Smart Solutions to Minimize Food Loss in E-Commerce and Retail

➢ Introduction

Food loss in retail and e-commerce, particularly for perishable goods, is a significant issue that contributes to both environmental harm and business inefficiencies. This project aims to develop a technology-driven solution to minimize food waste by addressing key challenges such as inventory tracking, demand forecasting, and surplus management.

Problem Statement:

Globally, 1.3 billion tons of food are wasted annually, with 10-15% of food loss occurring at the retail level due to unsold inventory, spoilage, and overstocking. The goal of this project is to create a solution that:

- Tracks and manages inventory in real-time.
- Optimizes demand forecasting.
- Engages customers with discounts and recipes for near-expiry products.
- Facilitates donations of surplus inventory.

➢ Functionalities

The solution will include the following features:

1. Smart Inventory Management

- **Real-time Tracking:** Continuous monitoring of inventory to identify near-expiry goods.
- **Automated Notifications:** Alerts for inventory approaching expiration.
- **Discount Mechanism:** Dynamic pricing based on the proximity of expiration dates. Discounts increase as the expiry date nears to encourage faster sales.

2. Demand Forecasting

- **Predictive Analytics:** Use historical sales data to forecast future demand for perishable goods.
- **Stock Optimization:** Balance inventory levels to reduce overstocking and shortages.

3. Customer Engagement

- **User Interface:** A user-friendly interface to:
    - Display near-expiry products with discounts.

    - Provide recipe suggestions for utilizing these products.
- **Promotional Campaigns:** Notify users of available discounts via push notifications or emails.

4. Donation Facilitation

- **Charity Platform:** Connect with food banks and charities for surplus product redistribution.
- **Seamless Integration:** Automate the scheduling and management of donations.

5. Analytics Dashboard *(Bonus)*

- Visualize key metrics such as:
    - Inventory trends.
    - Sales data.
    - Predicted wastage reduction.
- Provide actionable insights for decision-making.

➢ Discount Mechanism

To incentivize the sale of near-expiry goods:

- **Dynamic Discounting:**
    - Discounts increase as the product's expiration date approaches.
    - Example:
        - 5 days before expiry: 10% discount.
        - 2 days before expiry: 30% discount.
        - 1 day before expiry: 50% discount.
- **Thresholds and Alerts:** Notify users of upcoming discounts and encourage purchases.

➢ Technical Requirements

Frontend:

- User-friendly interface for customers and administrators.
- Framework: React, Angular, or Vue.js.

Backend:

- Manage inventory, notifications, and analytics.

- Framework: Node.js, Django, or Flask.

Database:

- Store inventory and sales data.
- Options: PostgreSQL, MySQL, or MongoDB.

Additional Tools:

- **Analytics:** TensorFlow or scikit-learn for demand forecasting.
- **Notifications:** Firebase or Twilio for user alerts.

➢ Deliverables

1. **Functioning Prototype:**
    - Fully integrated backend and frontend system.
    - Real-time tracking and discounting of near-expiry goods.
2. **Presentation:**
    - Explain the problem, solution, and technology used.
    - Demonstrate the prototype and its real-world impact.
3. **Documentation:**
    - Technical and user documentation.

➢ Evaluation Criteria

- **Innovation:** Novelty of the approach to minimizing food loss.
- **Functionality:** Effectiveness and usability of the solution.
- **Scalability:** Potential for implementation in real-world scenarios.
- **Presentation:** Clarity and impact of the demonstration.
- **Impact:** Real-world potential to reduce food loss.

➢ Conclusion

This project addresses the critical issue of food loss in e-commerce and retail. By integrating smart inventory management, demand forecasting, and customer engagement features, the solution will reduce food waste, enhance business efficiency, and contribute to environmental sustainability.