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An empirical analysis of deep learning architecture towards Classification and prediction of food Adulteration

[1]N.Hamsaleka & [2]Dr.V.Kathiresan

[1]Ph.D Scholar, Department of Computer Science, Dr.SNS Rajalakshmi college of Arts and Science, Coimbatore (India)
[2]Professor, Department of Computer Science, Dr.SNS Rajalakshmi college of Arts and Science, Coimbatore (India)

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***Corresponding Author**
Email: hamsaleka91[at]gmail.com

ABSTRACT

Due to food related disease in growing tremendously, it has become important to identify the food contamination using wide variety of analysis. The process employed for detection of food adulteration is critical task. Due to its importance, many data mining technique has been employed to identify the food adulteration based on various factors. Even there exist some challenges because most of method exhibit static behaviour. The ultimate goal of this study is to carry out of the empirical analysis of food adulteration using deep learning techniques. The deep learning technique is applied to the information leveraged from data sources. The model builds the class from the analysis of data through the information extracted from the foods substance on various properties along the ingredients and adulterants. The deep learning technique is used for representation of the classification model in order to generate feature representation of mandatory ingredients of food and to predict the contamination on the samples which produces the variance from the ingredient features in the food to identify impurities. The classification model is capable of categorizing the adulteration into multiple categories on deviation of the feature value of the each instance. Finally it is used as method for detection of the food adulteration on wide varieties. It can be used as food adulteration assessment tool to understand the risk of the food prepared.

1. Introduction

Food Safety policies and tools has been generated and started adopting it in all over the world. On adopting the available tools, still many challenges been arising on various aspects such as accuracy of contamination prediction. The problem of food adulteration is by no means a contemporary phenomenon and is likely to be as old as the food processing and production systems themselves. In order to avoid those challenges, many data mining technique in terms of supervised [1] and unsupervised model have been employed. Those models focus on the microbiological or toxic chemical hazards. The ultimate goal to the study is to examine the data mining technique employed for food adulteration and contamination.

The neural network models are prevalent in the machine learning community, there has be no prior work done in applying these models to large-scale adulteration detection. The dataset is constructed using the generation of ingredient substitutions and alternate combinations of ingredients using online recipes.

The implementation of the deep learning model provides various functionalities such as identification, characterisation and exposure range of toxic substance in the food [2]. The information is preprocessed as matrix model will underlie a practical approach to enable tracing a risk origin with quantitative evaluations through all pesticide identification and application food preserving elements. It contains the all available instances and classifies new instance based on the similarity measure

The remaining paper is organized into section as follows, section 2 describes the review of literatures related to food adulteration and data mining techniques related to classification and prediction, section 3 outlines the deep learning model to predict and classify the food adulteration and contamination, and finally paper is concluded with future direction.

2. Related Work

In this section, we describe the mechanism used to determine the adulteration and contamination in the processed food using machine learning techniques are analysed on various aspects based on disease illness and side effects. The risk level is calculated on the probability of an adverse health effect and the severity of that effect, consequential to contamination .

2.1 Food Hazard Classification and Prediction using PetriNet

In order to gain the cause of hazard analysis critical control point (HACCP) and Petri net are combined and applied. It is used for food safety and look for the cause of the food hazard [3]. Petri nets are directed bipartite graphs, which includes transition, place, and arc. Transition and place are two kinds of nodes, and arc is the connecting of the nodes, which indicates the number of tokens (Dynamic elements of a Petri net) that can be consumed from an input place by a connected transition. The posterior probability is defined as the probability after observing the specific characteristics of the test instance.

2.2 Food Hazard Detection using Analytical Hierarchy Process

AHP is an effective tool for predicting risk. It is an approach to perform structured analysis of the aggregative food safety risk in food by using fuzzy set theory and analytical hierarchy process. It aims to provide a practical risk assessment solution, and perform structured analysis of food [4]. It provides the ability to identify and separate the data into structured format.

2.3 Computer Aided Inspection Model

CAI system provides an alternative for an automated, non-destructive and cost effective technique to accomplish accurate, fast and objective quality determination. CAI system is based on image Analysis and processing which can be adopted in food industry. The various stages of CAI system consists of preprocessing, enhancement, segmentation, feature extraction and classification [5]. Considerable research as proven its potential for inspection and grading of fruits, meat, vegetables, grain, bakery products, confessionary products and processed food products.

2.4 Automated Target Recognition System

It is constructed using the sensor to monitor the food hazard; monitored information is converted into system readable form. The techniques uses a combination of discrete wavelet transforms, multiclassifiers, and decision fusion, to effectively exploit the hyperspectral data to achieve high detection rates while maintaining low false alarm rates[7]. The discrimination among the different classes is maximized, when the level of skew among the different classes in a given node is maximized

2.5. Electronic Noses (ENs)

It has shown to be a very effective and fast tool for monitoring microbiological spoilage and food quality control. The ability of this instrument can also be used for the selection of the most appropriate species or strains for a determinate purpose. The aim of this study was essay the ability of a novel EN for the detection of bacterial presence in water and other foodstuff in cooperation with classical microbiological and chemical techniques [6]. It measures the correlation between pairs. These measures compute the imbalance of the feature values over different ranges of the attribute, which may either be discrete or numerical.

3. Outline of proposed model

Despite of much concurrent issue related to food hazard detection, we employ a new model using deep learning architecture to determine the contamination of the food through processing of various stage of the process in this model. Deep learning architecture is used due to the dramatic difference in the linguistic properties, there may be a need for separate sets of lexicon that correspond to each dataset collected from various sources. The feature generated is stored in the feature vector to make acts as training data for class generation. This model increase the predictive accuracy as it passes 16 layers which includes the hidden layers as primary aspects of the research.

4. Conclusion

The empirical analysis of deep learning architectures towards prediction and classification of the food adulteration and contamination has been examined in detail. In addition , many literature related to the food hazard detection using data mining model has been extracted for utilizing those process to build a proposed model. The model identifies the risk level of the contaminated food by dimensions which have reduced to built specific datasets to represent as uniformly distributed data.

References

1. S. Y. Leung, C. K. Kwok1, X. P. Nie, K. C. Cheung1 and M. H. Wong, “Risk assessment of residual DDTs in freshwater and marine fish cultivated around the Pearl River Delta, China”, Arch Environ Contam Toxicol, vol. 58, no. 2, pp. 415-430, Feb, 2010.
2. Codex Alimentarius Commission (2001) Principles and guidelines for the conduct ofmicrobiological risk assessment, 2nd edn, The Codex General Principles ofFood Hygiene.
3. Parsons, D.I., Orton, T.G., Souza, J.D., Moore, A., Jones, R. & Dodd, C.E.R. (2005) 'A comparison of three modelling approaches for quantitative risk assessment using the case study of Salmonella spp. In poultry meat', International journal of food microbiology, vol. 98, pp. 35-51.
4. Yoshua Bengio, Re jean Ducharme, Pascal Vincent, and Christian Janvin. A neural probabilistic language model. The Journal of Machine Learning Research, 3:1137–1155, 2003.
5. E. Ferrara, P. De Meo, G. Fiumara, and R. Baumgartner, “Web data extraction, applications and techniques: A survey,” Knowledge-Based Syst., vol. 70, pp. 301–323, 2014.
6. Gonzalez-Sanchez Alberto, Frausto-Solis Juan, Ojeda-Bustamante W. Predictive ability of machine learning methods for massive crop yield prediction. Span J Agric Res. 2014;12(2):313–28. science 2016

