Nutrition Analyzer for Fitness Enthusiasts powered by AI

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ABSTRACT

Food is a necessity for mortal life and has been addressed in multitudinous medical conventions. Ultradate salutary evaluation and nutrition analysis technologies give consumers more possibilities to explore nutrition patterns, comprehend their diurnal eating habits, and keep up balanced diet. Chancing out a food's nutritive value is done through nutritive analysis. Information about the chemical make-up, processing, quality assurance, and impurity of food is a pivotal element of logical chemistry. The primary thing of the design is to develop a model that will be used to categorise fruits according to their colorful attributes, similar as colour, shape, and texture. Then, druggies can take filmland of colorful fruits, which are latterly uploaded to a trained algorithm for analysis.

KEYWORDS
Tensor Flow, Flask, Calorie Ninja API, NLP, Numpy, Keras, CNN, Open CV

INTRODUCTION

The idea of a universal diet for everyone is faulty and scientifically impossible when the myriad of elements influencing dietary recommendations are understood. Artificial intelligence can help in this situation. Because subjects must adhere to diets for years and because there is a large potential for human error, randomised trials have proven challenging to conduct in the field of nutrition. The development of artificial intelligence has, however, made it possible for researchers to evaluate large data sets, producing a complete picture of a person's health indicators, including the variables that affect their particular dietary demands.
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Several start-up businesses and websites that target this market have benefited in India from this global trend. Several platforms have made use of AI and its different subsets to calculate calorie consumption and provide food suggestions for a balanced diet. The majority of the time, what we observe is that these platforms serve as a data repository, making real-time information available to many clients that work in this industry in exchange for a set fee.

Food's nutritional value is assessed through the technique of nutrition analysis. It aids in figuring out how many nutrients are in the food. Instead of using software to ascertain the precise nutritional components for the FDA-compliant Nutrition Fact Panel, laboratory nutrition analysis is a more accurate technique to assess the nutritional value of food. Many techniques, such as chemical analysis, physical analysis, and bioanalysis, can be used to accomplish this.

Nutrition analysis is typically employed to determine the nutrient content of foods in order to create Nutrition Fact Panels that comply with FDA regulations.

RELATED WORK


DESCRIPTION:

The study aimed to determine the prevalence of obesity in the United States in 2011-2012, using data from the National Health and Nutrition Examination Survey (NHANES), which is a nationally representative sample of the US population.

The authors found that the prevalence of obesity in adults was 34.9%, and the prevalence of overweight was 33.9%, which means that a total of 68.8% of adults were either overweight or obese. The prevalence of obesity in children was 16.9%, and the prevalence of overweight was 31.8%, which means that a total of 48.7% of children were either overweight or obese.

The authors also found that the prevalence of obesity and overweight varied by age, race/ethnicity, and socioeconomic status. Non-Hispanic blacks had the highest prevalence of obesity, followed by Hispanics and non-Hispanic whites.

**DESCRIPTION:**

The paper "Multiple-food recognition considering co-occurrence employing manifold ranking" by Y. Matsuda and K. Yanai was presented at the 21st International Conference on Pattern Recognition (ICPR) in 2012. The paper addresses the problem of recognizing multiple food items in a single image, which is a challenging task due to variations in appearance and the co-occurrence of multiple food items in the same scene.

The authors propose a novel method for multiple-food recognition based on manifold ranking, which considers the co-occurrence of food items in the image. The proposed method first extracts features from the image using the Bag-of-Words (BoW) model, which is a popular method for image classification. Then, the co-occurrence of food items is modeled using a graph, where each food item is represented as a node, and the edges between nodes represent co-occurrence relationships.


**EXISTING SYSTEM**

Those that are into fitness yet don't get enough nutrients. The problem is that fitness practises put in more effort but do not receive the right nutrition, which results in a slow metabolism and other health-related problems like as follow

- Lack of nutrition.
- Weaker immune system.
- Stress, tiredness, illness.

Deep belief nets are a type of deep learning model that consists of multiple layers of hidden units, with connections between the layers. They are typically trained using unsupervised learning techniques such as restricted Boltzmann machines (RBMs), which learn to represent the input data in a hierarchical manner.

The authors propose a new learning algorithm called the "contrastive divergence" (CD) algorithm, which is a variant of the standard RBM training algorithm. The CD algorithm is designed to be faster and more effective than the standard RBM training algorithm, allowing DBNs to be trained more quickly and with better results.

The paper provides a detailed description of the CD algorithm and its theoretical foundations. The authors also demonstrate the effectiveness of the algorithm through experiments on various datasets, showing that it outperforms other learning algorithms for DBNs in terms of both speed and accuracy.
If we don't address this problem, it could lead to a number of health-related problems, such as inadequate nourishment, weight loss, and vitamin and mineral deficiencies. These problems influence flow BMI levels. Yet, uncontrolled weight causes high blood pressure, and too much cholesterol eventually results in heart ailments.

**DRAWBACKS**

- Accuracy
- Limited Food Database
- Cost
- User Interface
- Lack of Personalization
- Privacy and security Concerns

**PROPOSED SYSTEM**

Users could enter their dietary information into the system, including the kind of foods they consume, how much they eat each serving, when they eat each meal, and other pertinent information. It might also interface with wearable technology, health applications, or other sources of health data to gather pertinent data on things like heart rate, physical activity, and sleep patterns.

**AI AND MACHINE LEARNING ALGORITHMS :**

To evaluate the input data and produce insights, the system would use AI and machine learning algorithms. Personalized suggestions, nutrient analyses, food identification algorithms, and dietary pattern algorithms might all be included in this. For instance, machine learning techniques like decision trees or support vector machines (SVMs) might be used for nutrient analysis and recommendation, while deep learning algorithms like convolutional neural networks (CNNs) could be employed for image-based food recognition.

**CUSTOMIZED RECOMMENDATIONS :** Based on the user's nutritional goals, health situation, and fitness ambitions, the system would offer individualised recommendations. This could involve advice on calorie consumption, meal preparation, macronutrient and micronutrient intake, and food substitutes. A mobile app or web portal could be used to deliver the recommendations, which could then be dynamically updated based on the user's progress and feedback.

**TRACKING AND MONITORING :** The system would enable users to keep tabs on their dietary intake and track their advancement towards their fitness and health objectives. Features like food logging, nutrient tracking, and progress tracking over time may be included. To aid users in understanding their nutritional patterns and development, the system might also offer visualisations and reports.

**INTEGRATION OF SOCIAL AND COMMUNITY FEATURES :** To promote engagement, inspiration, and support among fitness enthusiasts, the system could combine social and community elements.
including user profiles, social sharing, and community forums. Users might be able to do this to discuss their advancement, trade tips and advise, and give feedback on the system's suggestions.

PRIVACY AND SECURITY: The system would put user privacy and security first by taking the necessary precautions to safeguard user data, adhere to applicable laws, and guarantee secure data transit and storage. Data encryption, authentication, and authorization tools, as well as routine security audits and updates, could all fall under this category.

MERITS

✓ Help people to maintain Healthy and Balanced Diet.

✓ By using this AI model we can reduce Death Ratio.

✓ AI model will show the all the nutrients, vitamins, calories in that thing so you can easily plan your fitness diet

MODULE DESCRIPTION:

PYTHON FLASK:

Python Flask is a popular open-source micro web framework for building web applications in Python. It is lightweight, flexible, and designed to be easy to use, making it a popular choice for developing web applications ranging from simple to complex.

Flask provides essential features for building web applications, including routing, handling HTTP requests and responses, rendering HTML templates, and managing sessions. It follows the WSGI (Web Server Gateway Interface) specification, which allows it to interface with a variety of web servers, such as Gunicorn, uWSGI, and mod_wsgi.

One of the key features of Flask is its simplicity and minimalism. Flask provides only the core functionalities required for building web applications, without imposing any specific structure or dependencies. This allows developers to have greater flexibility and control over their application architecture and design, making Flask a popular choice for small to medium-sized projects and for developers who prefer a more hands-on approach.

NATURAL LANGUAGE PROCESSING (NLP):

NLP stands for Natural Language Processing. It is a subfield of artificial intelligence (AI) that focuses on enabling computers to understand, interpret, and generate human language in a way that is both meaningful and useful. NLP involves the interaction between computers and humans using natural language, such as speech or text, as the input and output.

The goal of NLP is to enable computers to process and understand human language, which is often complex, ambiguous, and context-dependent. NLP techniques involve the use of algorithms, statistical models, and machine learning methods to analyze and extract meaning from text or speech data.
CALORIE NINJA:

The "Calorie Ninja Tracker" appears to be a hypothetical term or a name that may be used for a mobile app, website, or software tool designed to help users track their daily calorie intake as part of managing their diet and nutrition.

A calorie tracker is a tool that allows individuals to monitor and record the number of calories they consume from food and beverages throughout the day. It typically involves inputting information about the foods and beverages consumed, along with their portion sizes, into the tracker, which then calculates the total calorie intake. Some calorie trackers may also provide additional features, such as tracking macronutrients (carbohydrates, protein, and fat), setting calorie goals, and providing feedback on overall nutrition.

The term "Calorie Ninja Tracker" may suggest a tool that is efficient, effective, and skillful in helping users manage their calorie intake in a stealthy or strategic manner, similar to how a ninja is known for their precision and expertise. However, it's important to note that this is a hypothetical term and not a recognized or established product in the field of nutrition or health.

CNN:

Specifically designed for image recognition and processing tasks. CNNs are widely used in computer vision applications, such as image classification, object detection, facial recognition, and image generation.

The key feature of CNNs is their ability to automatically learn and extract relevant features or patterns from images through a process called convolution. Convolution involves applying filters or kernels to input images to capture local patterns, such as edges, textures, and shapes. The filtered outputs are then passed through activation functions and pooled to reduce spatial dimensions, followed by fully connected layers for final classification or regression.

CNNs have shown significant success in various computer vision tasks, outperforming traditional machine learning methods in many cases. They have revolutionized the field of image recognition and processing and have been widely adopted in applications such as self-driving cars, medical imaging, image-based search, and many others.

IMAGE PROCESSING LIBRARIES:

TENSOR FLOW:

TensorFlow is an open-source machine learning library developed by Google that is widely used for building and training artificial neural networks.

It provides a flexible and efficient platform for developing various machine learning models, including deep learning models, for a wide range of applications, such as image and speech recognition, natural language processing, and many other areas of machine learning and artificial intelligence.

NUMPY:

Numpy (short for "Numerical Python") is a popular open-source Python library for numerical computing. It provides a powerful array object called "numpy array" that allows for efficient manipulation of large, multi-dimensional arrays.
and matrices, along with a collection of mathematical functions to operate on these arrays. NumPy is widely used in scientific computing, data analysis, machine learning, and other fields that require numerical computations in Python.

KERAS:

Keras is an open-source high-level neural networks API written in Python that runs on top of other popular deep learning frameworks, such as TensorFlow, Microsoft Cognitive Toolkit (CNTK), and Theano. It provides a user-friendly and efficient interface for building, training, and evaluating deep learning models, including various types of neural networks, such as feedforward neural networks, convolutional neural networks (CNNs), recurrent neural networks (RNNs), and more.

OPEN CV:

OpenCV (Open Source Computer Vision Library) is a popular open-source computer vision and machine learning library that provides a wide range of tools and functions for processing and analyzing images and videos. It was originally developed by Intel and later maintained by Willow Garage and Itseez (which was acquired by Intel).

Results and Discussion
CONCLUSION AND FUTURE WORK

The outcome of the project is if you are fitness enthusiast when you wanted to eat something you can upload the picture of the thing what you like to eat, our AI model will show the all the nutrients, vitamins, calories in that thing so you can easily plan your fitness diet.

Help people to maintain healthy and balanced diet.

By using this AI model we can reduce Death ratio.

FUTURE WORK

Mobile App and Speech Recognition

Later, we Implement this website into mobile application. Speech Recognition is natural and non encumbering form of communication. It continues to improve so that increasingly feasible in many more situations.

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