ESTIMATION OF CALORIES IN FOOD AND BEVERAGES USING DEEP LEARNING

Dr.Chandrasekharan.Dinesh, Associate Professor, Department of Information Technology,
Vignan's Institute of Information Technology(A), Visakhapatnam-530049
Ms.K.Y.S.D.Tejasri, MCA Student, Department of Master of Computer Application,
Vignan's Institute of Information Technology(A), Visakhapatnam-530049

Abstract:
Monitoring calorie consumption is vital to maintain excellent health since in the present world, a healthy body depends on the quantity of calories ingested. when your BMI is around between 25 and 29 on the scale. It suggests that you are giving things too much weight. If your BMI is more than thirty, you are considered obese. People must watch their calorie intake if they want to lose weight or get in shape. Calorie estimation in the current system must be done manually. The suggested model uses a deep learning algorithm to offer a special method of measuring calories. In the medical industry, calculating dietary calories is crucial. Since the calories in this food are beneficial to health. Our task is to identify the food category first, and then, once we have predicted the food category (fruit or vegetable), our system will determine the category of that image (either the image falls into the food or vegetable category). Once these things are determined, we will also predict the food's calorie count. Our work in this paper is entirely based on the MobileNet algorithm. Using a combination of deep learning and transfer learning, MobileNet recognizes an image and determines the category based on that identification. Several segmentation and image characteristics are also included in our system.

Keywords: Convolutional Neural Network, Transfer Learning, MobileNet, Deep Learning ,Image Recognition ,Calorie Estimation.

Introduction:
The key to a human body is food. These days, dietary consumption is a growing concern for people because poor diets can result in a host of ailments. A diet plan must always account for the overall amount of calories required to be ingested in order to stay in good health and fitness. Being overweight indicates that you have an abnormally high muscle-to-fat ratio. You are considered obese if your BMI is greater than 30. Weight gain can result from numerous factors. One such factor is the imbalance between calories consumed and calories burned.
Consuming more calories than you burn leads to the body storing the surplus as fat.
The body stores excess calories as a ratio of muscle to fat. People must watch their calorie intake if they want to lose weight or get in shape. However, this exchange can be frustrating and draining. People often avoid difficult and exhausting situations, so they don't always watch how much they eat, which can lead to obesity. Among these analyses, the object position computation and the volume and calorie evaluation approach are the two primary variables of the precision change. Support Vector Machine (SVM) is used, for example, in object categorization and discovery. The factor that has an impact is the evaluation reference point for both volume and calories.

Literature Survey:
In order to prevent obesity in humans, it is now crucial to keep food in a typical healthy diet. In this study, we fully demonstrate an innovative machine learning-supported system that automatically performs accurate food classification images and food quality measurements. In the training part of the model type system, this research presents an in-depth learning model with a convolutional neural network that divides food-specific regions. The suggested method's primary

goal is to increase the pre-training model's accuracy. In the articles, a model system supporting the client-server concept is designed. The server processes the image detection request that the client provides. Three main software components are planned for the prototype system: a server module, a text data training module for moderation attribute models, and a pre-trained CNN model module for classification purposes. We also experimented with food distribution categories, each with thousands of photographs, using machine learning training to maximize the accuracy of the achievement section.

Food Image Analysis and Dietary Assessment via Deep Model:

Food remains a primary focus in health discussions due to its vital role in human well-being. Nowadays, a variety of new food testing and analysis tools offer ample opportunities to scrutinize nutritional patterns, assess daily dietary habits, and uphold a balanced diet. In this work, using common food photographs (such as those from a smartphone), we create a comprehensive model of food and food recognition as well as a food review and analysis tool. In particular, we provide a three-step procedure that uses a deep convolutional neural network (CNN) object division to accept images of numerous (food) items via discovery regions.

The first paper was Titled as "Traffic Rules Violation Detection using Deep Learning," by Aniruddha Tonge, S. Chandak, R. Khiste, U. Khan, and L. A. Bewoor, in the 2020 4th International Conference on Electronics, Communication, and Aerospace Technology (ICECA). pp. 724728 (ICPS).

The second paper was titled as Using artificial intelligence and deep learning, Ruben J. Franklin and Mohana "Traffic Signal Violation Detection," in the 2020 5th International Conference on Communication and Electronics Systems (ICCES), 2020.

The third paper was titled as the performance analysis of the object detection algorithm for the intelligent traffic surveillance system was conducted by Chetan Kumar B, Punitha R, and Mohana. The findings were published in the 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA).

The fourth paper was titled as "Cloud Based Intelligent Traffic System to Implement Traffic Rules Violation Detection and Accident Detection Units," Siddharth Tripathi, Uthsav Shetty, Asif Hasnain, and Rohini Hallikar, Proceedings of the Third International Conference on Trends in Electronics and Informatics ICOEI, 2019.

Conclusion:

The main goal of this work is to present a more intelligent method for efficiently and lightweightly identifying food images. Because there are many different kinds of food that our bodies can consume, this paper presents a method that anyone can use to calculate the calories in various food items using a very light weighted algorithm. This suggested system consistently produces excellent results and very high precision. In order to identify food, the image processors rely on a variety of different parameters, therefore it is crucial for this system to employ a sizable dataset. Numerous additional algorithms are actively working on calorie estimation in the current context, but they also require a highly weighted system and are highly rated. However, the suggested system solely relies on MobileNet Algorithms, one of the primary CNN algorithms for image detection and the fact that this algorithm is highly accurate and light-weighted in comparison to earlier techniques is one of its main advantages.

References:

[1]: Kaylen J. Pfisterer, Robert Amelard, Audrey G. Chung, Braeden Syrnyk, Alexander, MacLean, Heather H. Keller & Alexander Wong , "Automated food intake tracking requires depth refned semantic segmentation to rectify visual volume discordance in long term care homes" published in

Science Report Issue 1 Volume 2, 2022 PP 1 -13, | https://doi.org/10.1038/s41598-021-03972-8 .

[2]: V. H. Reddy, S. Kumari, V. Muralidharan, K. Gigoo, and B. S. Thakare, "Food Recognition and Calorie Measurement using Image Processing and Convolutional Neural Network,"published in 2020 4th International Conference on Recent Trends on Electronics, Information, Communication & Technology (RTEICT), 2019, pp. 109-115.| DOI:10.1109/I2MTC.2016.7520547| Corpus ID: 26625125

[3]: Yogesh, Ashwani Kumar Dubey, Rajeev Ratan ," Development of Feature Based Classification of Fruit using Deep Learning" published in International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-12, October, 2019 | Retrieval Number L28041081219| DOI: 10.35940/ijitee.L2804.1081219

[4]: Sharmeen M. Saleem , Subhi R. M. Zeebaree and Maiwan B. Abdulrazzaq ," Real-life Dynamic Facial Expression Recognition: A Review" published in Journal of Physics: 26-27 MAY, 2021 Conference Series, Volume 1963, 2nd International Conference on Physics and Applied Sciences (ICPAS 2021), College of Education, Mustansiriyah University, Baghdad, Iraq, Citation Sharmeen M. Saleem et al 2021 J. Phys.: Conf. Ser. 1963 012010

[5]:Jun Zhou 1 ; Dane Bell 2 ; Sabrina Nusrat 3 ; Melanie Hingle 4 ; Mihai Surdeanu 3 ; Stephen Kobourov 3 ," Calorie Estimation From Pictures of Food: Crowdsourcing Study " published in 2019, at JMIR Publications Advancing digital health and Open Science Published on 5.11.2020 in Vol 7, No 2 (2020): Jul-Dec | Interact J Med Res 2018;7(2):e17 | doi:10.2196/ijmr.9359

[6] L. M. r. Azizah, S. F. Umayah, S. Riyadi, C. Damarjati, and N. A. Utama, "Deep learning implementation using convolutional neural network in mangosteen surface defect detection,"Date of Conference: 24-26 Nov. 2019 Date Added to IEEE Xplore: 08 February 2019 Published in: 2019 7th IEEE International Conference on Control System, Computing and Engineering (ICCSCE) , INSPEC Accession Number: 17577198 DOI: 10.1109/ICCSCE.2017.8284412 Publisher: IEEE Conference Location: Penang, Malaysia

[7]: V Balaji Kasyap; N. Jayapandian Food Calorie Estimation using Convolutional Neural Network Date of Conference: 13-14 May 2021 Date Added to IEEE Xplore: 15 June 2021 published in 2021 3rd International Conference on Signal Processing and Communication (ICPSC) INSPEC Accession Number: 20843253 DOI: 10.1109/ICSPC51351.2021.9451812 Publisher: IEEE Conference Location: Coimbatore, India

[8]: Pramod B. Deshmukh; Vishakha A. Metre; Rahul Y. Pawar Caloriemeter: Food Calorie Estimation using Machine Learning Date of Conference: 5-7 March 2021 Date Added to IEEE Xplore: 09 April 2021Published in: 2021 International Conference on Emerging Smart Computing and Informatics (ESCI) INSPEC Accession Number: 20553623 DOI: 10.1109/ESCI50559.2021.9397023 Publisher: IEEE Conference Location: Pune, India

[9]: Ma, P., Pong Lau, C., Yu, N., Li, A., Liu, P., Wang, Q., Sheng, J., Image-based Nutrient Estimation for Chinese Dishes Using Deep Learning, Food Research International (2021), PII: S0963-9969(21)00336-7 Reference: FRIN 110437 To appear in: Food Research International Received Date: 9 December 2020 Revised Date: 12 April 2021 Accepted Date: 21 May 2021 DOI: https://doi.org/10.1016/j.foodres.2021.110437

[10]: Nareen O. M. Salim1, Subhi R.M. Zeebaree1, Mohammed A. M. Sadeeq1, A. H. Radie2, Hanan M. Shukur3 and Zryan Najat Rashid4 Study for Food Recognition System Using Deep Learning published in Journal of Physics:26-27 MAY, 2021 Citation Conference Series, Volume 1963, 2nd International Conference on Physics and Applied Sciences (ICPAS 2021), College of Education, Mustansiriyah University, Baghdad, Iraq, Nareen O. M. Salim et al 2021 J. Phys.: Conf. Ser. 1963 012014

[11]: Parth Poply; J. Angel Arul Jothi Refined Image Segmentation for Calorie Estimation of Multiple-dish food items Date of Conference: 19-20 Feb. 2021 Date Added to IEEE Xplore: 12 April

2021 Published in: 2021 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS) ISBN Information: INSPEC Accession Number: 20633673 DOI: 10.1109/ICCCIS51004.2021.9397169 Publisher: IEEE Conference Location: Greater Noida, India

[12]: Rafhan Amnani Rahmat; Suhaili Beeran Kutty Malaysian Food Recognition using Alexnet CNN and Transfer Learning Date of Conference: 3-4 April 2021 Date Added to IEEE Xplore: 26 May 2021 Published in: 2021 IEEE 11th IEEE Symposium on Computer Applications & Industrial Electronics (ISCAIE) ISBN Information: INSPEC Accession Number: 20763891 DOI: 10.1109/ISCAIE51753.2021.9431833 Publisher: IEEE Conference Location: Penang, Malaysia

[13]: Landu Jiang; Bojia Qiu; Xue Liu; Chenxi Huang; Kunhui Lin DeepFood: Food Image Analysis and Dietary Assessment via Deep Model Published in: IEEE Access (Volume: 8) Page(s): 47477 – 47489 Date of Publication: 13 February 2020 Electronic ISSN: 2169-3536 INSPEC Accession Number: 19463933 DOI: 10.1109/ACCESS.2020.2973625 Publisher: IEEE

[14]: Mohammed A. Subhi; Sawal Hamid Md. Ali; Ahmad G. Ismail; Masuri Othman Food volume estimation based on stereo image analysis Published in: IEEE Instrumentation & Measurement Magazine (Volume: 21, Issue: 6, December 2018) Page(s): 36 – 43 Date of Publication: 13 December 2018 ISSN Information: INSPEC Accession Number: 18344296 DOI: 10.1109/MIM.2018.8573592 Publisher: IEEE

[15]: Z. Guo, Y. Lu, H. Zhou, Z. Li, Y. Fan, and G. Yu, "Anthropometric-based clustering of pinnae and its application in personalizing HRTFs," International Journal of Industrial Ergonomics, vol. 81, p. 103076, 202 July 2021 Journal of Physics Conference Series 1963(1):012014 DOI:10.1088/1742-6596/1963/1/012014