TEA TRAILS: A SOLUTION TO CONTROL THE QUALITY IN THE FERMENTATION STAGE OF BLACK TEA MANUFACTURING

SANJALI MANISHKA GURUGE

A dissertation submitted in partial fulfilment of the requirement for

Bachelor of Science (Honours) degree in Business

Information Systems

Business School

Informatics Institute of Technology, Sri Lanka

in collaboration with

University of Westminster, UK

2023

Abstract

Sri Lankan tea renowned as 'Ceylon Tea' has gained a global reputation for its exceptional aroma, taste and color that has persisted over generations. Being the largest producer of orthodox tea in the world, Sri Lanka currently ranks as the fourth largest tea producer of the world, benefiting from high quality black tea exports for nearly 150 years. Ensuring the quality of black tea is highly dependent on the 'Fermentation' process of the tea production process. Despite utilizing advanced technologies to monitor fermentation, the tea industry still relies on human expertise and manual data entry to determine optimal fermentation levels and detect color changes. The tea industry's reliance on these traditional methods has led to fluctuations in the optimum fermentation time resulting in over fermenting or under fermenting tea leaves, variations in detecting color changes from person to person, shortage of human labor and absence of automated fermentation systems established in factories causing a significant risk in maintaining the consistent quality of black tea.

The project aims to tackle the problems outlined in the problem context by designing, developing and evaluating a prototype that can accurately determine the fermentation status of dhools, subsequently categorize them into quality grades A, B or C based on their status and determine the optimum fermentation time for under fermented leaves to ensure uniform consistent quality of tea across different types of leaves. Comprehensive research was conducted through methods such as literature review, pilot study and visiting tea factories for observations. The research aimed to validate the problem context, gain knowledge about existing solutions and technologies, and identify requirements for the proposed solution. Interviews were conducted with tea factory managers, officers, owners and industry professionals to evaluate the findings and propose an effective solution.

The assessment results showed that there is a need for an application to address issues related to the fermentation process of tea production in Sri Lanka. 'Tea Trails' was introduced to capture real time images of successfully fermented dhools and generate necessary outcomes. Both industry experts and non-experts appreciated the usefulness of the application in detecting color changes to maintain the consistent quality of Ceylon Tea.

Keywords: Tea Industry, Tea Manufacturing Process, Fermentation Process, Optimum Fermentation Time, Quality, Image Processing, Deep Learning