MILK QUALITY PREDICTION USING SUPERVISED MACHINE LEARNING

Parkavi S , Pooja N, Nithiyasree T, Deeparani S
Information Technology
Loyola Institute Of Technology

Abstract - Milk is an important beverage essential for a healthy life. Milk adulteration by various impurities, such as water, whey and area and some other harmful instruments are used for milk quality analysis. These instruments are so accurate but these are complex, expensive, inconvenient for field use, and are require laborious skilled procedures to get the reading. There is a need to develop a rapid, accurate, sensitive, and costeffective simple working detection system. This article presents the theory, design, fabrication, and test results of an accurate and simple working prototype model of an across-conductance sensor for milk adulteration detection.

Index Terms – MLP(Multi layer perceptron), Xg booster(Extreme gradient), TPR (true positive rate)

I. INTRODUCTION

Milk adulteration by various impurities, such as water, whey, and urea, and some other harmful instruments are used for milk quality analysis. These instruments are accurate but these are complex, expensive, inconvenient for field use, and require laborious skilled procedures to get the reading. Portable sensors-based instruments working on direct/indirect transduction phenomena are also reported in the literature. Most commonly, the conductive sensors with selective sensing films are used for detecting the milk impurities but such sensors require calibration and show drift due to aging. There is a need to develop a rapid, accurate, sensitive, and costeffective simple working detection system. This article presents the theory, design, fabrication, and test results of an accurate and simple working prototype model of an across-conductance sensor for milk adulteration detection.

II. LITERATURE SURVEY

The aim of Maria **Frizzarin, Antonio Bevilacqua** was to build a calibration model in order to predict milk quality traits exploiting the information contained in mid-infrared spectra only. Three different traits have been provided, presenting heterogeneous degrees of prediction complexity thus possibly requiring trait-specific modelling choices. In this paper the different approaches adopted by the participants are outlined and the insights obtained from the analyses are critically discussed.

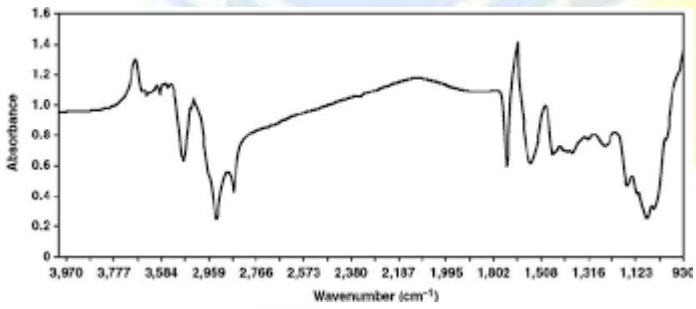

Figure1 mid infrared spectra

Imran Ahmad, Somrote Komolavanij proposed that Data mining techniques were applied to predict raw milk quality in terms of methylene blue reduction time (MBRT) from the independent parameters of raw milk inspection parameters such as travel time, temperature of milk, solid-not-fat, %fat, acidity and specific gravity. Predictive models were developed and the performance of 3 data mining algorithms namely; Multiple Linear Regression (MLR), Artificial Neural Network (ANN) and K-Nearest neighbor (KNN), was measured in terms of average error and Root Mean Square Error (RMSE). MLR showed high and inconsistent RMS error in 3 randomly picked data partitions whereas KNN and ANN were able to predict the MBRT values from the physico-chemical quality parameters, KNN was the preferred algorithm (K=7, RMSE of 1.7). The models were applied to a new set of data (n=78) without showing them the output parameter (MBRT). The predicted values of MBRT were plotted against the actual observed values to classify milk into 4 quality grades.

III. MILK QUALITY PREDICTION

The proposed method is to build a machine learning model for the classification of milk quality. The process carries from data collection where past data related to milk quality are collected. Data mining is a commonly used technique for processing enormous data. Machine learning is now applied where it reduces manual effort and a better model makes error less which leads to preventing problems. The data analysis is done on the dataset, proper variable identification is done that is both the dependent variables and

independent variables are found. The proper machine learning algorithms are applied to the dataset where the pattern of data is learned. After applying different algorithms a better algorithm is used for the prediction of the outcome.

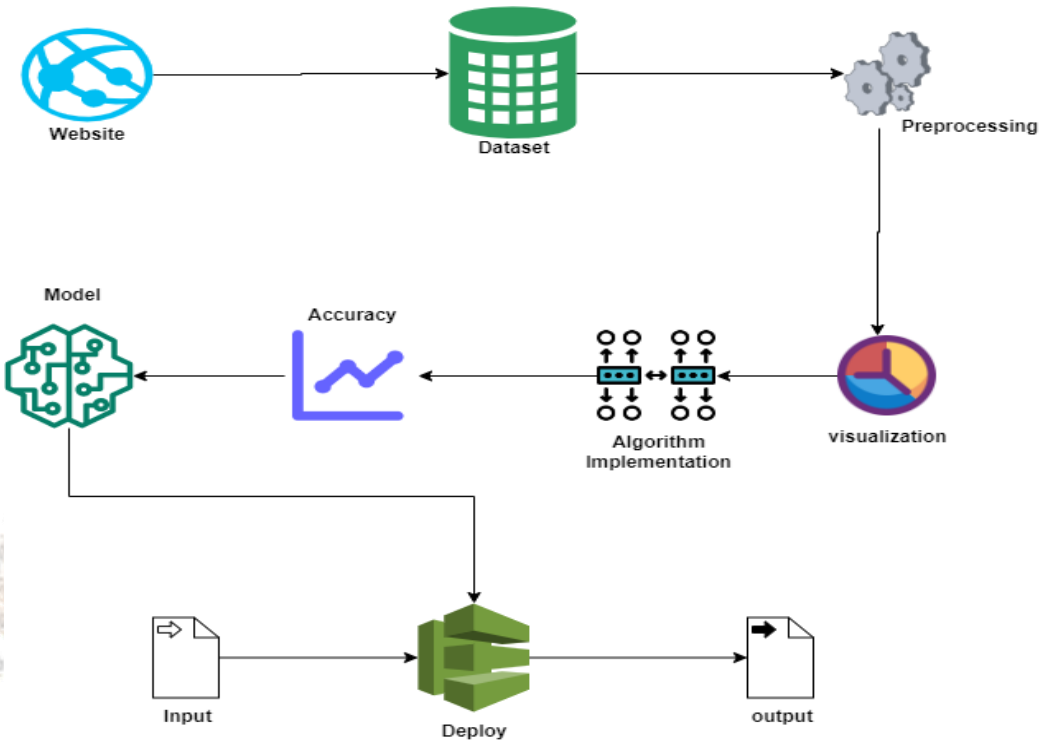

Figure 2 System architecture

(1)Preprocssing

The data which was collected might contain missing values that may lead to inconsistency. To gain better results data need to be preprocessed so as to improve the efficiency of the algorithm. The outliers have to be removed and also variable conversion need to be done

(2)Building the classification model

The prediction of Cirrhosis in a high accuracy prediction model is effective because of the following reasons: It provides better results in classification problem.

- It is strong in preprocessing outliers, irrelevant variables, and a mix of continuous, categorical and discrete variables.
- It produces out of bag estimate error which has proven to be unbiased in many tests and it is relatively easy to tune with.

(3)Construction of a predictive model

Machine learning needs data gathering have lot of past data's. Data gathering have sufficient historical data and raw data. Before data pre-processing, raw data can't be used directly. It's used to pre-process then, what kind of algorithm with model. Training and testing this model working and predicting correctly with minimum errors. Tuned model involved by tuned time to time with improving the accuracy

.

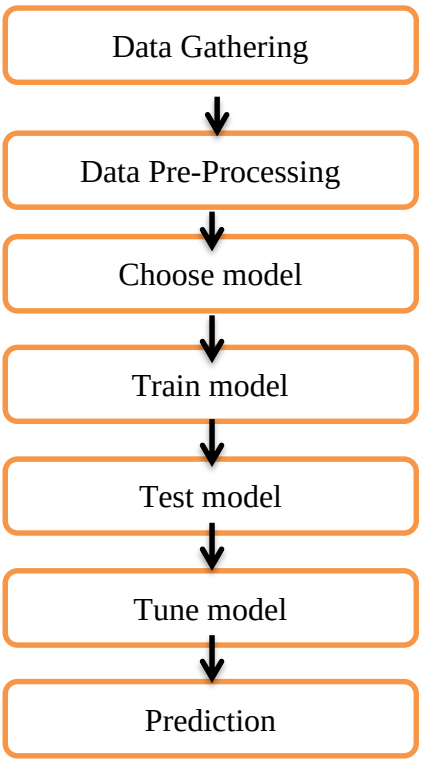

Figure 3 Process of dataflow diagram

IV. CONCLUSIONS

The analytical process started from data cleaning and processing, missing value, exploratory analysis and finally model building and evaluation. The best accuracy on public test set of higher accuracy score algorithm will be find out. The founded one is used in the application which can help to find the quality of the milk.

V. REFERENCES

1. Maria Frizzarin, Antonio Bevilacqua, “Mid infrared spectroscopy and milk quality traits”, 2021.
2. Naftali Slob , Cagatay Catal, “Application of machine learning to improve dairy farm management” 2021.
3. M. Frizzarin,, I. C. Gormley, “ Predicting cow milk quality traits from routinely available milk spectra using statistical machine learning methods”, 2021.
4. Imran Ahmad, Somrote Komolavanij, “Prediction of Raw Milk Microbial Quality Using Data Mining Techniques”, 2014.
5. Abhinav Senthil Chinnaiyan, “Milk Solid-Not-Fat Prediction using Artificial Intelligence and Digital Image Processing”, 2021.
6. A.S. Keceli, C. Catal, A. Kaya, B. “Tekinerdogan Development of a recurrent neural networks-based calving prediction model using activity and behavioural data Compute”. 2020.
7. R. Muñiz, M. Cuevas-Valdés, B. de la Roza-Delgado “Milk quality control requirement evaluation using a handheld near infrared reflectance spectrophotometer and a bespoke mobile application” 2020.
8. Q.T. Nguyen, R. Fouchereau, E. Frénod, C. Gerard, V. Sincholle “Comparison of forecast models of production of dairy cows combining animal and diet parameters Compute”, 2020.
9. M. Taneja, J. Byabazaire, N. Jalodia, A. Davy, C. Olariu, P. Malone “Machine learning based fog computing assisted data-driven approach for early lameness detection in dairy cattle Compute” 2020.
10. F. Zhang, J. Upton, L. Shalloo, P. Shine, M.D. “MurphyEffect of introducing weather parameters on the accuracy of milk production forecast models” 2020.