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Web Based Monitoring of Wool from Farm to Fabric

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A B S T R A C T

The project aims to create a comprehensive web-based monitoring system for the Indian wool industry. The system includes functions such as real-time information, farm-to-market wool tracking, quality assurance, storage and distribution, employment services, job platform, online business and training. The aim is to increase the efficiency, transparency and overall productivity of the wool industry by providing a framework that connects producers, buyers and stakeholders

Keywords: Farmer, Service Provider, Wool, Web Application.

1. INTRODUCTION

Wool production faces issues with quality control, traceability, and efficiency due to a fragmented process from cutting to weaving. Traditional methods are often opaque, making it difficult to track the wool's journey and maintain consistency. Increasing consumer demand for fair and sustainable production reflects the need for better traceability. Advanced technologies such as blockchain, IoT, and data analytics are transforming the industry by enabling real-time tracking, transparency, and ethics. This technology helps track wool from farm to fabric, increasing trust among consumers. Blockchain provides a secure and transparent record of evidence, while IoT systems monitor quality at every level. Based on technology, wool production can be made more efficient, ethical and productive, benefiting producers and consumers.

1.1. Objectives

- To develop a system that tracks wool from its source at the farm to the final textile product, ensuring transparency at every stage of the supply chain.
- To implement technologies that monitor and assess wool quality throughout the production process, reducing waste and inconsistencies.
- To integrate solutions that ensure wool is sourced responsibly, adhering to animal welfare standards and fair labour practices.
- To streamline wool processing by utilizing digital tools that reduce manual interventions and optimize workflows for faster and more cost-effective production.
- To create a framework that promotes environmentally friendly practices within the wool industry, reducing the carbon footprint and improving resource management.

2. LITERATURE REVIEW

2.1. Title: "Deep Learning Models for Plant Disease Detection and Diagnosis"

Authors: Konstantinos P. Ferentinos

Year: 2016

Abstract: This paper discusses the implementation of Convolutional Neural Network (CNN) models for the detection and diagnosis of plant diseases, focusing on the application of deep learning techniques in agriculture.

2.2. Title: "Crop Disease Detection and Solution System"

Authors: Mohammad Jahangir Alam, Md Abdul Awal, Md Nurul Mustafa

Year: 2014

Abstract: This article presents an Android application developed for crop disease detection, utilizing the BRISK algorithm to predict plant diseases and provide corresponding solutions.

2.3. Title: "AgroConsultant: Intelligent Crop Recommendation System Using Machine Learning Algorithms"

Authors: Z. Doshi, S. Nadkarni, R. Agrawal, N. Shah

Year: 2017

Abstract: This paper compares the accuracy of four machine learning algorithms—Decision Tree, K-Nearest Neighbors (K-NN), Random Forest, and Neural Network used for crop recommendation, alongside a rainfall prediction model to enhance decision-making.

2.4. Title: " Crop Recommender System Using Machine Learning Approach"

Authors: S. M. Pande, P. K. Ramesh, A. Anmol, B. R. Aishwarya

Year: 2021

Abstract: This paper explores various machine learning algorithms for predicting crop yield in specific regions, including a comparison of error rates and accuracy. It also introduces an Android application for recommending the most profitable crops.

2.5. Title: " Crop Yield Prediction Using Machine Learning Techniques"

Authors: R. Medar, V. S. Rajpurohit, S. Shweta

Year: 2018

Abstract: This study focuses on predicting crop yield using Naïve Bayes and K-Nearest Neighbors (KNN) algorithms, highlighting that Naïve Bayes provides higher accuracy compared to KNN for yield prediction.

3. METHODOLOGY

3.1. ARCHITECTURE OVERVIEW:

3.1.1. Front-End: Developed using React.js with HTML, CSS, and JavaScript to create a responsive and user-friendly interface for farmers, producers, and buyers.

3.1.2. Back-End: Built with Flask Restful and Python, providing a scalable and efficient server-side framework for handling application logic and APIs.

3.1.3. Database: MySQL is used to store structured data, including market info, quality metrics, and transactions, ensuring efficient and secure data management.

3.2. MODULES:

3.2.1. Weather and News Module: Delivers real-time weather updates and industry news to help users stay informed about market and environmental conditions.

3.2.2 Real-Time Market Information: Provides live wool prices, market trends, and demand analysis to support informed decision-making

3.2.3 Quality Assurance Module: Ensures wool quality through grading, monitoring, and certification processes to maintain consistency and standards.

3.2.4 Online Wool Marketplace: Enables producers and buyers to connect on a single platform for streamlined buying and selling of wool products.

3.3. KEY FEATURES:

Real-Time Market and Weather Updates:

Provides live wool market prices, trends, and weather forecasts to help stakeholders make informed decisions.

Wool Tracking and Quality Assurance:

Ensures traceability of wool from farm to fabric and includes tools for grading and certifying wool quality.

Online Wool Marketplace:

Facilitates direct transactions between wool producers and buyers, streamlining the buying and selling process**.**

Inventory and Processing Management:

Manages wool storage, warehousing, and scheduling of processing activities with real-time updates.

4. **IMPLEMENTATION**

4.1. System Setup and Architecture*:*

The system was structured using a React.js frontend for an interactive and responsive interface, Flask Restful for backend API development, and MySQL for managing structured data like wool tracking, quality metrics, and user details. Modules communicate securely through APIs.

4.2. Frontend and Backend Development:

The frontend was developed with HTML, CSS, JavaScript, and React.js to ensure usability and responsiveness across devices. The backend utilized Flask Restful with Python to handle API endpoints, core logic, and real-time data processing efficiently.

4.3. Database and Module Integration:

A MySQL relational database was designed to store data such as user information, market trends, and inventory. Key modules, including wool tracking, quality assurance, and the online marketplace, were integrated seamlessly, with data flow managed through APIs.

4.4. Real-Time Features and Security:

Real-time updates for wool prices, tracking, and weather were implemented using dynamic data-fetching techniques. Security was ensured through features like JWT-based authentication, role-based access control, and SSL encryption for data safety.

4.5***. Testing and Deployment:***

Comprehensive testing was performed, including unit, integration, and user acceptance testing. The system was deployed on a cloud platform, ensuring scalability, high availability, and smooth access for users.

RESULT AND DISCUSSION

The implementation of the web-based monitoring system successfully addressed key challenges in the wool supply chain, including transparency, traceability, and quality assurance. The system provided real-time updates on wool market trends, weather, and tracking, enabling users to make informed decisions. Modules like Quality Assurance and Online Marketplace improved operational efficiency by ensuring consistent wool grading and seamless trading. User feedback highlighted the platform's ease of use and its significant contribution to improving market access for stakeholders. Overall, the project demonstrated the effectiveness of integrating technology into the wool industry to enhance productivity and stakeholder collaboration.

CONCLUSION

In conclusion, the project has completed the challenges identified in the case and has made progress through the development and implementation of the tracking website. The system’s predictive modeling capabilities support better decision making and quality assurance. Overall, the web tracking system is a significant improvement over the traditional system, allowing participants to improve wool and ensure the quality of the product. Track the journey of wool from farm to fabric. This process not only improves wool quality and production, but also addresses growing consumer concerns about sustainability and ethics. As the demand for a transparent and traceable supply chain continues to grow, the integration of web tracking in wool will be important to the future of the textile industry.

FUTURE SCOPE

- Integrate AI and machine learning for predicting wool quality, market trends, and supply chain optimization.
- Implement blockchain for enhanced traceability and secure, immutable transaction records.
- Use IoT sensors for real-time monitoring of wool production, storage, and processing conditions.
- Add sustainability tools to measure environmental impact and promote eco-friendly practices.
- Develop a mobile application and expand the platform for global wool trading and enhanced security.

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