



Cold Chain Product Monitoring with Web-Based Support

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Abstract:

The cold chain logistics industry plays a crucial role in preserving the quality and safety of perishable products, including medicines, food, and specialty chemicals. Cold storage facilities are essential for maintaining these products between production and distribution, ensuring their freshness and integrity. In this study, we focus on product identification within the cold chain using the decision tree technique, a machine learning supervised learning algorithm known for its effectiveness in classification problems. The decision tree operates as a flow chart, classifying products based on various sets of variables. This method allows for accurate ranking of classes and efficient categorization of products. By analyzing tagged data, which includes information about freshness, quantity of loss, and other traits, we can quickly assess the condition of items in cold storage. This approach is particularly valuable for perishable goods, where degradation can occur rapidly. The study also emphasizes the importance of web-based support in cold chain logistics. Web-based platforms provide real-time information about the quantity and quality of stored products. This transparency is beneficial for clients, allowing them to access critical information about their products at any given time. Overall, our approach aims to enhance the effectiveness of cold chain product monitoring and ensure the preservation of quality throughout the supply chain.

Keywords: Cold Chain, Machine Learning, Supervised Learning Algorithm, Logistics.

1. INTRODUCTION

In the realm of product monitoring, routine inspections are essential to ensure quality and safety. However, the sheer volume of products often makes it impractical to conduct daily checks on every item. To address this challenge, the integration of web-based support becomes imperative for evaluating objects based on specific variables and determining their condition. This online tool employs advanced calculations, predictive algorithms, and datasets to provide valuable insights. The generated data not only aids in decision-making but also prompts clients to prioritize the retrieval of items from cold storage.

The primary objective of our study is to identify and categorize products using the decision tree technique, a powerful machine learning algorithm. Focused on handling unlabeled data received from customers, the algorithm utilizes tagged data to assess factors such as freshness, quantity of loss, and overall product condition. This approach enables us to swiftly ascertain the state of objects stored in cold facilities, with particular attention given to the rapid degradation of perishable items like food products.

Recognizing the limitations posed by clients' inability to track stored items, our project emphasizes the significance of web-based assistance. This platform ensures real-time access to critical information about stored items, allowing clients to make informed decisions on prioritizing their retrieval. By combining technological advancements with efficient data processing, our study aims to enhance the monitoring of stored products, ultimately guaranteeing the quality and effectiveness of the fresh supply chain.

2. LITERATURE SURVEY

Deep Learning is a powerful technique that is widely applied to Image Recognition and Natural Language Processing tasks amongst many other tasks. In this work, we propose an efficient technique to utilize pre-trained Convolutional Neural Network (CNN) architectures to extract powerful features from images for object recognition purposes. We have built on the existing concept of extending the learning from pre-trained CNNs to new databases through activations by proposing to consider multiple deep layers. We have exploited the progressive learning that happens at the various intermediate layers of the CNNs to construct Deep Multi-Layer (DM-L) based Feature Extraction vectors to achieve excellent object recognition performance. Two popular pre-trained CNN architecture models i.e., the VGG_16 and VGG_19 have been used in this work to extract the feature sets from 3 deep fully connected multiple layers namely “fc6”, “fc7” and “fc8” from inside the models for object recognition purposes. Using the Principal Component Analysis (PCA) technique, the Dimensionality of the DM-L feature vectors has been reduced to form powerful feature vectors that have been fed to an external Classifier Ensemble for classification instead of the SoftMax based classification layers of the two original pre-trained CNN models.

3. EXISTING SYSTEM

Cold storage is the only widely utilized method for preserving perishables in large quantities between manufacturing and marketing processing. Perishable commodities can be kept in a fresh and complete state for a longer period of time by controlling the temperature and humidity within the storage system. If the temperature is not kept low enough, the product will suffer from chilling damage. Relative humidity in the storeroom should be kept between 80% and 90% for the majority of perishables; any lower or higher has an adverse effect on the ability of the produce to stay fresh. The majority of fruits and vegetables have a relatively short shelf life after harvest if maintained at normal harvesting circumstances. When it comes to tracking goods, advanced techniques and continuous observation are needed. Thus, large corporations carry out a lot of surveillance. It is frequently used in container trucks that move goods over long distances in cold chain logistics. Storage of goods does not completely take advantage of preventive measures, and there is no long-term cold logistics solution.

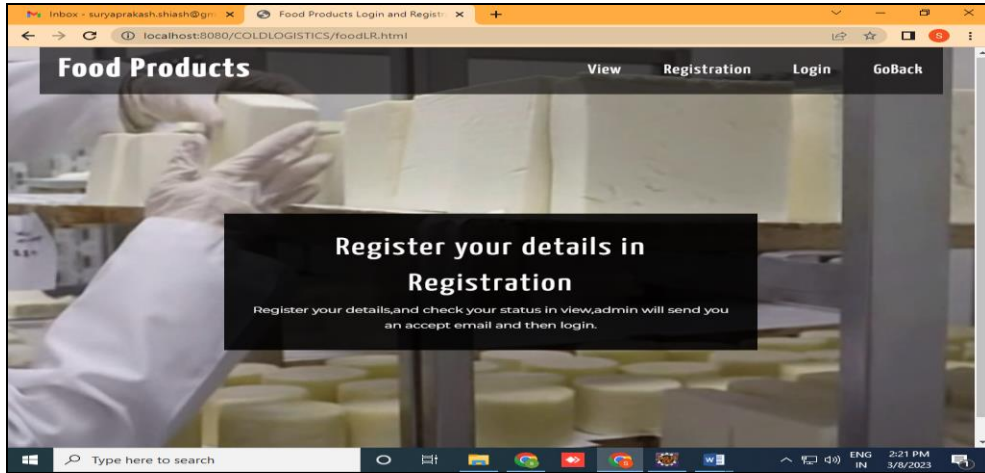
4. PROPOSED SYSTEM

The products are divided into various designated categories because the customer can normally store any kind of goods in a cold storage facility. Thus, it is essential to first research the products. Before analysing the goods that must be maintained, it is crucial to determine whether the storage can accommodate them because storage facilities require empty space for product storage. There are specific distinctive items that come up when products are categorized, because each type of product requires a different kind of facility, they will not fit into any of the categories. We cannot store medicines in food storage, for example, because they need optimal temperatures. Specific solutions are necessary to keep various objects in the facility. A client's order's unique items are separated out by an algorithm, which determines whether to save them or not based on predetermined criteria. After being delivered to the appropriate storage facilities, every item is swiftly evaluated using predictive algorithms, and some factors that are crucial for determining the state of the product are determined. It might be instantly and automatically finished using our project.

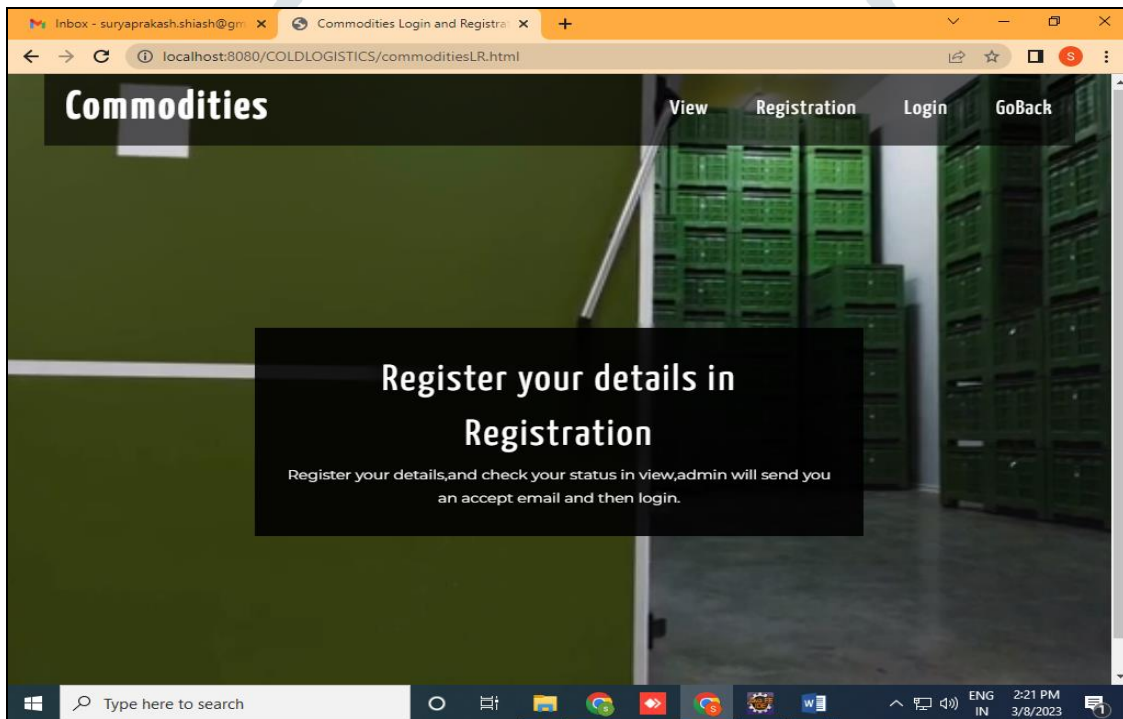
5. EXPERIMENTAL RESULTS

From the below figures it can be seen that proposed model is more accurate in order to prove our proposed system.

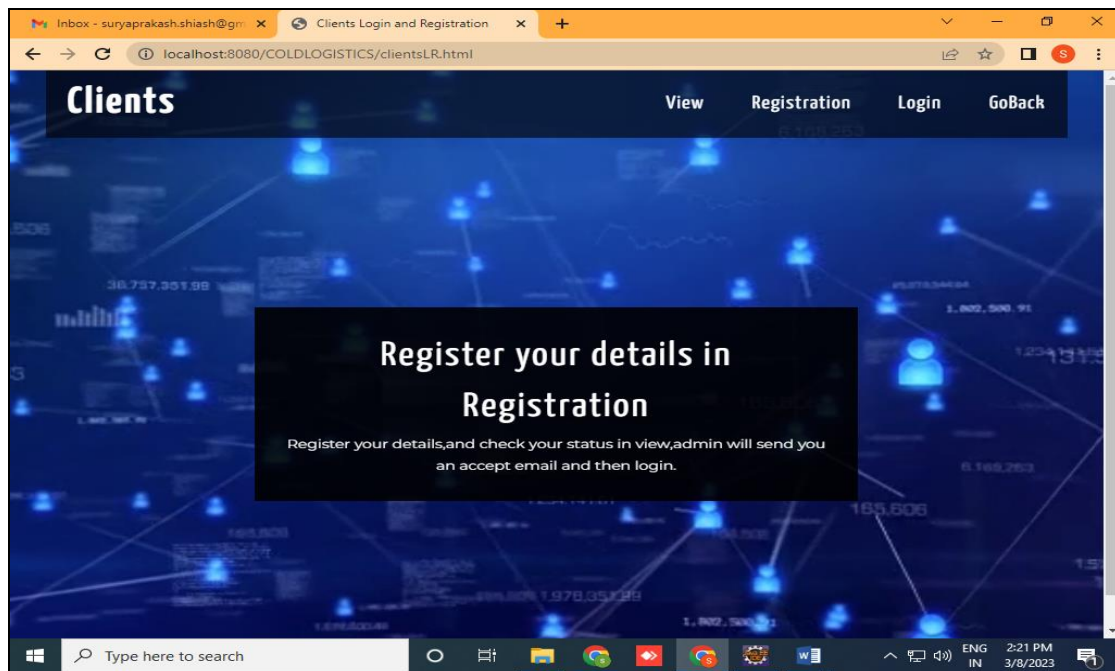
Registration:



Commodities Registration:



Clients Registration:



6. CONCLUSION

The current landscape witnesses a significant surge in interest and demand for cold chain solutions. Various methods are being employed to ensure the secure storage of diverse items, raising concerns primarily about preserving freshness and safety. Clients seek comprehensive reports on the status of their stored items, with a particular emphasis on accurate loss projections. The analytical process must be thorough, anticipating future storage requirements and preparations. In the face of climatic changes, the need for cold storage facilities becomes paramount. Despite the associated costs, many companies opt for chilled storage solutions, choosing to outsource this critical aspect of their operations. This preference is further fueled by the escalating demand for transportation services, driven by the increased number of products requiring refrigeration. This trend is indicative of a growing demand for value-added consolidating services in the industry.

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