A Comprehensive Review On Food Quality Analyzing And Diet Recommendation

Abhishek Sarkar[1], Akshatha H R[2], Arjun Sharma[3], Ganesh Naidu[4], Manjula G Hegde[5]

[1,2,3,4]UG students, [5]Assistant professor

Department of Electronics & Communication Engineering

Sambhram Institute of Technology, Bangalore

ABSTRACT

Food plays a very important role in our day to day life. With an increase in globalization quality of food decreases day by day. In most of the time various food processing is done to keep the food fresh. Various preservatives or the ingredients are added in the food so that it looks like fresh or tempting. Now most of the food is preserved with the chemicals which cause the food contamination. This contamination leads to various diseases which results that the consumer wants healthy food. The people want organic food for healthy lifestyle. So to avoid the problems associated with the food without human interpretation we need such a device which helps to determine the quality of food. There is a requirement of such a device which guide us about the hygienic food. Hence to fulfill this consumer demand we made a device that checks whether the quality of food is good or bad. This paper represents the use of various sensors in the field of the food industry. The sensors like pH sensor, gas sensor, temperature sensor help in identifying the condition of food. This system makes an effective presence in restaurants, households, small scale industries.

Keywords: Food Quality; Diet Guidance; Deep learning; Sensor Calibration; Maintain diet database.

INTRODUCTION

The project propose a photo based dietary tracking system that employs deep-based image recognition algorithms to recognize food and analyze nutrition. The system is beneficial for patients to manage their dietary and nutrition intake**[2]**.The food we consume can affect in any form of contamination that may occur due to storage or chemical reaction. within the food. There are several viruses and bacteria that causes food contamination and leads to numerous food borne diseases, for example nor virus a very contagious virus caused by contaminated food or water. Most of the people die of food poisoning globally every year. Maintenance of foods and use of chemicals to artificially increase the time span of food causes people illness. It is essential to develop a system that can help people to identify the freshness of food or quality of food items**[1]**.An appropriate dietary intake is considered as an important factor to improve overall wellbeing. Although most people are aware of the importance of healthy eating habits, they usually tend to neglect appropriate behaviors because of busy lifestyles and/or unwillingness to spend cognitive effort on food preparation. Those problems prevent users from a healthy food consumption**[3].** a human being suffering from many health problems such as fitness problem, maintaining proper diet problem, etc. Therefore, we are developing this website for providing special dietician information and proper exercise knowledge for normal persons and for handicap people also. The effective personal dietary guidelines are very essential for managing our health, preventing chronic diseases and the interactive diet planning helps a user to adjust the plan in an easier way. The website is to be produced on Artificial Intelligence and Dietician. Here there are two persons, the admin and user. The user fills the registration form and then login to the website. After login users have to fill personal information including age, weight, height, gender and exercise level**[7]**.

LITERATURE SURVEY

[1].*Arduino Based Smart IoT Food Quality Detection Technology:* The food we consume can affect in any form of contamination that may occur due to storage or chemical reaction. within the food. There are several viruses and bacteria that causes food contamination and leads to numerous food borne diseases, for example nor virus a very contagious virus caused by contaminated food or water. Most of the people die of food poisoning globally every year. Maintenance of foods and use of chemicals to artificially increase the time span of food causes people illness. It is

essential to develop a system that can help people to identify the freshness of food or quality of food items. Our proposed system may give the good quality (freshness) management in food. It is based on IOT and the different sensors are testing food freshness. Food like meat could not produce any smell they start to rotten. Most meat sellers add salt content meat to make meat fresh. For this reason we can check a temperature level humidity level, PH sensor used to test a meat salt content and image processing using matlab for predefined images are stored and testing freshness of food. In this way we are checking food quality explained below.

[2].*Food Photo Recognition for Dietary Tracking:System and Experiment:* The convenience of food entering methods plays a key role in the usability of dietary tracking applications. Existing methods include food database search and free text diary, both requiring typing. Bar code scanning is efficient but limited to packaged food. The recent advancement in computer vision and deep learning makes photo based dietary tracking possible through automatic food image recognition. Photo based dietary tracking is more intuitive, more faithful, and easier to perform than text based approaches. To perform subsequent nutrition value analysis, the recognized food category is used to look up nutrition databases. When a food type is not covered, nutrition can still be estimated by ingredient recognition.

[3].*An overview of recommender systems in the healthy food domain:* Food and diet are complex domains bringing many challenges for recommendation technologies. For making recommendations, thousands of fooditems/ingredients have to be collected. Besides, because foods/ingredients are usually combined with each other in a recipe instead of being consumed separately, this exponentially increases the complexity of a recommender system. Furthermore, food recommender systems not only recommend food suiting users' preferences, but also suggest healthy food choices, keep track of eating behavior, understand health problems, and persuade to change user behavior.

[4]. *An Embedded Simplified Fuzzy ARTMAP Implemented on a Microcontroller for Food Classification:* A portable system based on a microcontroller has been developed to classify different kinds of honeys. In order to do this classification, a Simplified Fuzzy ARTMAP network (SFA) implemented in a microcontroller has been used. Due to memory limits when working with microcontrollers, it is necessary to optimize the use of both program and data memory. Thus, a Graphical User Interface (GUI) for MATLAB® has been developed in order to optimize the necessary parameters to programme the SFA in a microcontroller. The measures have been carried out by potentiometric techniques using a multielectrode made of seven different metals. Next, the neural network has been trained on a PC by means of the GUI in Matlab using the data obtained in the experimental phase. The microcontroller has been programmed with the obtained parameters and then, new samples have been analysed using the portable system in order to test the model. Results are very promising, as an 87.5% recognition rate has been achieved in the training phase, which suggests that this kind of procedures can be successfully used not only for honey classification, but also for many other kinds of food.

[5].*Deep Residual Learning for Image Recognition:* Deeper neural networks are more difficult to train. We present a residual learning framework to ease the training of networks that are substantially deeper than those used previously. We explicitly reformulate the layers as learning residual functions with reference to the layer inputs, instead of learning unreferenced functions. We provide comprehensive empirical evidence showing that these residual networks are easier to optimize, and can gain accuracy from considerably increased depth. On the Image Net data set we evaluate residual nets with a depth of up to 152 layers—8× deeper than VGG nets
[40] but still having lower complexity. An ensemble of these residual nets achieves 3.57% error on the Image Net test set. This result won the 1st place on the ILSVRC 2015 classification task. We also present analysis on CIFAR-10 with 100 and 1000 layers. The depth of representations is of central importance for many visual recognition tasks. Solely due to our extremely deep representations, we obtain a 28% relative improvement on the COCO object detection data set. Deep residual nets are foundations of our submissions to ILSVRC & COCO 2015 competitions1 , where we also won the 1st places on the tasks of Image Net detection, Image Net localization, COCO detection, and COCO segmentation.

[6]. *A High Quality Embedded System for Assessing Food Quality Using Histogram of Oriented Gradients:* A low cost high quality system for accessing quality of food samples by finding the presence of fungus is proposed. Most of the food items kept for long intervals will have fungal infection in them. The proposed system uses Histogram of Oriented Gradients algorithm along with Support Vector Machine classifier to detect the presence of fungus. The features of the food samples captured in real time using a webcam are extracted using Histogram of Oriented Gradients algorithm. The extracted features are given to SVM classifier which compares these features with the trained one and displays the quality of food samples. The algorithms are implemented using ARM Cortex A-53 processor. Experimental results indicate that very good sensitivity and specificity is obtained and the execution time of the algorithms implemented in ARM processor is much lesser compared to the results obtained using MATLAB software.It is a real time application the algorithms are implemented in ARM Cortex processors thus reducing the time complexity. The proposed work is based on an embedded system consisting of Raspberry Pi 3 as a low-cost ARM powered Linux based computer. Raspberry Pi 3 is a useful

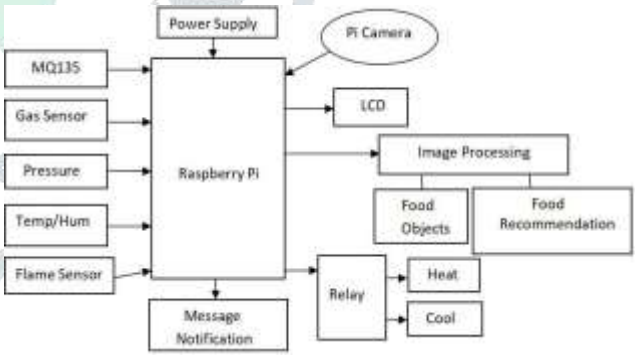
platform for machine learning development, where a camera can be connected as an add-on module for developing image classification applications. The ARM Cortex 64-bit embedded platform in the Raspberry Pi 3 supports floating point operations thus improving the real time performance of the system. Further Raspberry pi 3 has an inbuilt Wi-Fi module and hence can be used to monitor the quality of food samples remotely.

[7]. ***Artificial Intelligence Dietician:*** Nowadays, a human being suffering from many health problems such as fitness problem, maintaining proper diet problem, etc. Therefore, we are developing this website for providing special dietician information and proper exercise knowledge for normal persons and for handicap people also. The effective personal dietary guidelines are very essential for managing our health, preventing chronic diseases and the interactive diet planning helps a user to adjust the plan in an easier way. The website is to be produced on Artificial Intelligence and Dietician. Here there are two persons, the admin and user. The user fills the registration form and then login to the website. After login users have to fill personal information including age, weight, height, gender and exercise level. For calculating BMI age, weight, height, gender and exercise level are necessary. On the basis of calculated BMI (Body Mass Index) Artificial Dietician will display the proper dietician for logged user. This application suggests the user to what to do for example diet tips, Exercises, Online Training, etc. Here we are included different exercises like Yoga, Gym exercises, Aerobics, Cardio, Basic workouts, etc. The user can also fire a query to the admin on his/her health-related problems to maintain his/her fitness and the admin can give solutions on user's problems.

[8]. ***Communication techniques and challenges for wireless food quality monitoring***: The events of 11 September 2001 triggered various developments of container tracking systems. There are several systems on the market with a focus on homeland security aspects, such as unauthorized opening of the doors and deviations from the prescribed transport rout. Standard telematics systems for transport monitoring provide only the GPS information and at best the readings of the cooling unit's supply and return air temperature. Only a few of these systems provide interfaces for wireless temperature and humidity sensors. The container security box offers the option to install interior sensors at different positions in the container that send temperature and humidity measurements to the main unit installed on the roof of a container. An alternative system from Ceebron consists of single-use smart- trace-tags that can be attached to temperature sensitive items. They send their data to a telematics unit, which forwards it together with the GPS position. The Israel company BT9 provides a similar solution: Xsense wireless sensor tags are placed within pallets or packaging to monitor the actual temperature and relative humidity of the perishables. As long as the tags are in close proximity to a control unit, the data are transmitted in real time. Traditional data logger companies, such as Sensitech, equip their devices with RF-interfaces. A TempTale RF Gateway is installed at the warehouse entrance, and it can automatically download the temperature data from the loggers placed in the arriving goods. The battery-assisted passive TMT-8500 class 3 RFID temperature-monitoring tag from Intelleflflex Cooperation provides a free-space reading range of 100 m. Temperature data can be read out by standard RFID readers in accordance with the EPCglobal class 1 generation 2 protocol. Already existing infrastructure for RFID-based tracking and tracingcan be used, but it requires software extensions to integrate temperature data. The development of sensor systems equipped with a passive RFID interface is still going on. Their reading range can be extended by ultrawide-band communication and low-power analogue– digital converters, but these technologies are still in a research state.

[9]. ***Food Quaity Sensor and Methods Thereof:*** Today, food distributors typically label their products with expiration dates/codes, but these dates essentially only represent an estimate—that is, they assume an average, or even perfect, "heat history' that corresponds to a known aging profile. Food distributors generally do not continuously monitor the quality of their products, and thus, some spoiled food may make it through the Supply chain to a retail store to be purchased by shoppers. Spoiled food not only poses risks due to illness, but also represents lost revenue for grocers and squandered wages for the consumer. Moreover, "fresh' or still good quality food products may be discarded too early (i.e., before they are actually spoiled), which is both a waste of product and money.

BLOCK DIAGRAM OF PROPOSED SYSTEM



Description: Raspberrypi –acts as a microcontroller to perform the multiple operation to measure the food quality.DIP/ DL – digital image processing, it is used to

detect the food, maintain diet database, also give the user alert.Here the microcontrolle acts as a hardware part.DIP acts as a software part.

APPLICATIONS

- Automatically keeping food healthy and safe to eat by monitoring using sensors and Deep Learning.
- Auto heating or cooling of food.
- Healthy diet recommendations and alerts.
- Managing personal diet database, and status updates.
- Identifying the food and catagorizes it.

CONCLUSION

The proposed system gives information about the contaminated contents present in the food. This system is developed for the people so that they can identify the quality of food. The sensors like the gas sensor, temperature sensor are interfaced with Raspberry Pi and the obtained value is displayed on the LCD screen. This result helps to determine whether the quality of food is good or bad. This system can be used in various applications such as in restaurants, households and even in small scale industries. It gives a convenient way to find the amount of contamination in food. Without any human intervention, our system maintains and regulates the surveillance of the food system. The diseases due to the spoilage of food can be overcome up to great extent. We can improve this system by using a sensor like biosensor.

REFERENCES

[1]. Arduino Based Smart IoT Food Quality Detection Technology :*N.Usharani 1, D.Suruthi2, V.Sangeetha3, L.Punitha 4: 1,2,3UG Student, Department of Electronics and Communication Engineering, Paavai Engineering College, Namakkal, Tamil Nadu,India.4Associate professor, Department of Electronics and Communication Engineering, Paavai Engineering College, Namakkal, Tamil Nadu, India.Volume: 07 Issue: 03 | Mar 2020.*

[2]. Food Photo Recognization For Dietry Tracking: System and Experiment :*Zhao-Yan Ming1 , Jingjing Chen2 , Yu Cao1, Ciaran Forde3 , Chong-Wah Ngo2 , Tat Seng Chua1 1School of Computing, National University of Singapore, Department of computer Science, City University of Hong Kong 3Physiology, National University of Singapore. February 2018.*

[3]. An Overview of Recommender System in the Healthy Food Domain : *Thi Ngoc Trang Tran1 Muslum Atas 1 Alexander Felfernig1 Martin Stettinger1.30 May 2017 / Published online: 22 June 2017.*

[4]. An Embedded Simplified Fuzzy ARTMAP Implemented on a Microcontroller for Food Classification. *Eduardo Garcia-Breijo *, Jose Garrigues, Luis Gil Sanchez and Nicolas Laguarda-Miro. Published: 13 August 2013*

[5]. Deep Residual Learning for Image Recognition*: Kaiming He Xiangyu Zhang Shaoqing Ren Jian Sun Microsoft Research {kahe, v-xiangz, v-shren,jiansun}@microsoft.com*

[6]. A High Quality Embedded System for Assessing Food Quality Using Histogram of Oriented Gradients: *S. Jayanthy, S. Valli Ayswaria, M. Vaishali and P. Udhaya Poorani Department of Electronics and Communication Engineering, Sri Ramakrishna Engineering College, India*

[7]. Artificial Intelligence Dietician *:Aman Mukadam1, Samruddh Choudhari, Hamid Pasha3, Prof. Medha Kulkarni4 Aman Mukadam Mumbai University 2Samruddh Choudhari Mumbai University 3Hamid Pasha Mumbai University 4Professor Medha Kulkarni, Dept. of Information Technology, PVPPCOE, Maharashtra, India. Volume: 07 Issue: 01 | Jan 2020*

[8]. Communication techniques and challenges for wireless food quality monitoring: *Reiner Jedermann1,3, Thomas Pötsch2,4 and Chanaka Lloyd1,4 : 1 Institute for Microsensors, -actuators and -systems (IMSAS), and 2 Institute for Communication Networks (ComNets), University of Bremen, FB1, Otto-Hahn-Allee, Build. NW 1, Bremen 28359, Germany 3 Microsystems Center Bremen (MCB), Bremen, Germany 4 Bremen Research Cluster for Dynamics in Logistics (LogDynamics), Bremen, Germany*

[9]. Food Quaity Sensor and Methods Thereof: *Megan M. Owens, Waltham, MA (US); Marco A. Bonne, Carlisle, MA (US); Tai M. Chan, Brookline, MA (US); John R. Williams, Lexington, MA (US)*,Apr. 13, 2006