LEARNATHON 4.0

“Use of technology to test adulteration of fresh product”

Team Name-Team(SC2)_8

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Introduction:

•Food adulteration is a growing concern that affects the safety, quality, and nutritional value of food products.
•Harmful substances like artificial chemicals, coloring agents, or excess water are often added to increase shelf life or profit — putting consumers' health at risk.
•Traditional methods of detecting adulteration are manual, time-consuming, and prone to error.
•This project introduces a technology-driven solution that uses machine learning and data analysis to detect patterns of adulteration in fresh produce.
•The goal is to ensure safer food, build consumer trust, and support ethical production through intelligent, automated detection systems.

Problem Statement:

- “Use of technology to test adulteration of fresh produce.”

Food adulteration remains a major challenge in the global food industry. The manual detection of adulterants in food is not only time-consuming but also inefficient at scale. The need arises for an automated, scalable, and data-driven solution to reliably detect and report adulteration in various food products, especially fresh produce. By integrating technology, we aim to modernize detection methods, increase accuracy, and minimize health risks.

Objective:

•Detect Adulterated Food Products: Build a system that uses data to identify food items contaminated with harmful or low-quality substances.
•Ensure Consumer Safety: Reduce health risks by enabling early detection and alerting authorities or consumers about unsafe products.
•Support Food Quality Regulation: Provide insights to regulatory bodies and quality control departments for better monitoring and enforcement.
•Build Trust and Transparency: Help consumers and stakeholders trust food sources by ensuring the integrity and purity of food items.
•Improve Export Readiness: Assist producers and suppliers in meeting international food safety standards to enhance global trade opportunities.

Description:

- "Adulteration of food poses a serious risk to human health. Adulterated food has lower quality and is less nutritive."
- Food adulterants can be harmful chemicals, dyes, or other substances added to increase volume or shelf life, often for profit. These substances:
- Degrade the nutritional value of food.
- Cause serious health issues like food poisoning, cancer, and long-term diseases.
- Mislead consumers by presenting fake quality, taste, and appearance. Through data analysis and machine learning, this project targets early identification of such practices and reduces exposure to dangerous foods.

Dataset:

- https://www.kaggle.com/datasets/fahmidachowdhury/food-adulteration-dataset/data
- This open dataset from Kaggle includes:
- Product types (bread, butter, meat, beverages, etc.)
- Adulterants used (coloring agents, water, chemicals, etc.)
- Detection methods
- Severity and health risk levels
- Actions taken
- The dataset enables analysis of trends in adulteration and the development of predictive models to flag risky products.

Methodology:

•Data Collection: Sourced dataset from Kaggle on food adulteration.
•Data Preprocessing: Cleaned data, encoded features using pandas.
•Model Training: Trained a classification model using scikit-learn, saved with joblib.
•Backend Development: Built Flask API to serve the ML model and handle predictions.
•Frontend Development: Created user interface using HTML, CSS, and JavaScript.
•Integration: Connected frontend to backend using Fetch API for real-time predictions.
•Output Display: Displayed prediction results (e.g., severity, health risk) on the UI.

Conclusion:

- Food adulteration detection is feasible using ML.
- Can help regulate food quality and improve public health.
- Hence, by the web application we can identify the product is consumable or not.

Results:

- The model successfully identifies adulterated food items.
- High accuracy observed during testing.
- By giving the product name and adulterant we can know the Health Risk, Severity Score, and Action Taken.

Potential Impact:

- "Objective mode of satisfying consumers and building trust on growers, processors. Better export deals."
- By implementing technological adulteration detection:
- Consumers gain confidence in the safety and quality of the food they purchase.
- Producers and manufacturers benefit from a transparent supply chain, increasing accountability and reputation.
- Governments and exporters can ensure compliance with international food safety standards, enhancing global trade opportunities and export potential.
- It promotes a data-backed trust ecosystem in the food industry.

Future Scope:

- 1. Real-time sensors
- 2. Integration with mobile applications
- 3. Support for government inspections

References:

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Libraries: pandas, flask, joblib