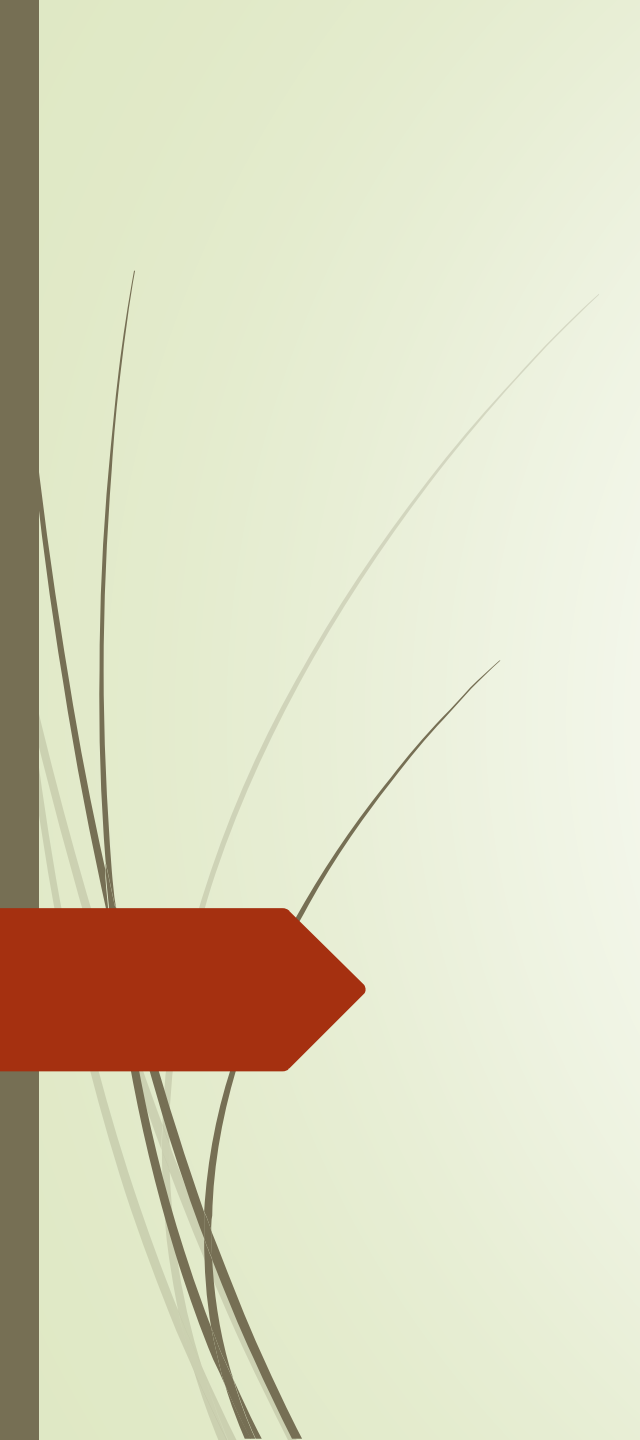
 **Revenue Forecast: Actual vs Predicted**



Forecasted Data

	Date	Revenue	Flag
1088	2025-01-01	226710.1602	Predicted
1089	2025-01-02	233669.5138	Predicted
1090	2025-01-03	222231.6837	Predicted
1091	2025-01-04	242017.3801	Predicted
1092	2025-01-05	238742.5083	Predicted
1093	2025-01-06	220571.6427	Predicted
1094	2025-01-07	233877.6454	Predicted
1095	2025-01-08	216330.3992	Predicted
1096	2025-01-09	212542.5647	Predicted
1097	2025-01-10	235551.1819	Predicted

 Download Forecasted Data (CSV)



The **Anomaly Detection** module helps businesses quickly identify irregularities in daily revenue patterns using statistical outlier detection. Leveraging **Z-score analysis**, it flags significant deviations—whether spikes or drops—that may indicate operational issues, fraud, or unexpected market behavior.

Users can interactively adjust the **Z-score sensitivity threshold** to control how strict or lenient the detection is, tailoring it to different business scenarios. A clean, interactive line chart overlays red markers on anomalous revenue points, allowing for quick visual insight.

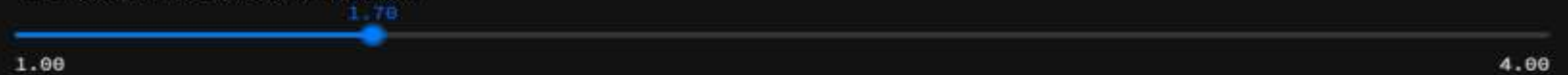
Key features include:

- Daily revenue trend chart with highlighted anomalies
- Adjustable sensitivity using Z-score threshold slider
- Tabular view of detected anomalies with dates and scores
- Downloadable CSV of anomalous records

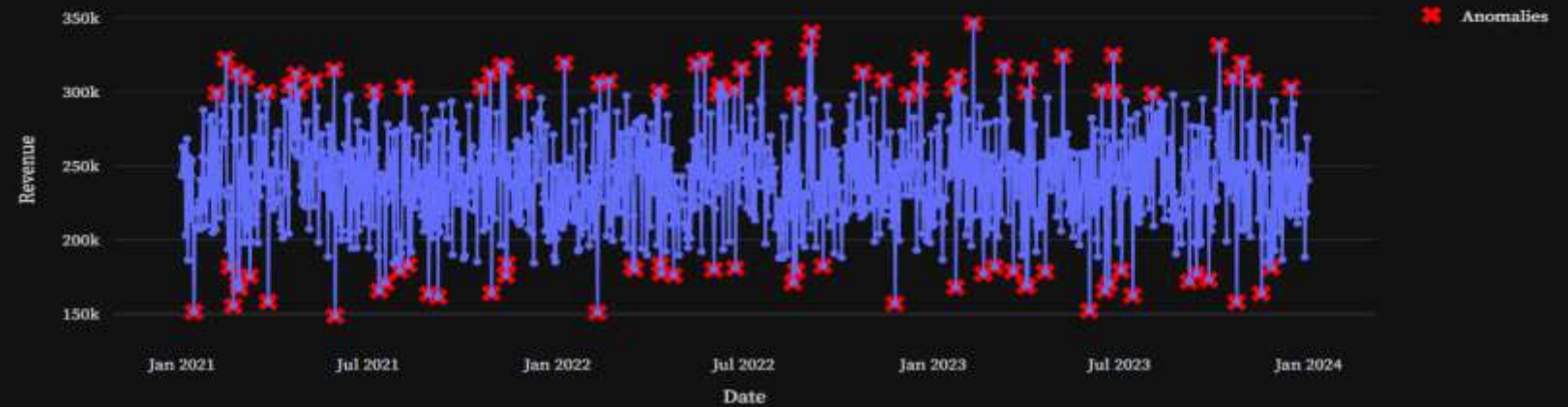
Revenue Anomaly Detection

Instantly detect unusual spikes or drops in revenue with smart anomaly detection.
Stay ahead of risks by identifying data outliers and operational irregularities early on.

⚙️ Anomaly Sensitivity (Z-score Threshold)




📊 Revenue with Anomalies Detected



Detected Anomalies

	Date	Revenue	Z_score
12	2021-01-13	151315.95	-2.6789
34	2021-02-04	299166.1	1.7398
43	2021-02-13	322119.93	2.4258
47	2021-02-17	181724.89	-1.7701
50	2021-02-20	155577.99	-2.5515
53	2021-02-23	313273.17	2.1614
55	2021-02-25	171258.47	-2.0829
56	2021-02-26	167395.82	-2.1983
62	2021-03-04	309474.26	2.0479
66	2021-03-08	175415.66	-1.9587

 Download Anomaly Data (CSV)

 What is Z-score?





User Dashboard Module Description

The **User Dashboard** provides a comprehensive view of your uploaded forecasting data, offering powerful visual analytics to evaluate performance and derive actionable insights. Designed for business analysts and decision-makers, this interactive dashboard helps you monitor trends, assess model predictions, and detect anomalies.

Key Features:

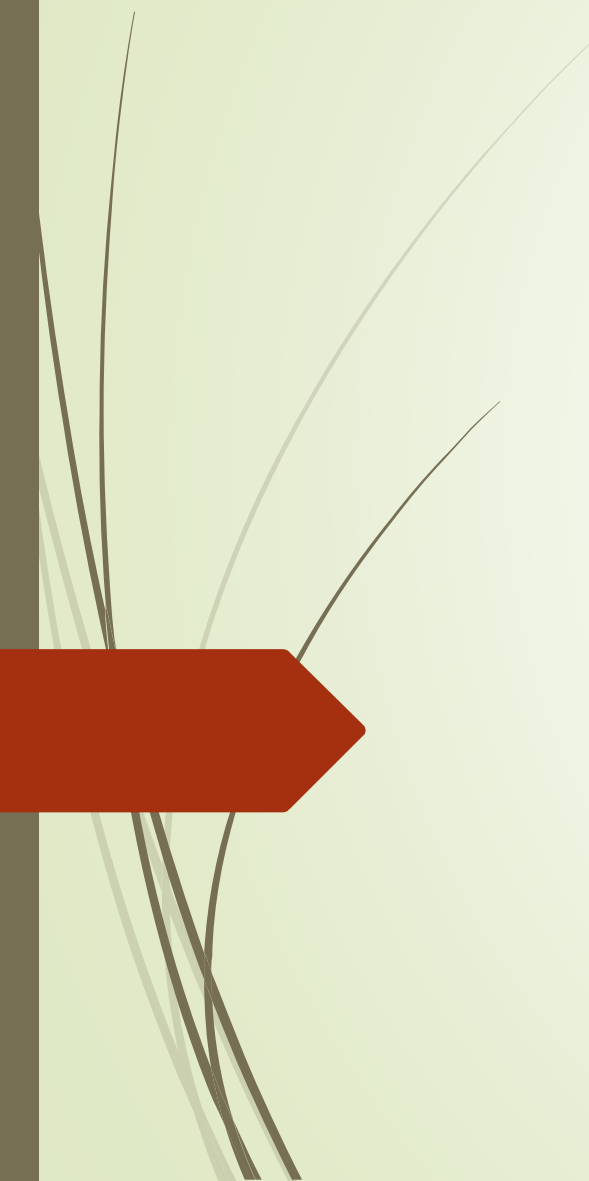
- **Monthly Revenue Trend:** Visualizes how revenue has changed over time, helping to identify seasonal effects and growth patterns.
- **Revenue by Product Category:** Highlights which categories contribute most to your revenue, aiding product-level decision-making.
- **Regional Revenue Distribution:** Displays geographic revenue breakdown with an intuitive pie chart.
- **Payment Method Preference:** Analyzes customer payment trends to optimize checkout strategies and support operations.
- **Top 10 Best-Selling Products:** Lists your highest-revenue products, helping you focus on top performers.

Dashboard Overview

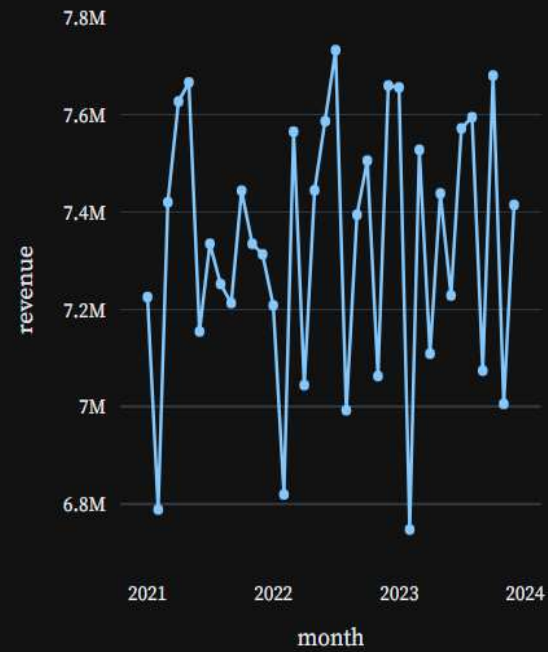
Upload your model predictions and evaluate accuracy with insightful metrics and visualizations.
Analyze trends, detect errors, and improve model decisions using real performance data.

Input Data for Analysis

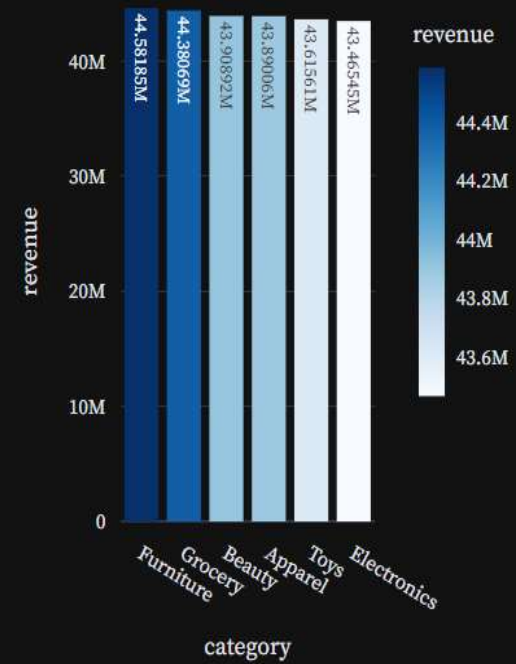
	date	product_id	product_name	category	subcategory	revenue	quantity_sold	unit_price	region	store_id	customer_ty
0	2022-06-14 00:00:00	PID45344	Shirts 804	Apparel	Shirts	2379.6	8	297.45	Central	ST016	New
1	2023-02-11 00:00:00	PID19958	Shirts 172	Apparel	Shirts	2680.02	18	148.89	North	ST015	New
2	2023-11-16 00:00:00	PID13673	Fruits 766	Grocery	Fruits	2342.58	6	390.43	West	ST003	New
3	2022-04-22 00:00:00	PID47400	Board Games 816	Toys	Board Games	6818.19	17	401.07	West	ST002	Returning
4	2023-04-05 00:00:00	PID50274	Shoes 907	Apparel	Shoes	2855.7	15	190.38	East	ST004	Returning



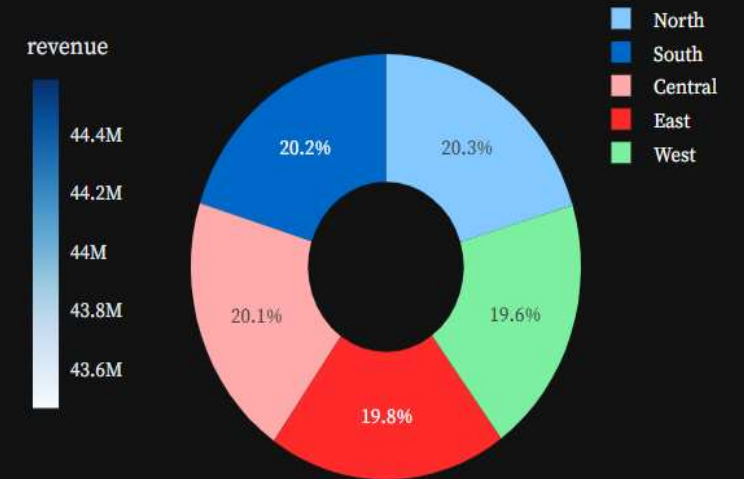
Monthly Revenue Trend



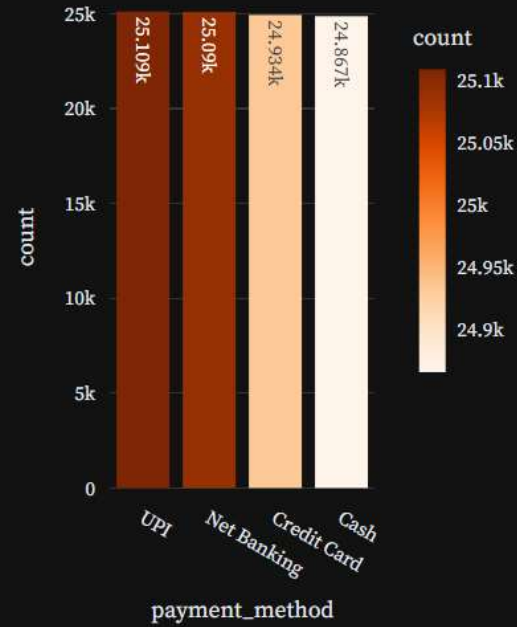
Revenue by Category



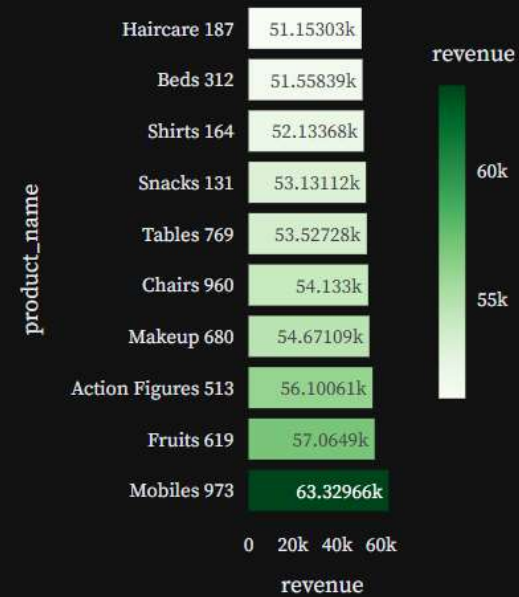
Revenue by Region



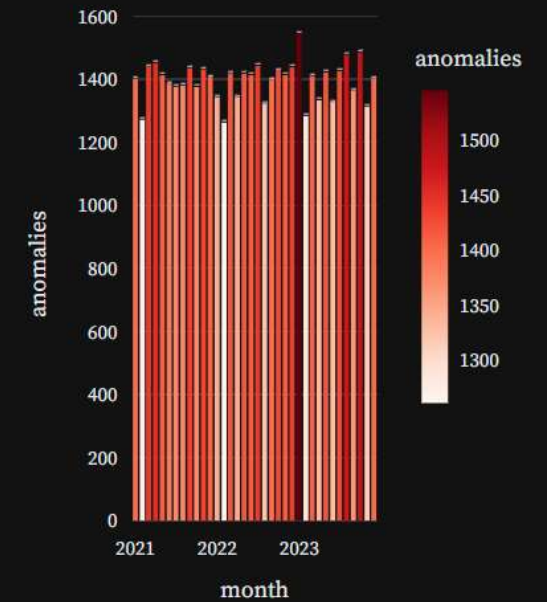
Payment Method Preference



Top 10 Best-Selling Products



Anomaly Flags Over Time



Settings Overview

Manage your user preferences, role access levels, and configuration options.
Customize your experience, update profile information, and configure system behavior securely.

User Profile Management

Update Profile Information

Full Name

Press Enter to apply

Role

Admin

Update Profile

Change Password

Reset Your Password

Change Password

Reset Your Password



Current Password



New Password



Confirm New Password



Change Password

About Us

AI-Driven Revenue Forecasting and Trend Analysis for Business Growth

Our project aims to leverage AI and machine learning techniques to forecast revenue trends for businesses across industries like retail, e-commerce, and SaaS. By using advanced algorithms, the system provides actionable insights to assist with financial planning, risk mitigation, and resource allocation.

Our Mission

To provide innovative AI-driven solutions for business growth through intelligent data analysis and forecasting.

Developer Information

This project is developed by Janki Panchal, a Data Science Intern under the guidance of Mr. Kirit Suthar, an Software Developer at InfoLabz.

Contact Us

Email: jankipanchal1609@example.com

LinkedIn: www.linkedin.com/in/janki-panchal-jp1609

Our company website: <https://infolabz.in/>



Logout Tab Description:

The **Logout** tab allows users to securely log out of their account, ending the current session. This ensures that sensitive information is protected and that users are required to log in again for future access. It's a simple but crucial step for maintaining privacy and security.

Session State Description:

Session state in Streamlit helps store information across different user interactions within a session. It maintains variables like username, role, and preferences during the user's time in the app. When a user logs in or performs other actions, their session state holds and manages this data until they log out or the session expires, providing a seamless user experience.



Learning and Work Experience

Key Learnings:

- Gained hands-on experience in **Machine Learning** using **Random Forest** for revenue forecasting.
- Built a **data pipeline** with Pandas & NumPy for time-series data preprocessing.
- Developed an **AI-based forecasting engine** for predicting future revenue trends.
- Designed a **Streamlit web app** for business users to interact with forecasts.
- Used **Matplotlib** and **Plotly** for clear, dynamic data visualizations.

Work Experience:

- Collaborated with mentors and analysts to align the system with real-world business needs.
- Contributed to **model development, tuning**, and validation for better accuracy.
- Designed a **user-friendly UI** in Streamlit for seamless access by different user roles.

Salient Features and Achievements

Salient Features:

- **Role-Based Login:** Secure dashboards for Admin, Analyst, and Manager with custom access.
- **Revenue Forecasting Engine:** AI-powered predictions using **Random Forest** on historical data.
- **Secure Registration:** OTP verification, CAPTCHA, and role selection for secure access.
- **Data Handling:** Upload CSV/Excel files with auto preprocessing (missing values, date formats, outliers).
- **Trend Visualization:** Interactive graphs via **Matplotlib** and **Plotly** for trends, anomalies, and forecasts.

Achievements:

- Designed a **user-friendly UI** in Streamlit for a smooth business user experience.
- Enhanced forecast **accuracy** with optimized Random Forest modeling.
- Built a **scalable system** ready for new models and data integrations.
- Ensured **system reliability** with thorough module-level testing.
- Collaborated with **mentors and experts** to align with real-world business needs.



Future Enhancements

Improved Data Management: Organize file structures, automate validation, and optimize for large datasets.

Model Optimization: Enhance **Random Forest** with better tuning, feature engineering, and evaluation.

Automated Pipeline: Build an end-to-end data ingestion and preprocessing pipeline to reduce manual work.

Advanced Dashboard: Add interactive charts (e.g., product-wise trends, growth analysis) using **Plotly & Matplotlib**.

User Customization: Allow users to set forecast preferences (region, product, prediction period).

Cross-Platform Support: Ensure Streamlit app runs smoothly on desktop, tablet, and mobile.

API Integration: Connect to external APIs (market trends, news) for enriched and real-time forecasting.



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