

AI -POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

LITERATURE SURVEY

DOMAIN NAME: ARTIFICIAL INTELLIGENCE

TEAM ID: PNT2022TMID29438

BATCH: B7-1A3E

TEAM LEADER: M HARSHA (510419104031)

TEAM MEMBER: S ARTHI (510419104012)

TEAM MEMBER: M OVIYA (5104191049)

TEAM MEMBER: S NIKITHA (5104191048)

PAPER 1: Android Based Monitoring System With Diet And Calorie Tracker.

Published year: 05-08-2022

Authors: V. Ram Kumar, S.Priyanga Devi, K. Laxmi Priya, M. Kavya Dharshani.

Journal name: IJERT

Summary: Having a fit and healthy body is everyone's dream, but it has somehow not been everyone's cup of tea. Lack of motivation and guidance bars people from achieving their healthy goals. This project was designed to solve this every problem. This allows the users to keep track of their diet and exercise regime, take expert advice and connect to other fitness enthusiasts thus equipping them to maintain a healthy lifestyle. The system plans offer its customer and fitness enthusiasts many beauty tips options that can help them reach their goals. It serves as a calorie tracker, allowing users to lose weight and track their food and exercise regimens through their phones. There are four components. First is its lifestyle tracker, the calorie counter. The second is to develop beauty problems. The third, and most innovative aspect, is healthy tech augmented coaching, which uses a combination of artificial intelligence and human trainer videos. Fourth are messages to help its users stay healthy and engaged with the app. By integrating AI with user data, this app is able to map its user's nutritional patterns and needs. Now, the fitness coach is an AI that can handle 77% of all user questions, which allows the trainers and nutritionists to put their focus on the other 23% of more complicated question show you feel today, tomorrow, and in the future. Thus, a proposed system gives recommend you a diet plan based on your physical aspects and your end goal.

Methodology used: Artificial Intelligence.

PAPER 2: Artificial Intelligence in Nutrients Science Research

Published year: January 2021

Journal name: 1. Chair and Department of Humanities and Social Medicine, Medical University of Lublin, 20-093 Lublin, Poland. 2. Biobanking and BioMolecular Resources Research Infrastructure, Poland.

Summary: Artificial intelligence (AI) as a branch of computer science, the purpose of which is to imitate thought processes, learning abilities, and knowledge management, finds more and more applications in experimental and clinical medicine. In recent decades, there has been an expansion of AI applications in biomedical sciences. The possibilities of artificial intelligence in the field of medical diagnostics, risk prediction, and the support of therapeutic techniques are growing rapidly. The aim of the article is to analyze the current use of AI in nutrient science research. The literature review was conducted in PubMed. A total of 399 records published between 1987 and 2020 were obtained, of which, after analyzing the titles and abstracts, 261 were rejected. In the next stages, the remaining records were analyzed using the full-text versions and, finally, 55 papers were selected. These papers were divided into three areas: AI in biomedical nutrients research (20 studies), AI in clinical nutrients research (22 studies), and AI in nutritional epidemiology (13 studies). It was found that the artificial neural network (ANN) methodology was dominant in the group of research on food composition study and the production of nutrients. However, machine learning (ML) algorithms were widely used in studies on the influence of nutrients on the functioning of the human body in health and disease and in studies on the gut microbiota. Deep learning (DL) algorithms prevailed in a group of research work on clinical nutrient intake. The development of dietary systems using AI technology may lead to the creation of a global network that will be able to both actively support and monitor the personalized supply of nutrients.

Methodology used: Artificial Intelligence.

PAPER 3: APPLICATION OF ARTIFICIAL INTELLIGENCE ON NUTRITION ASSESSMENT AND MANAGEMENT

Published year: May 2021

Author: Kavita Sudersanasadas

Journal Name: EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

Summary: The application of AI for the provision of food services to hospitalized patients is of immense scope. This review details the various ways through which AI can be applied for the nutrition assessment. Even though commercial AI-based nutritional assessment systems are available, many do not evaluate the nutrient intake, and the data available through them were not validated. Fat Secret is a commercially available AI-based food and nutrient assessment

system that can evaluate the food's calorie content. Also, the major challenge posed by such systems is the availability of locally appropriate data sets. Hence further research and validation are essential in this field. AI-based nutrient intake assessment system is of immense value to obtain and assess food intake data in isolation wards and for the follow-up without contact.

Methodology used: Artificial Intelligence.

PAPER 4: 5 AI-Powered Nutrition Apps That Help Fitness Enthusiasts with Their Calorie Intake

Published year: APRIL 8,2019.

Author: AKSHAYA ASOKAN

Journal name: IDG Media and The New Indian Express.

Summary: we take a look at the top AI-based online platforms which make use of AI and other deep learning technologies to provide a real-time update about nutrition intake. HealthifyMe: HealthifyMe is a leading Indian health and fitness app whose artificial intelligence powered virtual nutritionist, Ria, helps its users regarding their queries around fitness and nutrition in both audio and text in more than 10 languages Learning's obtained from HealthifyMe's 250 million tracked foods, workouts and 10 million message exchanges between coaches and clients. HealthifyMe supposedly owns the largest data set in this regard and are compatible with popular fitness wearable devices currently available in India. Neutrino: The platform provides nutrition-based data services, analytics, and technologies to its consumers and wants to turn itself into a leading source of nutrition-related insight platform. To enable individualized compilation of data, the platform uses NLP and mathematical models from the optimization theory and predictive analysis.

Methodology used: Artificial Intelligence.

PAPER 5: Virtual Nutritionist using AI

Publication year: June 2019

Author: Siddarthan Chitra Suseendran, Nanda Kishore B, Josephus Andrew, M.S.

Journal Name: International Journal of Engineering and Advanced Technology (IJEAT).

Summary: In this way, a requirement for a full help for furnishing them with solid nourishment is a fundamental focus to reach. In this paper, we propose a model for a sustenance master framework which point is to give its clients the nourishment skill. It creates solid dinners for people in various ages as indicated by various criteria including their development stage, sexual orientation, and their wellbeing status. An application is created and a few contextual investigations are connected to show how the proposed model can be connected for deciding one's nourishment utilizing Artificial Intelligence (Machine and deep learning). Few key

advantages are: Customized diet for any lifestyle and age along with various types of diets to choose from which acknowledges your pre medical conditions with appropriate macronutrient ratio split that ensures micronutrient supplement suggestions based on the foods you consume.

Methodology used: Artificial Intelligence

PAPER 6: Integrating Artificial and Human Intelligence: A Partnership for Responsible Innovation in Biomedical Engineering and Medicine.

Published year: 2019 Jul 16.

Author: Kevin Dzobo, Sampson Adotey, Nicholas E Thom ford, Witness Dzobo.

Journal name: National Library of Medicine.

Summary: Historically, the term "artificial intelligence" dates to 1956 when it was first used in a conference at Dartmouth College in the US. Since then, the development of artificial intelligence has in part been shaped by the field of neuroscience. By understanding the human brain, scientists have attempted to build new intelligent machines capable of performing complex tasks akin to humans. Indeed, future research into artificial intelligence will continue to benefit from the study of the human brain. While the development of artificial intelligence algorithms has been fast paced, the actual use of most artificial intelligence (AI) algorithms in biomedical engineering and clinical practice is still markedly below its conceivably broader potentials. This is partly because for any algorithm to be incorporated into existing workflows it has to stand the test of scientific validation, clinical and personal utility, application context, and is equitable as well. In this context, there is much to be gained by combining AI and human intelligence (HI). Harnessing Big Data, computing power and storage capacities, and addressing societal issues emergent from algorithm applications, demand deploying HI in tandem with AI. Very few countries, even economically developed states, lack adequate and critical governance frames to best understand and steer the AI innovation trajectories in health care. Drug discovery and translational pharmaceutical research stand to gain from AI technology provided they are also informed by HI. In this expert review, we analyze the ways in which AI applications are likely to traverse the continuum of life from birth to death, and encompassing not only humans but also all animal, plant, and other living organisms that are increasingly touched by AI. Examples of AI applications include digital health, diagnosis of diseases in newborns, remote monitoring of health by smart devices, real-time Big Data analytics for prompt diagnosis of heart attacks, and facial analysis software with consequences on civil liberties. While we underscore the need for integration of AI and HI, we note that AI technology does not have to replace medical specialists or scientists and rather, is in need of such expert HI. Altogether, AI and HI offer synergy for responsible innovation and veritable prospects for improving health care from prevention to diagnosis to therapeutics while unintended consequences of automation emergent from AI and algorithms should be borne in mind on scientific cultures, work force, and society at large.

Methodology used: Artificial Intelligence, Deep Learning, Neural networks.

PAPER 7: Food AI: Food Image Recognition via Deep Learning for Smart Food Logging.

Published year: July 2019.

Author: Doyen Sahoo, Wang Hao, Shu Ke.

Journal name: The 25th ACM SIGKDD Conference on Knowledge Discovery and Data Mining.

Summary: An important aspect of health monitoring is effective logging of food consumption. This can help management of diet-related diseases like obesity, diabetes, and even cardiovascular diseases. Moreover, food logging can help fitness enthusiasts, and people who want to achieve a target weight. However, food-logging is cumbersome, and requires not only taking additional effort to note down the food item consumed regularly, but also sufficient knowledge of the food item consumed (which is difficult due to the availability of a wide variety of cuisines). With increasing reliance on smart devices, we exploit the convenience offered through the use of smart phones and propose a smart-food logging system: FoodAI, which offers state-of-the-art deep-learning based image recognition capabilities. FoodAI has been developed in Singapore and is particularly focused on food items commonly consumed in Singapore. FoodAI models were trained on a corpus of 400,000 food images from 756 different classes. In this paper we present extensive analysis and insights into the development of this system. FoodAI has been deployed as an API service and is one of the components powering Healthy 365, a mobile app developed by Singapore's Health Promotion Board. We have over 100 registered organizations (universities, companies, start-ups) subscribing to this service and actively receive several API requests a day. FoodAI has made food logging convenient, aiding smart consumption and a healthy lifestyle.

Methodology used: Artificial Intelligence, Deep Learning.

Paper 8: A DIET CONTROL AND FITNESS ASSISTANT APPLICATION USING DEEP LEARNING - BASED IMAGE CLASSIFICATION

Published date: 2019

Author: Tianren Dong¹, Yu Sun and Fangyan Zhang

Journal Name: CSCP

Summary: With more and more attentions paid on health, people begin to care about healthy diet options created by experts on nutrition. However, it will take a long time to observe the effects by taking healthy diet. This causes great difficulty for users to follow the healthy diet strictly. Most existing applications are not user-friendly in inputting information to the application. Then it becomes difficult to track for exact health status. This paper proposes an android application which can be trained to recognize different kinds of food and facilitate the information input through phone camera using machine learning algorithms. Thus, nutritional

information can be fed in application accurately.

Methodology Used: Machine learning, Image recognition

Paper 9: Pub Smart-Log: A Deep-Learning based Automated Nutrition Monitoring System in the IoT

Published date: 29 August 2018

Author: Prabha Sundaravadivel, Kavya Kesavan, Lokesh war Kesavan, Saraju P. Mohanty, and Elias Kougianos

Journal Name: IEEE Transactions on Consumer Electronics

Summary: A correct balance of nutrient intake is very important, particularly in infants. When the body is deprived of essential nutrients, it can lead to serious disease and organ deterioration which can cause serious health issues in adulthood. Automated monitoring of the nutritional content of food provided to infants, not only at home but also in daycare facilities, is essential for their healthy development. To address this challenge, this paper presents a new Internet of Things (IoT)-based fully automated nutrition monitoring system, called Smart-Log, to advance the state-of-art in smart healthcare. For the realization of Smart Log, a novel 5-layer perceptron neural network and a Bayesian network-based accurate meal prediction algorithm are presented in this paper. Smart-Log is prototyped as a consumer electronics product which consists of Wi-Fi enabled sensors for food nutrition quantification, and a smart phone application that collects nutritional facts of the food ingredients. The Smart-6 Log prototype uses an open IoT platform for data analytics and storage. Experimental results consisting of 8172 food items for 1000 meals show that the prediction accuracy of Smart-Log is 98.6%.

Methodology Used: Internet of Things (IoT), Deep-Learning.

Paper 10: Intelligent SVM Based Food Intake Measurement System

Published date: 15-17 July 2013

Author: Parisa Pouladzadeh, Shervin Shi Mohammadi, Tarik, Arci.

Journal Name: 2013 IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications (CIVEMSA)

Summary: As people across the globe are becoming more interested in watching their weight, eating more healthily, and avoiding obesity, a system that can measure calories and nutrition in everyday meals can be very useful. Recently, due to ubiquity of mobile devices such as smart phones, Net books and tablets, the health monitoring applications are accessible by the patients practically all the time. A semi-automated food intake measurement application,

running on a mobile device, could assist the patient to estimate his/her consumption calories. In this paper, to improve the accuracy of the current state of the art technologies, we have engaged color k-mean clustering along with color mean shift and texture segmentation schemes to get more accurate results in segmentation phase. Furthermore, the proposed system is built on food image processing techniques and uses nutritional fact tables. Via a special calibration technique, our system uses the built-in camera of such mobile devices and records a photo of the food before and after eating it in order to measure the consumption of calorie and nutrient components. The proposed algorithm extracts important features such as shape, color, size and texture. Using various combinations of these features and adopting computational intelligence techniques, such as support vector machine, as a classifier, accurate results are achieved which are very close to the real calorie of the food.

Methodology Used: SVM Based, AI.