



Neurolytics – AI Business Analytics: A Web-Based Platform for Business Data Visualization and Six-Month Sales Forecasting

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business indicators and country-wise revenue visualization, while the analytics module provides category-level sales analysis using interactive charts. For future sales forecasting, a Linear Regression model is trained using historical transaction values and used to generate a six-month sales forecast. The system demonstrates how artificial intelligence and data analytics can be combined with web technologies to transform raw business data into meaningful insights and support data-driven decision making.

Keywords - AI business analytics; sales forecasting; machine learning; Linear Regression; data visualization; Flask.

I. INTRODUCTION

Artificial Intelligence (AI) and business analytics have become important technologies for organizations that need to understand large amounts of business data and make informed decisions. Traditional methods of analyzing sales information often require manual processing of records, which can make it difficult to identify important trends and future opportunities. AI-based analytics provides a more systematic approach by combining data processing, visualization, and machine learning techniques. Neurolytics – AI Business Analytics was developed as a web-based platform to address these requirements by providing a simple environment for analyzing business sales data and generating meaningful insights.

The proposed platform accepts e-commerce sales data in CSV format and processes important attributes such as Order ID, Country, Category, Unit Price, Quantity, Order Date, and Total Amount. The processed information is presented through interactive dashboards

ABSTRACT

Neurolytics – AI Business Analytics is a web-based business analytics platform developed to help organizations analyze sales data, visualize business performance, and forecast future sales. The system integrates HTML, CSS, JavaScript, Flask, Pandas, Chart.js, and Scikit-learn to provide an interactive and user-friendly analytics environment. A CSV-based e-commerce sales dataset containing information such as Order ID, Country, Category, Unit Price, Quantity, Order Date, and Total Amount is processed using Pandas for analysis. The platform provides separate modules for business overview, dashboard visualization, category-wise analytics, sales prediction, and user contact. The dashboard presents important



and analytical visualizations. The system provides an overall view of business performance through key metrics and graphical representations. Country-wise revenue and category-wise sales are visualized to make comparisons easier and to help users understand the distribution of business performance.

In addition to descriptive analytics, Neurolytics incorporates machine learning for sales forecasting. A Linear Regression model is trained using historical transaction data and is used to generate a forecast for the following six months. This enables users to obtain an estimated view of future sales based on the available historical records. The combination of Flask-based web development, Pandas data processing, Chart.js visualization, and Scikit-learn machine learning makes the platform suitable for demonstrating an integrated AI business analytics workflow.

The main objective of Neurolytics is to transform raw business transaction data into understandable visual information and useful predictive results through a single web-based platform. The system is designed with separate modules for the home page, dashboard, analytics, prediction, dataset handling, and contact functionality. By integrating these components, the platform demonstrates how web technologies, data analytics, and machine learning can work together to support data-driven business analysis.

II. LITERATURE REVIEW

Business analytics has evolved from traditional data reporting methods to intelligent systems that combine data visualization, predictive analytics, and machine learning. Existing business analytics approaches commonly focus on analyzing historical sales records to identify trends, compare business performance, and support managerial decision making. Data visualization techniques further improve the interpretation of large datasets by presenting important information through charts, graphs, and summary indicators.

Machine learning-based forecasting has also become an important approach for predicting future business performance. Regression techniques can be applied to historical sales information to identify relationships between observed data and future values. Linear Regression is one of the commonly used supervised learning techniques because of its simple implementation and ability to provide

understandable predictions. However, the effectiveness of forecasting depends on the quality, structure, and historical patterns present in the available dataset.

Web-based analytics platforms provide an accessible way to combine data processing and visualization with predictive models. Technologies such as Python, Pandas, Flask, Scikit-learn, and JavaScript-based visualization libraries can be integrated to create interactive analytics applications. Neurolytics follows this approach by combining web-based business visualization with a machine learning-based six-month sales forecasting module. The system focuses on providing business insights through an integrated and user-friendly platform rather than requiring separate tools for data analysis and prediction.

III. METHODOLOGY

Neurolytics is implemented as an integrated web-based analytics system that combines data preprocessing, business visualization, and machine learning-based forecasting. The overall methodology begins with collecting sales transaction data in CSV format, followed by data cleaning and preprocessing. The processed dataset is then analyzed to generate business performance indicators and graphical visualizations. Finally, historical transaction values are provided to a Linear Regression model to generate the predicted sales values for the next six months.

The system is developed using Flask as the web application framework. Pandas is used for reading, cleaning, and processing the dataset, while Chart.js is used to display interactive business charts. Scikit-learn provides the Linear Regression algorithm used for sales forecasting. HTML, CSS, and JavaScript are used to create the user interface and connect the different modules of the platform.

The methodology consists of three major stages: data preprocessing, business analytics, and sales prediction. During preprocessing, invalid or missing values in the Total Amount field are handled before model training. In the analytics stage, the available transaction records are summarized to obtain useful business information such as revenue by country and sales by category. In the prediction stage, the transaction records are



assigned sequential month numbers and a Linear Regression model is trained using these historical values. The trained model then estimates sales values for six future periods.

The major steps involved are:

- Uploading and reading the CSV sales dataset.
- Cleaning and preprocessing the transaction values.
- Generating business metrics and visualizations.
- Training the Linear Regression model.
- Forecasting sales for the next six months.
- Displaying the prediction results through the web interface.

A. Data Preprocessing

The sales dataset is provided in CSV format and contains transaction-level information including Order ID, Country, Category, Unit Price, Quantity, Order Date, and Total Amount. Pandas is used to read the dataset and convert the Total Amount values into a numerical format. Invalid or missing Total Amount records are removed before further processing. The cleaned transaction records are then used for both business analysis and machine learning.

B. Machine Learning Model

Linear Regression is used as the prediction algorithm in Neurolytics. Each valid transaction record is assigned a sequential number representing its position in the dataset. The transaction number is used as the input variable, while Total Amount is used as the target variable. The model learns the relationship between these historical values and generates estimated values for the following six periods. The predicted values are rounded to two decimal places and negative predictions are prevented from being displayed as sales values.

IV. RESULTS AND DISCUSSION

The developed Neurolytics platform successfully integrates business data analysis, interactive visualization, and machine learning-based sales forecasting into a single web application. The system processes the uploaded e-commerce sales dataset and presents the analyzed information through different modules. The results obtained from the dashboard, analytics module, and prediction module demonstrate the practical use of the proposed platform for understanding business performance and estimating future sales.

A. Dashboard Results

The dashboard provides a summarized view of the business data using key performance indicators and graphical visualization. Important information such as total revenue, total orders, top-performing country, and top-performing category can be viewed through the dashboard. The country-wise revenue chart helps users compare the contribution of different countries and identify areas with higher business performance.



Fig. A. Dashboard showing key business metrics and country-wise revenue.

B. Analytics Results

The analytics module provides different analytical features for understanding business performance. It includes revenue analysis, customer analytics, growth prediction, and AI-based insights. These features provide users with a structured view of important business information and help in identifying performance patterns. The visual card-based interface makes the available analytical functions easy to understand and access.



Fig. B. Business analytics page showing revenue analysis, customer analytics, growth prediction, and AI insights.

C. Prediction Results

The prediction result displays the estimated sales values for six future periods. The model produces values of ₹1265.78, ₹1265.79, ₹1265.80, ₹1265.81, ₹1265.82, and ₹1265.83 for Months 1 to 6, respectively. The results show a gradual increase across the forecast period based on the historical transaction data used for model training. This demonstrates the integration of machine learning prediction within the Neurolytics web application.

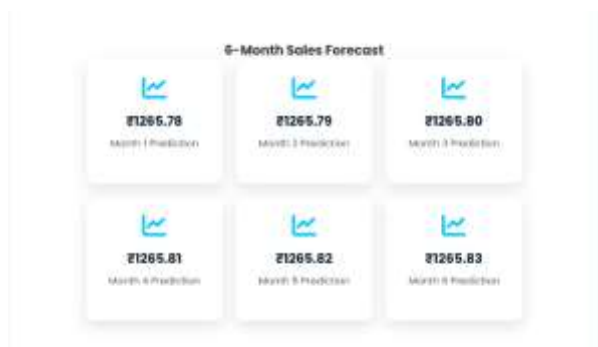


Fig. C. Six-month sales forecast generated by the Linear Regression model.

V. CONCLUSION

Neurolytics – AI Business Analytics successfully demonstrates the integration of web development, business analytics, data visualization, and machine learning in a single platform. The system processes e-commerce transaction data and presents useful business information through an interactive dashboard and analytics interface. The Linear Regression model further extends the system by generating a six-month sales forecast from historical transaction data. The developed platform provides a simple and accessible approach for converting raw business data into meaningful analytical and predictive information. Overall, the

project demonstrates the practical application of AI and data analytics for supporting data-driven business decision making.

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