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Malnutrition Detection Using AI

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Abstract:*Malnutrition is a leading cause of child mortality in many countries. Identifying malnourished children can help reduce the likelihood of death and treat or minimize health problems. A balanced diet is essential for providing energy and enabling cells to function properly. Insufficient nutrition during pregnancy and childbirth can lead to various health complications later in life, such as underweight, brittle hair and nails, mental illness, stunting, and wasting. Malnutrition occurs when a person's diet is either excessively rich in some nutrients or lacking in one or more essential nutrients, resulting in symptoms like underweight, stunting, and wasting. In India, many children with mild to moderate undernutrition go unnoticed, leading to stunted growth. Early detection of malnutrition can improve health outcomes and reduce healthcare costs. To this end, a system utilizing Convolutional Neural Networks (CNNs) and Transfer Learning has been proposed to analyze input images of children and distinguish between normal and malnourished children. The system aims to automate the identification of child malnutrition to reduce the impacts caused by malnutrition, benefiting healthcare professionals and families.*

Keywords: Malnutrition, Deficiency, Malnutrition, Deep learning, CNN.

I. INTRODUCTION

One approach for effective aid is to identify children under the age of five who are suffering from malnutrition more nearly than ahead, in order to target them with applicable food. frequently, the lack of a varied diet is the reason for malnutrition. Help at this age is particularly important, as the physical development during this time also determines how well the children can learn latterly, it has been proven that malnutrition affects children's education and their future. We've developed a Deep literacy- grounded AI system to find out about malnutrition in its early stages. It's delicate to tell whether a child suffers from malnutrition. Manually measuring weight and other measures is an error-prone process.

Specialized calibrated bias are also susceptible and infelicitous for transport to remote areas due to their weight. This system can be bettered by using depth cameras to get further and more accurate measures. Malnutrition Discovery using Deep literacy.
Malnutrition is a condition that occurs due to smaller inputs or over input of nutrients. This can lead to health issues similar as diabetes, heart complaint, eye problems, and suppressed growth.

The research paper focuses on the development of a Deep Learning-based AI system for detecting malnutrition in children under the age of five. The paper highlights the importance of early detection of malnutrition, as it can significantly impact a child's physical development and future learning abilities. The paper mentions that conventional methods of measuring malnutrition, such as manual weight measurements, are error-prone and specialized calibrated devices are not suitable for remote areas due to their weight. To address this issue, the paper proposes the use of depth cameras for more accurate measurements.

The research methodology involves the use of a Convolutional Neural Network (CNN) called AlexNet, known for its high accuracy in challenging datasets. The paper emphasizes that the detection of malnutrition can help healthcare providers take preventive measures and reduce the adverse effects of malnutrition on children. Overall, the paper highlights the importance of using deep learning-based AI systems for early detection of malnutrition in children and its potential impact on improving child health outcomes.

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II. LITERATURE SURVEY

[1] In the paper "A sustainable solution for monitoring malnutrition in children in developing countries" The Author have proposed Malnutrition is a grave concern for children worldwide, especially in developing countries. UNICEF reports indicate that 101 million children below the age of five are underweight globally. India, as a developing nation, ranks second in child malnutrition. This is a troubling statistic as malnutrition can have a detrimental long-term impact on a country's economic growth. Despite the Government of India's efforts to address the issue, assessing malnutrition remains a challenging task. This paper outlines the authors' novel technological solution, which offers a cost-effective and straightforward method for monitoring children's growth and addressing the problem at hand.

[2] In the paper "A Deep Learning Approach to Predict Malnutrition Status of 0-59 Month's Older Children in Bangladesh" The Author have proposed Malnutrition is a significant issue in developing countries like Bangladesh, particularly because the current generation of children is the future workforce, and their health directly impacts the country's economic growth. Thus, preventing child malnutrition is a top priority at this stage. The present study aims to classify malnutrition using a deep learning approach of predictive modelling based on significant malnutrition features, to predict the malnutrition status of children aged between 0 to 59 months. The study utilizes an Artificial Neural Network (ANN) approach applied to data from the Bangladesh Demographic and Health Survey 2014 (BDHS). The findings demonstrate how a predictive model can effectively classify the malnutrition condition.

[3] In the paper "Efficient Machine Learning for Malnutrition Prediction among under-five children in India" The Author have proposed A fuzzy expert system which diagnoses whether an infant is suffering from malnutrition and, if so, the extent or severity of the condition. The system utilizes 13 input variables including breast feeding, daily family income, level of mother's education, colostrum intake, energy intake, protein intake, vitamin A intake, iron intake, family size, height, weight, head circumference, and skinfold thickness of the infant. The presence and severity of malnutrition are diagnosed using categories that include severe undernutrition, moderate undernutrition, mild undernutrition, normal nourishment, mild overnutrition, and moderate overnutrition. It is important to note that malnutrition includes both undernutrition and overnutrition. The designed expert system uses the Mamdani inference method and allows for easy diagnosis of the level of nourishment in an infant based on appropriate input values.

[4] In the paper "Malnutrition Detection using Convolutional Neural Network", the Author proposed a Convolutional Neural Network (CNN), which is a Deep Learning algorithm capable of taking in input, analyzing images, and distinguishing between them. Utilized the AlexNet architecture and Transfer Learning during the training process. The system takes an image of a child as input and compares it with the trained model to classify the child as malnourished or normal. The goal of the system is to detect malnutrition in children, allowing people and healthcare providers to reduce the effects of malnutrition by automating the process instead of relying on manual methods.

[5] In the paper "Managing child malnutrition via digital enablement: Insights from a field trial" The author proposed that the Integrated Child Development Scheme (ICDS) of the Government of India has only yielded mixed results, with nearly one fourth of children under the age of six still being undernourished. Despite increased budgetary allocations to improve the program, there is mounting pressure on policy makers and program implementers to demonstrate the effectiveness of the ICDS. To address the issue, the author argues for an integrated digital approach to malnutrition management that involves not only making data available, but also establishing relationships between various program indicators and overlaying them with socio-economic conditions of the region and family demographics. The ICDS program must overcome challenges such as limited skills and motivation of community health workers, as well as poor utilization of existing services due to low awareness and lack of fine-grained socio-economic data. The author proposes a digital framework to overcome these obstacles and ensure data availability, integrity, connectivity, and causality. A digitization prototype utilizing a microservice oriented architecture was created and field trial insights are presented in this paper.

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III. PROBLEM STATEMENT

To build an AI model in order to detect malnutrition and give suggestions accordingly.

IV. OBJECTIVE

The research aims to contribute to the field of nutrition and health by developing a Deep literacy-grounded AI system that leverages depth cameras to directly descry malnutrition, with a focus on remote areas where conventional styles of dimension may not be doable.

It seeks to give a result to the challenges of early discovery of malnutrition by exercising advanced technology that can overcome the limitations of homemade also, also aims to raise mindfulness about the global frequency of malnutrition in children and its mischievous goods on physical development and unborn literacy capacities, as stressed by reports from associations like the World Health Organization (WHO) and UNICEF.

The paper specifically emphasizes the situation in India, where a significant chance of children are reported to be suppressed and light, grounded on the National Family Health Survey (NFHS- 3) data, and proposes an innovative approach to attack this issue using slice-edge technology.

V. SCOPE

The research paper includes developing a Deep Learning-based AI system for detecting malnutrition, utilizing depth cameras for accurate measurements.The scope of the paper will cover the development and implementation of the AI system, including data collection, pre-processing, model training, and evaluation. This will also involve conducting experiments and analyses to validate the accuracy and effectiveness of the proposed system in detecting malnutrition in children.The scope of the research paper will be limited to the use of depth cameras and Deep Learning-based AI techniques for malnutrition detection in children under five years of age, with a focus on remote areas and the potential implications for improving early detection and intervention strategies.

VI. SYSTEM ARCHITECTURE

The proposed system architecture is designed to detect malnutrition using skin and nail images, and it follows the following steps:

Users must create an account in the system by providing a username and password. They can use their credentials to log into the system after registering. By taking this measure, the system is protected against unauthorised users.

After logging in, the user can select an input image for processing.

The system accepts two types of images as input: skin images and nail images, which are provided by the user.

Image processing techniques are then applied to the input images to prepare them for further processing.

This may include converting the images to grayscale, applying Bilateral Filtering to reduce noise, and performing Canny Edges detection to highlight edges in the images.

Machine learning algorithms, specifically Convolutional Neural Networks (CNN), are then applied to the processed images for categorizing them into different parts. The CNN algorithm is trained on a dataset that includes healthy and unhealthy skin images, as well as healthy and unhealthy nail images. The system uses a dataset of healthy and unhealthy skin images, as well as healthy and unhealthy nail images, to train the CNN algorithm.

During the training process, the dataset is fed into the CNN model, which learns the patterns and features associated with healthy and unhealthy skin and nail images. After the training process, the input images are processed by the trained CNN model, and the results are displayed on the user interface (UI).

The results may include information about the presence of malnutrition in the child based on the processed skin and nail images.

The user can view the results on the UI. The user can then interact with the system through the UI to select input images, view the processed images, and access the results. The system provides a user-friendly interface for easy interaction and interpretation of the malnutrition detection results.

Overall, the proposed system architecture integrates user registration and login, input image selection, image processing, image categorization using CNN, training process, result display, and user interaction through the UI. It

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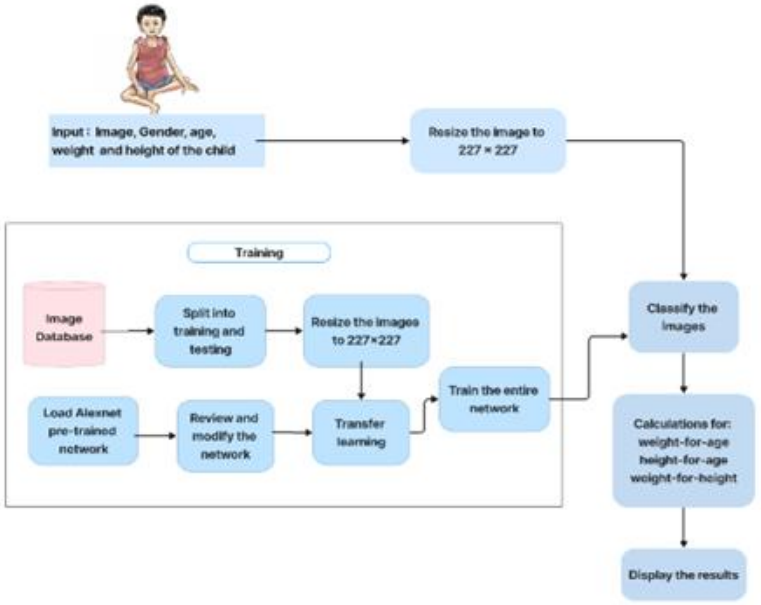
combines image processing, machine learning, and user interface components to provide a comprehensive solution for detecting malnutrition in children based on skin and nail images.



VII.CONCLUSION

This systemutilized the Convolutional Neural Network (CNN or ConvNet) algorithm to detect and categorize malnutrition. The primary goal of this system is to predict whether children are affected by malnutrition or not, and identify the specific type of malnutrition they may be suffering from. By using CNN, we have been able to accurately identify children at risk of malnutrition and provide insights into the appropriate measures that should be taken to address their specific condition. In the next phase of our study, we will further leverage the capabilities of CNN to detect and classify the type of malnutrition that has affected the children, thereby enhanced our understanding of this critical health issue, and enabled more targeted interventions for the affected children.

REFERENCES

[1] A. S. Vaidya, G. Makkena, V. Srihari, M. B. Srinivas and S. K. Rao," A sustainable solution for monitoring malnutrition in children in developing countries," 2013 IEEE Global Humanitarian Technology Conference: South Asia Satellite (GHTC-SAS), 2013, pp. 170-174, DOI: 10.1109/GHTC-SAS.2013.6629910.

[2] M. M. Shahriar, M. S. Iqubal, S. Mitra and A. K. Das, "A Deep Learning Approach to Predict Malnutrition Status of 0 59 Month's Older Children in Bangladesh," 2019 IEEE International Conference on Industry 4.0, Artificial Intelligence, and Communications Technology (IAICT), 2019, pp. 145-149, DOI: 10.1109/ICIAICT.2019. 8784823.

[3] S. Jain, T. Khanam, A. J. Abedi and A. A. Khan, "Efficient Machine Learning for Malnutrition Prediction among under-five children in India," 2022 IEEE Delhi Section Conference (DELCON), 2022, South Asia Satellite (GHTC-SAS), 2013, pp. 1-10, DOI: 10.1109/DEL-CON54057.2022.9753080

[4] A. Thapar and M. Goyal,"A fuzzy expert system for diagnosis of malnutrition in children," 2016 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), 2016, pp. 1-6, DOI: 10.1109/R10-HTC.2016.7906819.

[5] A. R. Lakshminarayanan, P. B, R. V, S. Parthasarathy, A. A. Azeez Khan and K. Javubar Sathick, "Malnutrition Detection using Convolutional Neural Network," 2021 Seventh International conference on Bio Signals,Images, and Instrumentation 2021, pp. 1-5, DOI 10.1109/ICBSII51839.2021.94451884

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[6] A. Maitra, R. E. Rote and N. Kuntagod, "Managing child malnutrition via digital enablement: Insights from a field trial," 2017 IEEE Global Humanitarian Technology Conference (GHTC), 2017, pp. 17, DOI:10.1109/GHTC. 2017.8239273.

[7] X. Dezhi and G. U. Ganegoda, "Multi Agent System to Reduce Malnutrition (MASRM) in Children," 2010 International Conference on Computational Intelligence and Software Engineering, 2010, pp. 1-4, DOI: 10.1109/CISE.2010.567680.

[8] C. Hayat and B. Abian, "The Modeling of Artificial Neural Network of Early Diagnosis for Malnutrition with Backpropagation Method," 2018 Third International Conference on Informatics and Computing (ICIC), 2018, pp. 1-7, DOI:10.1109/IAC.2018.8780505.

[9] Kadam, N., Dabhade, V., Baravkar, R., Saravade, V., & Mankar, C. (2019). Detect Malnutrition in Underage Children by using TensorFlow Algorithm of Artificial Intelligence. (Vol. 06, Issue 12)

[10] Mohseni, M., Aryankhesal, A., & Kalantari, N. (2019). Prevention of malnutrition among children under 5 years old in Iran: A policy analysis. PloS one, 14(3), e0213136.

[11] Madhuri Arya, Pooja Chavhan and Ujjwala Chaudhry, [2015], 'Malnutrition Detection and Management System', International Journal of Computer Science and Information Technology Research (Vol. 3, Issue 1, pp: (364-368))

[12] Dezhi, X., & Ganegoda, G. U. (2011). Rule based classification to detect malnutrition in children. International Journal on Computer Science and Engineering (IJCSE) Vol, 3.

[13] Malnutrition is a world health crisis, [2019], WHO. ://www.who.int/nutrition/topics/world-food-day-2019 malnutrition-world-health-crisis/en.

[14] Markos, Z., Doyore, F., Yifiru, M., & Haidar, J. (2014). Predicting Under nutrition status of under-five children using data mining techniques: The Case of 2011 Ethiopian Demographic and Health Survey. J Health Med Inform, 5, 152.

[15] Mohseni, M., Aryankhesal, A., & Kalantari, N. (2019). Prevention of malnutrition among children under 5 years old in Iran: A policy analysis. PloS one, 14(3), e0213136.