

Novel Approach for Measuring Nutrition Values Using Smartphone



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Abstract Food is the source of energy, and it plays a vital role in human existence. The quality of food is suffering day by day such as adulteration and heavy use of various pesticides. The traditional approach to analyze food nutritional values involves the use of various sensors and laboratory procedures to detect the quality, but such sensors and methods really take lots of time. There is a need of a system which we can use to quickly evaluate the quality of food by methods which are ubiquitous. The number of handheld devices and their processing capabilities has increased manifolds over the last few years. In this paper, the novel methodology has been proposed which uses the smartphones to take the image, and instantly, it provides the nutrition value. The proposed model helps detect the nutritional quality of the food by utilizing the various sensors which are present in smartphones such as cameras and microphone. The model uses the classifiers to detect the type of food and process all the algorithms in cloud. Four datasets are used with multi-class level. Machine is trained with various algorithms such as CNN and RNN, and we have used transfer learning. The whole system is implemented successfully, and the accuracy of 82% has been achieved.

Keywords Statistics · Data mining · NLP · Object detection · Machine learning · DietCam

1 Introduction

As per the economist in 2016, more than 1.9 billion adults aged 18 years and older were overweight. Of these, over 650 million adults were obese [1]. Similarly, about 13% of the world's adult population (11% of men and 15% of women) were obese in 2016 [2]. Obesity increases the risk of various diseases and health conditions such

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TPR, PPV and ROC based Performance Measurement and Optimization of Human Face Recognition of IoT Enabled Physical Location Monitoring

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Abstract: This paper describes the construction of Internet of Things (IoT) enabled system which not only captures the sensors data in textual and numeric form but also performs live human face recognition to monitor physical location effectively. The dataset used in order to apply supervised machine learning algorithms is the combination of automatically captured live sensor data along with name of the human face recognized or unknown and additional manually introduced class label. Performance measurement of face recognition is done with the help of Decision Tree (DT), K-Nearest Neighbors (KNN), Naïve Bayes (NB) and Logistic Regression (LR). The results show that DT gives the best performance with respect to classifier's accuracy; True Positive Rate, Positive Predictive Value and area under curve of Receiver Operating Characteristics (ROC) for face recognition prediction whether the recognized face is true or false.

Index Terms: Machine Learning, Physical Location Monitoring, Confusion Matrix, ROC, Decision Tree, Naive Bayes, Logistic Regression, K-Nearest Neighbors.

I. INTRODUCTION

Internet of Things (IoT) is the one of the emerging and rapidly developing technology in the field of Information Technology and Communication Engineering. Lots of devices can be connected to each other with the help of IoT to communicate and exchange their information and data. In today's life, it is necessary to monitor the physical location with the help of IoT where numbers of different sensors are connected to single board computer. Analysis of physical location is required in order to identify any abnormal conditions in the environments like home locations, sensitive laboratories, hospitals, educational institute, industries etc. Abnormal conditions can be sudden increase or decrease in temperature and humidity, increase in intensity of light, increase in gas sensor values, unknown person's detection in the premises which in turn can cause severe damage to the location and surroundings. So it is essential task to capture sensor data continuously on regular intervals and perform statistical as well as systematic analysis of the same to create decision support system which is required to avoid further loss in the environment. IoT enabled system with multimedia data such as digital images of human faces are useful for face detection and recognition. Face recognition is useful in

various scenarios such as intrusion detection, identifying the several actions such as switch ON/OFF various devices, identifying user's routine in the environment to know when user is at home and interacting with the devices and so on. Development of IoT enabled system with face recognition makes significant change in safety and security of premises. More robust and powerful system can be achieved with the help of IoT and face recognition. The objective of this paper is to present prescient scientific models for IoT enabled with face recognition system for monitoring physical location. Location considered here is the living room of a home and data is captured for one month continuously. The system employs four supervised machine learning predictive models with DT, KNN, NB and LR for analysis of human face recognition to find accuracies of applied classifiers, precision, recall and ROC curve and compare them.

II. RELATED WORK

Sankar Mukherjee et al. addressed an issue of meeting sensor connect with the Mobile Adhoc Network (MANET) organizes on the grounds that hubs have distinctive power levels, heterogeneous conventions and have odds of co-channel obstructions another design of IoT systems, where sensor systems and MANET are joined together for proficient correspondence with the Internet Gateways [1].

Neelesh Mishra et al. presented an overview of different congestion control calculations utilized at transport layer. IoT requires a vehicle layer convention which offers blockage control, adaptability and dependability as indicated by necessity of gadgets [2]. Dragos Mocrii et al. presented a survey of real advancements of IoT-based smart homes and current difficulties of brilliant home advances and their scattering, and indicate some interesting arrangements and future patterns [3]. Adel Alkhalil et al. recommended the usage of information provenance as an imperative instrument that can improve the security and protection of IoT frameworks and reviewed the most difficult issues in IoT information provenance. Seven issues have been talked about including provenance security, monstrous measure of information, ordering, different customers, change, question, and interoperability [4]. Nallapaneni Manoj Kumar et al. expounded the conceivable security and protection issues considering the segment cooperation in IoT and concentrates how the Distributed Ledger based Block Chain (DL-BC) innovation add to it [5].

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Supervised Machine Learning Supported Time Series Prediction and Analysis of IoT Enabled Physical Location Monitoring

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Abstract: *Internet of Things (IoT) is one of the evolving technologies in the recent days to exchange the information from one device to another using any type of network, at anytime, and at anywhere. With the introduction of IoT and Machine Learning (ML) to monitor physical location in real time fashion is necessary to identify abnormal conditions in the surroundings. The proposed system depicts that different sensors in addition to camera are used to monitor and identify abnormal environment conditions of the same and send alert message to the user to take corrective action to avoid any future loss in the environment. Real time sensor data which is aligned with multimedia data is stored onto local system and ThingsSpeak server as well as it is pushed onto Go Daddy cloud whenever camera detects person to perform systematic and statistical analysis using different supervised machine learning algorithms. This paper presents time series prediction of different sensor values such as temperature, humidity, gas, light dependent resistor, and person prediction using timestamp (day and time) to understand the physical location well in advance to take appropriate decision. Experimental results show that decision tree is the best predictive model to predict person when timestamp is given in the form of date and time. Study also reveals that Decision Tree Regression (DTR) and Random Forest Regression (RFR) give good results with approximately same minimum Root Mean Squared Error (RMSE) to predict different sensor values.*

Index Terms: *Physical Location Monitoring, Time Series Prediction, RMSE, Supervised Machine Learning*

I. INTRODUCTION

The Analysis and structure of IoT is the way towards providing data and giving a forecast utilizing the sensor. IoT chips away at smart items that interface with the sensor and accumulate data and speak with neighboring individuals utilizing versatile, remote and sensor advances. The valuable data from sensor information and process on this data utilizing machine learning are separated. Physical area for gathering the data from sensor and work on this data is required to extract the knowledge.

Proposed framework utilizes the sensor to ask for feeling of the earth. The significance of installed is the association of two distinct things and the coordinated framework in which the product is incorporated into the equipment. The incorporated framework that has the benefit of low power utilization enhances framework execution and does it effortlessly. IoT alongside Machine Learning (ML) is utilized to caution the circumstance when the individual is in genuine hazard. ML is utilized to do systematic analysis of the dataset. It utilizes Raspberry-Pi as the fundamental base

of our task for preparing information. The Graphical User Interface (GUI) is created for work areas or workstations and applications for mobiles to display different sensor values with the status of the physical location to indicate whether the location is in normal condition or not. Framework likewise gives the predication of the data. It utilizes the machine learning calculation for giving precision of the framework and arranges the data originate from sensor and gives the predication of this data. The construction utilizes four various machine learning predictive models with Decision Tree (DT), Naïve Bayes (NB), K-Nearest Neighbor (KNN), and Random Forest (RF) for person prediction using time series analysis. The proposed system also performs time series prediction of different sensor values using DTR.

II. RELATED WORK

Aras Can Onal et al widened IoT skeleton that consolidates the data recuperation, getting ready, and knowledge layers is given a use container on atmosphere data gathering examination. The learning model made uses batching unsubstantiated learning procedure in the learning time of the skeleton with an explicit ultimate objective to best use the related immense data for this issue. The US climate data got from 8000 assorted atmosphere stations around North America is received through log records. Wind Speed 3 Clusters, Sensor Fault and submitted to learning stage for the learning system. In this explicit examination, air temperature, wind-speed, relative wetness, detectable quality, and weight data are used as a piece of the data examination. Traditional k-infers gathering count is associated and the results are presented. As interesting miracles, framework watched that the data packing matches the geological game plan of the stations. In a manner of speaking, a segment of the fundamental land locale inside the North American terrain (and the territory USA) shape obvious atmosphere gatherings and easily isolated from one another. Likewise, possible sensor inadequacies and quirks are produced with using gathering technique. This use case empowered to show an instance of how such an IoT Big Data framework can be used for such utilization [1].

Peng Sun et al inspects the endorsement of accelerating sensors in a support assistant examination using both Naive Bayesian Classifier (NBC) and Tree Augmented Naive Bayesian Classifier (TAN) figuring. Through a bracket helper preliminary the counts are affirmed. The examination comes about confirm that the future techniques in this paper in perspective of NBC and TAN are effective. In addition, the results similarly instigate that

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A Review Paper on Face Recognition Methodologies

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Abstract— In the previous few years, the procedures of face recognition have been researched thoroughly. Well-versed reviews, for various human face recognition methodologies, are provided in this paper. Initially, we proffer a summary of face recognition with its application. Followed by a literature review of various face recognition techniques. Several face recognition algorithms are analyzed and elaborated with their limitations as well. It also includes brief overviews regarding various modern approaches like neural networks, line edge mapping, and many others, which are widely used nowadays to make the process of face recognition more efficient. Conclusively, the research results are reviewed and are summarized.

I. INTRODUCTION

In various fields and disciplines, face recognition is traversing as a modern research problem. Generally, face recognition includes 2 steps, face detection, and face recognition. Face detection means catching or discovering a face in an image. Then it is followed by recognition which includes identifying or recognizing the detected face. To date, various effective approaches have been introduced. In [1], a conventional method for distinguishing faces is used i.e. Eigen faces. To collect different profiles into the form of curves, calculating their norm and differentiating other profiles based on the deviation from the norm, is what proposed by the author. This results in a vector with independent standards, and further, it can be compared with the other vectors. While in [2] the author proposes a more complex but effective approach. This approach is the combination of KFDA and nearest neighbor where one performs feature extraction and the other performs recognition. [4] Proposes the approach called Hidden Markov Model. In this approach, the hardware is also upgraded to achieve better results. The next methodology [6] is one of the most commonly used approaches in machine learning applications. The support vector machine is a simplistic, yet efficient machine learning model which can be used to classify profiles into multiple classes. In the next approach [9] author proposes the use of neural networks for face recognition. This approach uses various algorithms concurrently to obtain the best possible result.

II. LITERATURE REVIEW

In this section, we elaborate on different face recognition techniques by reviewing some of the works. The methodologies include Eigen faces, KFDA with Nearest Neighbor, Hidden Markov Model, SVM, and Neural Networks. The OCR architecture is broken down in following stages:

1. Eigen Faces

The Eigen face algorithm is the most commonly used approach when it comes to face recognition. In the Eigen face algorithm, the Eigen faces are the eigenvectors. These eigenvectors are derived from the covariance matrix of the dataset. Eigen faces are also sometimes referred to as ghostly images. The main reason for using the Eigen face approach is that it represents the input data efficiently. This is done by representing each face in terms of the linear combination of Eigen faces. To achieve this, a dimension reduction technique is required. Conventionally, the dimension reduction technique, which is used here, is Principal Component Analysis.

The author in this paper [1] is using face recognition to mark the attendance of the students in the class. So the author here [1] starts by elaborating what is Principal Component Analysis. The author states it used to examine face recognition issues by using it as a dimension reduction technique. It is also mentioned that is comprehended as Eigen face projection. The principal component analysis is used to reduce the dimension of the data and accurately decompose the face structure into orthogonal principal components which we know as 'Eigen faces'. In simple words, PCA is used to remove information that is not useful to generate Eigen faces. Moreover, PCA gives a suitable representation for the face space which otherwise forms a cluster.

Furthermore, it is also stated that PCA has major applications in various fields, such as image analysis, identifying anonymous faces, and dimensional data reduction. A comparison of test images, with training images, is done by

Aspect Category Extraction for Sentiment Analysis using Multivariate Filter Method of Feature Selection

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Abstract: Aspect-oriented sentiment analysis is done in two phases like aspect term identification from review and determining related opinion. To carry out this analysis, features play an important role to determine the accuracy of the model. Feature extraction and feature selection techniques contribute to increase the classification accuracy. Feature selection strategies reduce computation time, improve prediction performance, and provides a higher understanding of the information in machine learning and pattern recognition applications etc. This work specifically focuses on aspect extraction from restaurant review dataset but can also be used for other datasets. In this system, we proposed a multivariate filter strategy of feature selection which works on lemma features. This method helps to select relevant features and avoid redundant ones. Initially, the extracted features undergo preprocessing and then the “term-frequency matrix” is generated which contains the occurrence count of features with respect to aspect category. In the next phase, different feature selection strategies are applied which includes selecting features based on correlation, weighted term frequency and weighted term frequency with the correlation coefficient. The performance of weighted term frequency with correlation coefficient approach is compared with the existing system and shows significant improvement in F1 score.

Keywords: Aspect-Based Sentiment Analysis (ABSA), Natural Language Processing(NLP), Machine Learning (ML), feature selection, correlation coefficient, Term Frequency-Inverse Document Frequency (TF-IDF).

I. INTRODUCTION

Due to the quick expansion of the social networking sites, people post their opinions freely. The growth of internet technologies led to increase in online shopping and posting reviews about the products. This helps customers to compare multiple products and gives them further options to choose from. It is a difficult task to analyze products by overall comparison and hence the need to compare products. Comparison can be done on the basis of aspects. ABSA has become a research interest and a challenging task for the researchers. ABSA includes different subtasks namely aspect

term identification, opinion target extraction and corresponding sentiment determination. The sentiment classification is done at three levels like aspect level, sentence level and document level.

Following is the example from a restaurant review dataset. Restaurant reviews can have major aspect categories as price, ambiance, food, service, etc. So instead of determining overall review sentiment, it is useful to extract the aspect from review and then determine sentiment for that aspect. In the following example, sentence 1 denotes food aspect category and sentence 2 shows price and food aspect categories.

- “The food was great.”
- “The food was pricey and not too tasty.”

The aspect categories may be explicit or implicit. In sentence 2, price aspect is explicit but the food aspect is implicit.

The focus of this work is to extract aspect categories from review sentences. Hence, this is a text categorization problem. This system is trained and tested using SemEval 2014 restaurant review dataset. The reviews in the given dataset had 5 aspect categories like food, ambiance, price, service and miscellaneous. When enough review data is available and aspect categories are defined, then supervised algorithms can be used to forecast the aspect categories. The accuracy of the supervised algorithms is reliant on the quality of the features extracted and selected. We proposed a multivariate filter method of feature assortment to reduce the dimensionality of feature space.

Existing feature selection methods are classified to major classes like wrapper, filter, and hybrid. In the wrapper approach, at first different feature subsets are selected and then the feature sets are evaluated using the selected classifier. In a filter-based approach, the selection of features is not reliant on any machine learning algorithm. In this, features are preferred on the basis of their numerical weight [9], [12]. The hybrid approach is the union of the above two approaches. Filter method is further divided into two parts namely univariate and multivariate approach. In univariate filter method, features are evaluated with respect to relevance and in the multivariate approach, the correlation between features is calculated and redundant features are avoided. We are proposing a multivariate filter approach which selects relevant features and avoids redundant ones. The paper catalogue is as below. Section II is related work, the proposed system is described in section III, section IV shows the results of experimentation and section V contains the conclusion followed by the future scope.

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ADHYAYAN—An Innovative Interest Finder and Career Guidance Application



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Abstract ADHYAYAN is an innovative mobile application which determines a user's interest in a particular domain and nurtures them effectively so that they can pursue career in the field which they are interested in. The system takes into account social media posts, results of a test and application activity to find out the interest of users in different fields and then assists, guides and evaluates them continuously to improve their skills in these fields. ADHYAYAN is a three-tier system which consists of a front-end, middle layer, and back-end. Front-end is an Android application which provides personalized GUI for each user. Middle layer is Firebase, while back-end is a server hosted on 'Google Cloud Platform'. An algorithm has been developed for ADHYAYAN which calculates the ratio of user's interest in different domains and eventually feeds are generated in the same ratio on user's profile. To cater the increasing need of skilled employees in different fields and promote interest-based learning, ADHYAYAN has been proposed to overcome various limitations and drawbacks of existing solutions.

Keywords Unemployability · Social media · Continuous evaluation · Test · Feeds · Profile · Skills · Career · Short term profile · Long term profile · Personalized · Real-time

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Recent Trends in Power Quality Improvement and Demand Side Load Management in Smart Grids

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Abstract - - The growing consumer demand on electrical energy sources every day and the aging transmission and distribution power grid infrastructure is causing new challenges for electrical engineers. In recent years, the focus of power system engineers and consumers has been shifted to "power quality" due to increased usage of voltage sensitive equipment such as computers, servers, network infrastructure and precision electronic manufacturing equipment by consumers. The variations in bus voltage mainly occur due to electromagnetic transients, harmonic distortion, voltage sag, voltage swell and flicker due to switching of large capacitor banks in power grid. In addition, recently there have been numerous small to mid-size installations of renewable energy sources such as solar photovoltaic (PV) systems and wind power generation which are connected to the grid at the distribution side. The nature of these renewable energy sources is that they produce intermittent power generation based on solar and wind energy availability and their high penetration poses problems of voltage and frequency instability in the grid.

Another cause of poor power quality is that load demand is not predictable and consumption or daily behaviour of load patterns is not known, hence there is difficulty in matching the demand and supply of power. Demand side management helps energy providers to reduce the peak load demand and adjust the load profile to a certain extent. In this paper, several latest publications related to the improvement of power quality such as passive and active filters, Active Power Line Conditioning (APLC), static VAR compensation, electric spring and smart loads are reviewed. Also various methods of demand side management such as estimation of load patterns, peak clipping, valley filling, intelligent load switching, electric spring and smart loads for reducing the peak demand on utilities are discussed. Proposed work in this area includes development of new topologies and control methodologies of electric spring to get fast response to the changing load and maintain grid stability. Another area of proposed work includes development of algorithms for accurate estimation of demand load patterns so as to reduce the peak load demand on the system.

Keywords - - Smart grid, Electric spring, Active Power Line Conditioning (APLC), Smart loads, ICT

I. Introduction

In recent years, consumers are paying more attention to power quality due to increased usage of voltage sensitive equipment such as computers, power electronic motor drives, inverters and network infrastructure such as servers, routers, modems etc. Any power line interruption, frequency variation, transient noise can permanently damage the electronic equipment at the consumer end. If the consumer equipment is damaged, it can be concluded that power quality problem exists and it needs to be addressed immediately as the consumers can lose their business competitiveness and incur financial losses. [4].

The generation of power is distributed these days with small to mid-size installations of renewable energy sources such as solar photovoltaic (PV) systems and wind power generation systems at the distribution side. The nature of these renewable energy sources is that they produce intermittent power generation based on solar and wind energy availability during the day and their high penetration in utility grids is posing problems of voltage and frequency instability. Due to distributed nature of renewable energy sources, fast response to the user demand needs to be achieved in efficient manner and it is required to balance the demand and supply patterns more closely in order to maintain power and frequency stability and also to reduce voltage imbalance.

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