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| IBM |
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**Domain Name**: Healthcare

**Use case Name**: AI-powered Nutrition Analyzer for Fitness Enthusiasts

**ABSTRACT:**

Food prevails to be an essential commodity for providing energy and satisfying hunger generic food practice cannot be prescribed to everyone. Every human body needs specific amount of nutrients, protein, minerals and vitamins, hence a nutritional analyzer is a needed one. It is also essential for human life and has been the concern of many healthcare conventions. Nowadays new dietary assessment and nutrition analysis tools enable more opportunities to help people understand their daily eating habits, exploring nutrition patterns and maintain a healthy diet. Nutritional analysis is the process of determining the nutritional content of food. It is a vital part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of food.

The main aim of the project is to building a model which is used for classifying the fruit depends on the different characteristics like colour, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent the trained model. The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

By the end of this project you will know fundamental concepts and techniques of Convolutional Neural Network .gain a broad understanding of image data. Knowhow to pre-process/clean the data using different data preprocessing techniques. Know how to build a web application using the Flask framework.

# Paper 1

*Title:* Health Analysis of Transformer Winding Insulation through Thermal Monitoring and Fast Fourier Transform (FFT) Power Spectrum

*Author:* [Muhammad Aslam](https://ieeexplore.ieee.org/author/37088839043), Inzamam Ul Haq, [Muhammad Saad Rehan,](https://ieeexplore.ieee.org/author/37086189976) Faheem Ali, [Abdul Basit](https://ieeexplore.ieee.org/author/37296818900), [Muhammad Iftikhar Khan](https://ieeexplore.ieee.org/author/37085778539), [Muhammad Naeem Arbab](https://ieeexplore.ieee.org/author/37296917600)[.](https://ieeexplore.ieee.org/author/37088866317)

*Year:* 2021

*Methodology:* Thermal monitoring, novel winding insulation model, thermal monitoring algorithm and installation of monitoring unit at 500 kv grid station.

# Paper 2

*Title:* Leftovers Nutrition Prediction for Augmenting Smart Nutrition Box Prototype Feature Using Image Processing Approach and AFLE Algorithm

*Authors:* [Yuita Arum Sari](https://ieeexplore.ieee.org/author/37085697206), [Luthfi Maulana](https://ieeexplore.ieee.org/author/37088570806), [Yusuf Gladiesnyah Bihanda](https://ieeexplore.ieee.org/author/37088571257), [Jaya Mahar Maligan](https://ieeexplore.ieee.org/author/37087501405), [Nabila](https://ieeexplore.ieee.org/author/37088571104) [Nur’aini,](https://ieeexplore.ieee.org/author/37088571104) [Dhea Rahma Widyadhana](https://ieeexplore.ieee.org/author/37088570584)

*Year:* 2020

*Methodology:* The dataset was taken using an SNB prototype combined with full of lighting inside the box. Each item of food was placed in the compartment of the white tray box.

# Paper 3

*Title:* A Low-Cost Smart Glove System for Real-time Fitness Coaching

*Authors:* Yongpan Zou ,Dan Wang,Schiong Hong,Rukhsana Ruby, Dian Zhang,Kaishun Wu

*Year:* 2020

*Methodology:* Besides nutrition, strength training appeals a mushrooming number of people across all age groups, especially the youngsters. More specifically, iCoach, is a Smart fitness glove with commercial inertial measurement IMU including accelerometer, gyroscope and magnetometer embedded in its wrist band. Compared with professional coach, iCoach achieves satisfactory assessment quality.

# Paper 4

*Title:* Physical Activity Recommendation for Exergame Player Modeling using Machine Learning Approach.

*Authors:* Zhao Zhao, Ali Arya, Rita Orji, Gerry Chan

*Year:* 2020

*Methodology:* Exergames are effective tools to motivate and promote daily activities. A validated design of a personalized physical activity recommender systems for exergames based on a study of participant’s preferred activities. The methodology was to use the questionnaire data to train a binary predictive model to predict whether the user would like a new type of exercise or not.

# Paper 5

*Title:* Optimizing Nutrition using Machine Learning Algorithms-a Comparative Analysis

*Authors:* [Asmabee Khan,](https://ieeexplore.ieee.org/author/37087225001) [Sachin Deshpande](https://ieeexplore.ieee.org/author/37085904547), [Amiya K. Tripathy](https://ieeexplore.ieee.org/author/37950187800)

*Year:* 2019

*Methodology:* The background studies towards designing recommendation system using machine learning algorithms that lead to the design of nutrition based recommendation system.

# Paper 6

*Title:* Emo Wei: Emotion-Oriented Personalized Weight Management System Based on Sentiment Analysis.

*Authors:* Jihyeon Kim, Uran Oh

*Year:* 2019

*Methodology:* To confirm the feasibility of monitoring emotion from personal logs such as online posts, using Recurrent Neural Network (RNN) based sentiment analysis on weight loss related tweets and posts from an online weight management community called FatSecret in comparison to general tweets

# TABULAR FORM:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Authors** | **Title** | **Methodology** | **Pros**  **(Advantage)** | **Cons**  **(Disadvantage)** |
| 1. | [Muhammad](https://ieeexplore.ieee.org/author/37088839043) [Aslam](https://ieeexplore.ieee.org/author/37088839043),  [Inzamam Ul Haq,](https://ieeexplore.ieee.org/author/37088866317) [Muhammad Saad](https://ieeexplore.ieee.org/author/37086189976) [Rehan,](https://ieeexplore.ieee.org/author/37086189976)  Faheem Ali, [Abdul Basit,](https://ieeexplore.ieee.org/author/37296818900) [Muhammad](https://ieeexplore.ieee.org/author/37085778539) [Iftikhar Khan,](https://ieeexplore.ieee.org/author/37085778539) [Muhammad](https://ieeexplore.ieee.org/author/37296917600) [Naeem Arbab](https://ieeexplore.ieee.org/author/37296917600) (2021)  (IEEE paper 1) | Health Analysis of Transformer Winding Insulation Through Thermal Monitoring and Fast Fourier Transform (FFT) Power Spectrum | Thermal monitoring, novel winding insulation model, thermal monitoring algorithm and installation of monitoring unit at 500 kv grid station. | The system assesses the power transformer’s health status by tracking the hot- spot temperature and the transient incipient activities like partial discharges (PD) inside the winding insulation. | It requires oil and cellulose i.e., kraft paper to make the transformer so that the quality of the kraft paper must be as per the requirement. |
| 2. | [Yuita Arum Sari,](https://ieeexplore.ieee.org/author/37085697206) [Luthfi Maulana,](https://ieeexplore.ieee.org/author/37088570806) [Yusuf](https://ieeexplore.ieee.org/author/37088571257)  [Gladiesnyah](https://ieeexplore.ieee.org/author/37088571257) | Leftovers Nutrition Prediction for Augmenting Smart  Nutrition Box | The dataset was taken using an SNB prototype  combined with | The method was also embedded in SNB prototype to  enhance the | The segmentation algorithm has  drawbacks when |

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|  | [Bihanda,](https://ieeexplore.ieee.org/author/37088571257) [Jaya](https://ieeexplore.ieee.org/author/37087501405)  [Mahar Maligan,](https://ieeexplore.ieee.org/author/37087501405) [Nabila Nur’aini,](https://ieeexplore.ieee.org/author/37088571104) [Dhea Rahma](https://ieeexplore.ieee.org/author/37088570584) [Widyadhana](https://ieeexplore.ieee.org/author/37088570584) (2020)  (IEEE paper 2) | Prototype Feature  Using Image Processing Approach and AFLE Algorithm | full of lighting  inside the box. Each item of food was placed in the compartment of  the white tray box. | estimation  function. | applying in  multiple conditions. |
| 3. | Yongpan Zou  ,Dan Wang,Schiong Hong,Rukhsana Ruby, Dian Zhang,Kaishun Wu (2020)  (IEEE paper 3) | A Low-Cost Smart  Glove System for Real-time Fitness Coaching | More specifically,  iCoach, is a Smart fitness glove with commercial inertial measurement IMU including accelerometer, gyroscope, magnetometer embedded in its wrist band. | The detection of  non-standard behaviors and quality assessment results are displayed on the user interface. The results can also be reported to users in the form of voice reminder. | The overall  speed of repetition is too fast or too slow. The speed of outward and backward processes is not balanced. The repetitions are not stable with noticeable  shakes. |
| 4. | Zhao Zhao, Ali  Arya, Rita Orji, Gerry Chan (2020)  (IEEE paper 4) | Physical Activity  Recommendation for Exergame Player Modeling using Machine Learning Approach. | The methodology  was to use the questionnaire data to train a binary predictive model to predict whether the user would like a new type of exercise or not. | The feasibility of  using the player model for personalizing PA, potential of using machine learning in building the recommender system for PA and the considerable effect in optimizing the system. | Sometimes it  might not be realistic for some users to try those new Pas that our system recommended. The system did not look at the distance between PA with different perspectives. |
| 5. | [Asmabee Khan,](https://ieeexplore.ieee.org/author/37087225001)  [Sachin](https://ieeexplore.ieee.org/author/37085904547) [Deshpande,](https://ieeexplore.ieee.org/author/37085904547) [Amiya K.](https://ieeexplore.ieee.org/author/37950187800) [Tripathy](https://ieeexplore.ieee.org/author/37950187800) (2019)  (IEEE paper 5) | Optimizing  Nutrition using Machine Learning Algorithms-a Comparative Analysis | The background  studies towards designing recommendation system using machine learning algorithms that lead to the design of nutrition based recommendation system. | An expert  recommendation system is designed, which wills the user to assess their nutritional status and get a Web/App-based counseling from Nutritionists/D  ietitian. | There must not  be a lack of knowledge about proper nutrient-content diet to predict and form statistics. |
| 6. | Jihyeon Kim,  Uran Oh (2019)  (IEEE paper 6) | Emo Wei:  Emotion-Oriented Personalized Weight  Management | To confirm the  feasibility of monitoring emotion from  personal logs | The paper  provided design implications for future weight  management | This field has  not yet developed enough to grasp  the situation, the |

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|  |  | System Based on  Sentiment Analysis. | such as online  posts, using Recurrent Neural Network (RNN) based sentiment analysis on weight loss related tweets and posts from an online weight management community called FatSecret in comparison to general tweets | systems to better  assist people with managing not only their physical but also their emotional well-being by minimizing potential stress. | sentiment  analysis module used here, has only about 80% accuracy.  Moreover, people tend to write their daily diet records rather than expressing their feelings on the diet which makes sentiment analysis more  Difficult. |