**National University of Technology**

Computer Science Department



**SRS Document**

Sales Forecasting Tool using ML

**Final Year Project**

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**1: Introduction: (Usama’s Part Starts)**

**Purpose:** The primary purpose of developing the Sales Forecasting System for E-commerce is to empower our e-commerce platform with a robust tool that accurately predicts sales trends, enabling better strategic decision-making and resource allocation. The system aims to:

* **Enhance Decision-Making**: Provide stakeholders, including managers and executives, with insightful sales forecasts to support informed decision-making processes.
* **Optimize Inventory Management:** Assist in maintaining optimal inventory levels by predicting future demand trends, reducing overstock or stockouts, and minimizing associated costs.
* **Improve Resource Planning**: Enable effective allocation of resources, such as human capital, marketing budgets, and operational infrastructure, based on anticipated sales volumes.
* **Increase Competitiveness:** Equip the e-commerce platform with a competitive edge by staying ahead of market trends and adapting quickly to changes in consumer behavior and preferences.
* **Enhance Customer Satisfaction:** Ensure a seamless shopping experience for customers by minimizing disruptions caused by inventory shortages or delays.
* **Support Business Growth:** Facilitate scalable and sustainable growth by aligning business strategies with accurate sales forecasts, thereby maximizing revenue potential.

**1.2 Document Conventions**

* **Acronyms and Abbreviations:**

**Description:** Acronyms and abbreviations are spelled out in their first occurrence, followed by the abbreviated form in parentheses. The abbreviated form is used thereafter (e.g., Sales Forecasting System (SFS)).

**Purpose:** This convention ensures clarity by providing definitions for acronyms and abbreviations, making the document accessible to a wide audience.

* **Enumeration:**

**Description**: Numbered lists are used for sequential items. Bulleted lists are used for non-sequential items or items of equal importance.

**Purpose**: This convention helps organize information in a structured manner, especially when presenting lists of requirements or features.

* **References:**

**Description:** References to external documents or standards are provided in Section 1.5, with proper citation.

**Purpose**: Including references ensures transparency and allows readers to access additional information or standards relevant to the Sales Forecasting System.

* **User Interface Elements:**

**Description:** Graphical user interface elements, such as buttons, fields, and menus, are presented in title case (e.g., Submit Button, User Profile Menu).

**Purpose:** Formatting UI elements in title case distinguishes them from regular text, making it clear that they represent components of the user interface.

* **Requirements:**

**Description:** Functional requirements are presented as statements, specifying what the system must do. Non-functional requirements are expressed as qualities or constraints the system must satisfy.

**Purpose:** Clearly distinguishing between functional and non-functional requirements helps readers understand the nature of each requirement type.

* **Change Tracking:**

**Description:** Any updates or changes made to the document will be tracked and documented in a revision history section.

**Purpose**: Providing a revision history ensures that readers are aware of the document's evolution, promoting transparency and accountability in the development process.

**1.3 Intended Audience and Reading Suggestions**

This section of the Software Requirements Specification (SRS) document for the Sales Forecasting System for E-commerce provides information about the intended audience and offers suggestions for effective reading.

**1.3.1 Intended Audience:**

The intended audience for this SRS document includes:

* **Developers:**

Individuals involved in the design, coding, and testing of the Sales Forecasting System.

* **Project Managers:**

Those responsible for planning, scheduling, and overseeing the development and deployment of the system.

* **Quality Assurance Teams:**

QA professionals engaged in testing, validation, and verification processes.

* **Stakeholders:**

Executives, managers, and any individuals or groups with a vested interest in the successful implementation of the Sales Forecasting System.

**1.3.2 Reading Suggestions:**

To optimize comprehension and understanding, readers are encouraged to follow these suggestions:

* **Sequential Reading:**

Start with the introductory sections and proceed sequentially through the document to gain a comprehensive understanding of the system's requirements.

* **Referencing:**

Utilize the table of contents for quick reference to specific sections of interest.

* **Interactive Engagement:**

Actively engage with the document by cross-referencing sections, diagrams, and related information to enhance understanding.

* **Collaborative Review:**

Foster collaboration by involving relevant stakeholders in the review process, ensuring alignment with diverse perspectives.

**1.4 Project Scope**

**1.4.1 Inclusions:**

* **Sales Data Integration:**

The system will integrate with the e-commerce platform to access historical sales data.

* **Forecasting Algorithms:**

Implementation of advanced forecasting algorithms to predict future sales trends based on historical data and relevant variables.

* **User Authentication:**

Secure user authentication to ensure only authorized personnel can access and modify forecasting settings and results.

* **Reporting Module:**

A reporting module that generates detailed reports, visualizations, and insights based on the forecasted sales data.

* **Scalability:**

Design considerations for scalability to accommodate the growth of the e-commerce platform.

**1.4.2 Exclusions:**

* **External Market Factors:**

Factors such as economic conditions, market trends, or geopolitical events that are beyond the scope of the system's predictive capabilities.

* **Real-Time Sales Tracking:**

Real-time sales tracking is not within the current scope. The system will focus on historical data analysis and forecasting.

* **External Data Sources:**

Integration with external data sources beyond the e-commerce platform's sales data is excluded from the current scope.

* **Customization for Other Industries:**

Tailoring the system for forecasting in industries other than e-commerce is not included in this scope.

**1.4.3 Constraints:**

* **Budgetary Constraints:**

The project will adhere to predefined budgetary constraints for development, implementation, and maintenance.

* **Time Constraints:**

The project is subject to specific timelines for development, testing, and deployment to meet business objectives.

* **Regulatory Compliance:**

Adherence to relevant data protection and privacy regulations is a constraint that must be followed during system development.

* **1.4.4 Assumptions:**
* **Stable API from E-commerce Platform:**

The assumption that the e-commerce platform will provide a stable and consistent API for accessing historical sales data.

* **Availability of Historical Data:**

Availability of sufficient and accurate historical sales data for effective forecasting.

* **User Training:**

The assumption that end-users will undergo training to effectively utilize the forecasting system.

**(Usama’s Part Ends)**

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**2. Overall Description (Hassan’s Part Starts)**

**2.1 Product Perspective:**

The *Sales Forecasting of E-commerce Websites Web Application with AI* is designed to provide accurate and data-driven sales predictions for e-commerce platforms. This section outlines how the proposed web application fits into the broader technological landscape and its relationships with existing systems.

* **Relationship with Existing Systems:**

Our sales forecasting web application will operate as an independent system but will establish crucial connections with existing e-commerce websites. It will leverage data from multiple ecommerce platforms to analyze historical sales patterns, user behaviors, and product trends. Integration points will be established through secure APIs, allowing seamless data flow between the web application and e-commerce databases.

* **System Architecture:**

The system architecture is designed with modularity and scalability in mind. The core components include:

* **Data Ingestion Module:** This module fetches historical sales data, customer interactions, and product details from e-commerce websites. It ensures compatibility with various e-commerce platforms through standardized data connectors.
* **Machine Learning Engine:** The heart of the system, this engine employs advanced AI algorithms to analyze historical data, identify patterns, and generate accurate sales forecasts. Regular updates to the machine learning models ensure adaptability to changing market dynamics.
* **Web Application Interface:** The user interface allows authorized users to interact with the system, input custom parameters, and visualize the generated sales forecasts. It provides an intuitive dashboard for data exploration and decision-making.
* **API Layer:** Secure APIs facilitate communication between the web application and external e-commerce platforms. Authentication mechanisms are implemented to ensure data privacy and integrity.
* **Interfaces with External Components, Databases, and APIs:**

To ensure the effectiveness of sales forecasting, our web application will interface with various external components:

* **E-commerce Platforms APIs***:* APIs provided by e-commerce platforms will be utilized for data extraction. This includes fetching sales data, product details, and customer interactions.
* **External Data Sources:** Supplementary data sources, such as market trends and economic indicators, may be incorporated to enhance the accuracy of sales forecasts.
* **Database Integration***:* The web application will interact with secure databases to store and retrieve processed data. This includes storing historical data, model parameters, and user-specific settings.
* **Role and Integration within the Ecosystem:**

The sales forecasting web application plays a pivotal role in empowering e-commerce businesses with actionable insights. By seamlessly integrating with existing systems, it enhances decision-making processes for product stocking, marketing strategies, and resource allocation. The system's adaptability ensures that it remains a valuable asset in the evolving landscape of e-commerce.

**2.2 Product Features:**

The final product will encompasses a suite of advanced features tailored to deliver accurate predictions and enhance decision-making for e-commerce businesses. Each feature is intricately designed to align with the overarching project objectives.

* **Data Collection:**
* **Description:** The system includes robust data collection mechanisms to fetch and consolidate crucial data from e-commerce websites. It encompasses sales history, customer interactions, and product details.
* **Link to Project Objectives:** Enables the utilization of comprehensive and up-to-date data for precise sales forecasting.
* **Machine Learning Algorithms for Forecasting:**
* **Description:**Integrates cutting-edge machine learning algorithms that analyze historical data patterns, customer behaviors, and market trends to generate accurate sales forecasts.
* **Link to Project Objectives*:*** Forms the core of the system, ensuring the delivery of reliable and data-driven sales predictions.
* **User Authentication:**
* **Description:** Implements a secure user authentication system to control access levels and protect sensitive forecasting data. Differentiates between administrators, analysts, and general users.
* **Link to Project Objectives:** Safeguards the integrity of sales forecasting information and ensures that only authorized personnel have access.
* **Data Visualization:**
* **Description:** Provides an intuitive and interactive dashboard for users to visualize sales forecasts. Incorporates graphical representations, charts, and trend analysis tools.
* **Link to Project Objectives:** Facilitates easy interpretation of complex forecasting data, empowering users to make informed decisions.
* **Customizable Parameters:**
* **Description:** Allows users to input custom parameters and preferences, tailoring the forecasting models to specific business needs. This includes adjusting timeframes, product categories, and market segments.
* **Link to Project Objectives***:* Enhances the flexibility and adaptability of the system to diverse e-commerce scenarios.
* **Real-time Updates:**
* **Description:** Ensures timely updates of forecasting models to adapt to dynamic market conditions. Integrates mechanisms to automatically refresh data at regular intervals.
* **Link to Project Objectives:** Keeps the forecasting models relevant and aligned with the ever-changing e-commerce landscape.
* **Notification System:**
* **Description:** Implements a notification system to alert users about significant changes in sales forecasts, market trends, or anomalies in data patterns.
* **Link to Project Objectives:**Enhances proactive decision-making by keeping users informed about critical developments.
* **Integration with E-commerce Platforms:**
* **Description:** Establishes secure connections and APIs with various e-commerce platforms for seamless data exchange. Supports compatibility with a range of platforms.
* **Link to Project Objectives:** Enables the system to leverage diverse data sources, ensuring a comprehensive analysis for accurate forecasting.
  1. **User Classes and Characteristics:**

The final product will cater to distinct user classes, each with specific roles and expectations. Tailoring the user experience to meet their needs is paramount for the system's effectiveness.

* **Administrators:**

**Characteristics:**

* Hold managerial roles within the e-commerce business.
* Responsible for overseeing and managing the sales forecasting system.
* Require access to all features and functionalities for system administration.

**Expectations:**

* Access to comprehensive system settings and configurations.
* Ability to manage user roles and permissions.
* Utilize advanced analytics for strategic decision-making.
* **Data Analysts:**

**Characteristics:**

* Specialized in data analysis and interpretation.
* Engage in in-depth exploration of sales forecasting data.
* Responsible for refining and optimizing forecasting models.

**Expectations:**

* Access to detailed data visualization tools.
* Ability to customize forecasting parameters for thorough analysis.
* Receive system-generated insights and anomalies.
* **General Users:**

**Characteristics:**

* Frontline staff or non-analyst personnel within the e-commerce business.
* Primarily interested in simplified and actionable insights.
* Engage with the system for day-to-day decision support.

**Expectations:**

* User-friendly interface for easy navigation.
* Clear and concise visualizations of sales forecasts.
* Minimal input requirements for obtaining relevant information.

**2.4 Operating Environment:**

* **Hardware Requirements:**
* The system is adaptable to standard computing hardware configurations, including servers with sufficient processing power and memory to accommodate data processing and machine learning computations.
* Clients (user devices) should have adequate computing resources for web application access, requiring standard hardware configurations.
* **Software Requirements:**
* The web application is platform-independent, supporting major operating systems such as Windows, Linux, and macOS.
* Backend components are developed using Python, leveraging frameworks like Django, ensuring cross-platform compatibility.
* Web application frontend is designed with responsiveness, supporting common web browsers including Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari.
* **Network Requirements:**
* Reliable internet connectivity is essential for accessing the web application and fetching real-time updates.
* The system is designed to operate seamlessly within standard corporate network infrastructures, ensuring secure data transfer between the application and e-commerce platforms.
* **Supported Browsers:**
* The web application is optimized for a consistent user experience across major browsers, including but not limited to Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari.
* Compatibility with the latest versions of browsers is prioritized to leverage advanced web technologies.
* **Devices:**
* The web application is accessible through a variety of devices, including desktops, laptops, tablets, and smartphones.
* Responsiveness is integrated into the design, ensuring an optimal user experience regardless of the device used.
* **External Dependencies and Integrations:**
* Integration with e-commerce platforms requires adherence to their respective APIs and security protocols.
* External data sources, if utilized, need to be accessible and conform to standard data exchange formats.
* Regular updates to machine learning models may depend on external data feeds, necessitating reliable connections.

**2.5 Design and Implementation Constraints:**

The development of the software is constrained by several key factors:

* **Budget:** Limited financial resources dictate careful allocation to technology, personnel, and external services.
* **Time:** Strict adherence to project timelines requires efficient project management and streamlined development processes.
* **Technology:** Selection is constrained by compatibility with e-commerce platforms, aiming for interoperability and adherence to industry standards.
* **Regulatory Compliance:** Adherence to data protection regulations, privacy laws, and compliance with e-commerce API policies are non-negotiable.
* **Data Privacy and Security:** Rigorous measures are essential to safeguard sensitive sales and customer data, ensuring industry-standard security practices.
* **Scalability:** Design must accommodate potential scalability needs, adapting to varying data volumes and user loads.
* **User Adoption and Training***:* Interfaces should be user-friendly, and training considerations must minimize the learning curve for users.
* **Integration Challenges***:* Diverse e-commerce platform integrations pose challenges in data structures, APIs, and security protocols.
* **Machine Learning Model Training:** The accuracy of forecasting relies on historical data quality, with potential impacts on machine learning model effectiveness.

**2.6 User Documentation:**

Clear and accessible user documentation is integral to ensure effective utilization of the web application. The documentation package includes:

* **User Manuals:** Concise manuals providing an overview of the web application's features, functionalities, and step-by-step instructions for common tasks.
* **Guides:** In-depth guides focusing on specific user roles, such as administrators, data analysts, and general users. Tailored guidance for each user class.
* **Tutorials:** Interactive tutorials demonstrating key processes, from data input to interpreting forecasts. Hands-on learning aids for users of varying expertise levels.
* **FAQ Section:** Frequently Asked Questions section addressing common queries and potential challenges. A quick reference for problem-solving.
* **Troubleshooting Guide:** Comprehensive troubleshooting guide with solutions for common issues. Ensures users can address problems independently.
* **Best Practices:** Recommendations and best practices for optimizing system usage, ensuring efficient and effective forecasting.
* **Release Notes:** Periodic release notes outlining updates, new features, and improvements. Keeps users informed about system enhancements.
* **Contact Information:** Contact details for technical support and assistance. Ensures users can seek help when needed.

**2.7 Assumptions and Dependencies**

**Assumptions:**

**Data Availability:**

* **Assumption:** Assume that historical sales data, customer interactions, and product details from e-commerce platforms will be consistently available for analysis.
* **Rationale***:* Reliable data is fundamental to accurate forecasting; any disruptions in data availability may impact the system's predictive capabilities.

**Data Accuracy:**

* **Assumption:** Assume that the provided data is accurate and free from significant errors.
* **Rationale:**The effectiveness of machine learning models depends on the quality and accuracy of input data.

**API Availability:**

* **Assumption:** Assume that e-commerce platforms will maintain stable and accessible APIs for data retrieval.
* **Rationale:** Continuous access to real-time data through APIs is critical for up-to-date forecasting.

**Dependencies:**

**External APIs:**

* **Dependency:** The proper functioning of the system relies on the availability and reliability of APIs provided by e-commerce platforms for data retrieval.
* **Mitigation:** Establish clear communication channels with e-commerce platforms and have contingency plans for potential API changes or disruptions.

**Data Integrity:**

* **Dependency:** The accuracy and integrity of sales and customer data depend on external factors beyond the system's control.
* **Mitigation:**Implement data validation checks, collaborate with e-commerce platforms to ensure data quality, and have mechanisms for handling discrepancies.

**Technological Dependencies:**

* **Dependency:** The system's technology stack is dependent on third-party libraries, frameworks, and tools.
* **Mitigation:** Regularly update and monitor dependencies, staying informed about any changes or updates that may impact system functionality.

**User Engagement:**

* **Dependency:** The effectiveness of the system relies on consistent user engagement and input.
* **Mitigation:** Develop user-friendly interfaces, conduct user training sessions, and implement feedback mechanisms to encourage continuous user involvement.

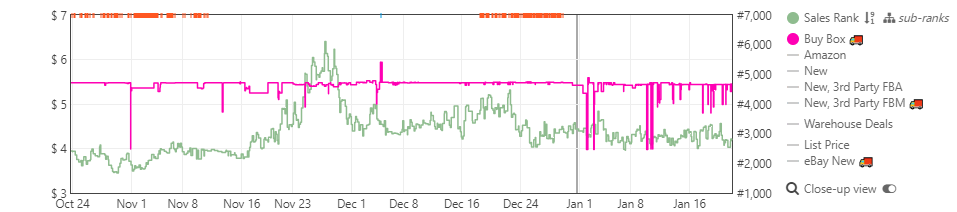
**(Hassan’s Part Ends)**

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**3. System Features (Adnan’s Part Starts)**

**3.1 Advanced Sales Forecasting**

**Overview:**

Our system's flagship feature revolves around the integration of cutting-edge machine learning algorithms, ushering in a new era of advanced sales forecasting. Through an in-depth analysis of diverse datasets encompassing historical sales records, customer interactions, and product details, the system goes beyond traditional tracking. This meticulous examination empowers users with highly accurate and data-driven sales forecasts.

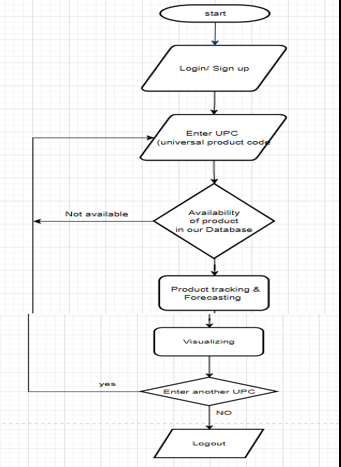
**Key Benefits:**

This feature extends far beyond conventional sales tracking, offering users invaluable insights crucial for strategic decision-making. It not only optimizes inventory levels but also plays a pivotal role in effective resource planning.

**Advanced Functionality:**

The machine learning engine, a core component of this feature, employs sophisticated AI algorithms to continuously analyze historical data, identify emerging patterns, and generate precise sales forecasts. Regular updates to these models ensure adaptability to the ever-changing dynamics of the market.

**Process Flowchart:**



**3.2 Customizable Parameters**

**Overview:**

Flexibility is at the heart of our system, providing users with the ability to input custom parameters and preferences. This feature allows businesses to tailor forecasting models to suit their unique needs. Users can fine-tune timeframes, specify product categories, and refine market segments, offering a personalized approach to the forecasting process.

**Key Benefits:**

The adaptability of this feature enhances the system's versatility, ensuring seamless adaptation to diverse e-commerce scenarios. Users gain the capability to personalize forecasts based on specific business requirements, fostering a responsive and tailored approach.

**Customization Capabilities:**

Empowering users to define custom parameters includes adjusting timeframes, refining product categories, and specifying market segments. This level of customization ensures that the system aligns precisely with the unique characteristics and demands of each business.

**4. External Interface Requirements**

**4.1 User Interfaces**

**Overview:**

The user interface serves as the gateway for authorized users to interact comprehensively with the system. It boasts an intuitive dashboard designed for seamless navigation, allowing users to effortlessly input custom parameters, visualize dynamically generated sales forecasts, and explore data through graphical representations and trend analysis tools.

**Key Requirements:**

- Implement an intuitively designed navigation system for a user-friendly and seamless interaction.

- Ensure the presentation of visually clear and concise sales forecast visualizations.

- Streamline user engagement by minimizing input requirements for obtaining relevant information.

**Interactive Dashboard:**

The web application interface provides an interactive dashboard that allows users to explore and analyze sales forecasts effortlessly. With graphical representations, charts, and trend analysis tools, the dashboard ensures that users can make informed decisions with ease.

**4.2 Hardware Interfaces**

**Overview:**

Our system is meticulously crafted to seamlessly integrate with standard computing hardware configurations. This includes servers with sufficient processing power and memory to meet the computational demands of data processing and machine learning.

**Key Requirements:**

- Ensure compatibility with prevalent server configurations to ensure widespread accessibility.

- Optimize resource usage to guarantee efficient and streamlined system performance.

**Scalability Measures:**

The system architecture is designed to accommodate potential scalability needs, adapting to varying data volumes and user loads. This ensures that the hardware interfaces can efficiently handle increased demands without compromising performance.

**4.3 Software Interfaces**

**Overview:**

The web application is designed for platform independence, supporting major operating systems such as Windows, Linux, and macOS. The backend components are developed using Python, leveraging frameworks like Django to ensure a robust and cross-platform compatible foundation.

**Key Requirements:**

- Ensure seamless compatibility with the latest versions of major operating systems for widespread accessibility.

- Employ Python and Django for the development of robust backend components, ensuring a reliable and cross-compatible foundation.

**Cross-Platform Compatibility:**

By supporting major operating systems and utilizing robust frameworks, the software interfaces guarantee seamless compatibility and accessibility across a diverse range of devices, enhancing the user experience.

**4.4 Communications Interfaces**

**Overview:**

Ensuring secure communication, our system employs secure APIs to establish connections between the web application and external e-commerce platforms. Robust authentication mechanisms are implemented to guarantee the privacy and integrity of data during all communication processes.

**Key Requirements:**

- Establish and maintain secure connections with external e-commerce platforms for reliable and secure data exchange.

- Implement and continuously update authentication measures to safeguard data during communication, ensuring a secure and reliable data exchange process.

**Secure Data Exchange:**

The API layer facilitates secure communication between the web application and external e-commerce platforms, ensuring the confidentiality and integrity of data. Regular updates to authentication mechanisms enhance the overall security of the communication interfaces.

**(Adnan’s Part Ends)**

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**5. Other Nonfunctional Requirements (Mehmood’s Part Starts)**

Nonfunctional requirements are aspects of a system that are not related to specific behaviors or features but describe how the system performs its functions. In the context of eCommerce sales forecasting, the following subpoints might be considered:

**5.1 Performance Requirements**

* **Response Time:**

Define the maximum acceptable time for the system to respond to user queries or generate sales forecasts. This involves specifying the time taken to retrieve, process, and present the required information. For example, ensure that the response time for generating a forecast report for a specific time period is within a few seconds to provide a seamless user experience.

* **Throughput:**

Specify the maximum number of sales transactions or forecast requests the system should handle within a specific time frame. This could involve setting limits on transactions per second or per minute, ensuring the system's ability to handle varying loads. For instance, the system should be capable of handling a peak load of 1000 forecast requests per minute during promotional periods.

* **Scalability:**

Describe how the system should scale to handle increased demands. This includes specifying how additional users or growing data volumes will be accommodated without a significant decline in performance. Consider scenarios where the user base doubles, and ensure that the system can scale horizontally or vertically to meet the increased demand.

**5.2 Safety Requirements**

* **Data Integrity:**

Ensure that the sales forecasting process doesn't compromise the integrity of the data. This involves implementing validation checks, error handling mechanisms, and data cleansing processes to prevent inaccuracies in the input data.

* + **Validation Checks:** Implement robust data validation checks to verify the accuracy and completeness of incoming data. For example, validate that numerical values fall within expected ranges, dates are in the correct format, and there are no duplicate entries.
  + **Error Handling Mechanisms:** Develop comprehensive error-handling mechanisms to gracefully manage unexpected situations. When errors occur, the system should log relevant information for troubleshooting purposes, notify appropriate personnel, and implement fallback mechanisms to maintain the continuity of the forecasting process.
  + **Data Cleansing Processes:** Integrate data cleansing processes to identify and rectify inconsistencies or errors in the dataset. This could involve the removal of duplicate records, standardization of data formats, and the application of data cleansing algorithms to improve the overall quality of the input data.
  + **Data Auditing:** Implement regular data auditing procedures to track changes in the dataset over time. This involves creating an audit trail that records modifications, additions, or deletions to the data, allowing for easy identification of changes and accountability for data accuracy.
  + **Data Validation in Forecasting Algorithms:** Extend data integrity measures into the forecasting algorithms. Ensure that the algorithms are designed to handle potential outliers, missing values, or anomalies in the data, preventing these issues from significantly impacting the accuracy of the sales forecasts.
  + **Continuous Monitoring:** Implement continuous monitoring processes to detect and address any deviations from expected data integrity standards. Automated alerts and notifications can be set up to prompt immediate action when data quality concerns arise.

**5.3 Security Requirements**

* **Encryption Standards:**

Specify the encryption protocols used to secure data during transmission and storage. This might include using industry-standard SSL/TLS protocols for secure communication and employing robust encryption algorithms for stored data. For added security, consider periodic encryption key rotation to minimize vulnerabilities.

* **Access Controls:**

Define who has access to the sales forecasting system and the specific actions they can perform. Implement role-based access controls to ensure that only authorized personnel can access or modify sensitive data. Conduct regular access reviews to revoke unnecessary permissions and enhance overall system security.

* **Authentication Mechanisms:**

Specify how users will be authenticated before gaining access to the system. This could involve implementing secure login procedures, multi-factor authentication, or integration with existing authentication systems. Additionally, consider implementing session timeouts and account lockout policies to mitigate unauthorized access attempts.

**5.4 Software Quality Attributes**

* **Accuracy:**

Define the expected level of accuracy for the sales forecasts. Specify the acceptable margin of error to ensure that the predictions align closely with actual sales figures. For instance, set a target accuracy rate of 95% for monthly sales forecasts to ensure reliable insights for decision-making.

* **Maintainability:**

Outline how easily the sales forecasting system can be maintained and updated. This involves using modular and well-documented code, version control systems, and practices that facilitate future enhancements without causing disruptions. Consider implementing automated testing suites to ensure ongoing maintainability and reduce the risk of introducing errors during updates.

* **Usability:**

Specify the user-friendliness of the system. Ensure that the interface is intuitive, easy to navigate, and provides clear insights into the sales forecasts for users. Usability testing and user feedback mechanisms can be employed to enhance the overall user experience. Regular user feedback surveys can be conducted to identify areas for improvement and enhance usability continuously.

**6. Other Requirements**

**Data Governance**

* **Data Management:**

Detail how sales data will be collected, stored, and managed throughout the forecasting process. Specify data storage protocols, data cleansing procedures, and data retention policies to ensure the accuracy and reliability of the data used in forecasting. Implement data versioning to track changes and maintain a historical record of data modifications for audit purposes.

**Regulatory Compliance**

* **Legal and Industry Compliance:**

Identify any legal or industry-specific regulations governing the handling of sales data. This might include compliance with data protection laws, industry standards, and any other relevant regulations. Specify how the system will adhere to these standards to avoid legal complications. Regular compliance audits can be conducted to ensure ongoing adherence to regulatory requirements.

**Training and Support**

* **Training Requirements:**

Outline the training programs provided to users to ensure they can effectively use the sales forecasting system. This may include comprehensive documentation, interactive training sessions, and online resources to empower users with the necessary skills. Consider providing continuous training opportunities to keep users updated on system enhancements and changes.

* **Support Mechanisms:**

Specify the support services available to users. This could include helpdesk support, online forums, a knowledge base, and regular software updates to address issues, provide assistance, and ensure the continued reliability of the forecasting system. Implement a robust ticketing system to track and prioritize support requests, ensuring timely resolution of issues.

**Integration with Existing Systems**

* **Compatibility:**

Specify how the sales forecasting system will integrate seamlessly with other existing systems within the eCommerce infrastructure, such as inventory management or customer relationship management (CRM) systems. Define data exchange formats, APIs, or middleware that facilitate smooth communication and data flow between systems. Conduct regular integration tests to validate the interoperability of the forecasting system with other components in the eCommerce ecosystem.

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**(Mehmood’s Part Ends)**

**THANK YOU**