

VITAMIN DEFICIENCY DETECTION USING CNN

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Abstract— *This paper presents a new AI-based application designed to detect human vitamin deficiencies using dermoscopy images[11]. Traditional methods of identifying vitamin deficiencies often involve expensive laboratory tests and may not be available to everyone. However, different vitamin deficiencies may show different visual manifestations on dermoscopy images, which is a potential tool for non-invasive and cost-effective diagnosis.*

The proposed application uses advanced deep learning techniques to analyze the users' dermoscopy images.[11] Using deep learning algorithms, the application can accurately distinguish and identify patterns that indicate various vitamin deficiencies. After the analysis, the application provides users with a comprehensive report containing detailed information about the identified vitamin deficiency and related recommendations for dietary correction or supplementation.

This innovative approach gives people a convenient and accessible way to identify potential vitamin deficiencies. in the beginning, which facilitates timely intervention and better health outcomes. In addition, the collaborative nature of the platform allows for continuous improvement and improvement of its diagnostic accuracy, which ultimately benefits both users and healthcare providers in the treatment of vitamin deficiency health problems.

Index Terms: *AI-based application, vitamin deficiencies, dermoscopy images, computer vision techniques, machine learning algorithms, non-invasive diagnosis, cost-effective, dietary correction, supplementation, collaborative platform, diagnostic accuracy*

I. INTRODUCTION

This article examines the critical issue of vitamin insufficiency and the requirement for viable intercessions to address its far reaching impacts around the world. Just like the advancement of assistive advances to advance freedom

for the outwardly disabled, combating vitamin insufficiency requires imaginative approaches to progress mindfulness, determination and mediation strategies. Innovative developments guarantee to relieve the hurtful impacts of vitamin lack. The reason for this article is to shed light on the multifaceted roots of vitamin deficiency and to suggest preventive measures to progress open wellbeing and well-being utilizing apparatuses such as deep learning frameworks and discourse production similar to those utilized to assist the outwardly impeded.

Vitamin deficiency, regularly caused by inadequate admissions of basic minerals and supplements, could be a side effect of numerous ordinary wellbeing issues. It can be troublesome to closely screen a person's dietary needs[15], particularly on the off chance that they are unconscious of potential insufficiencies and have not looked for restorative consideration. Shockingly, more than 2 billion individuals around the world endure from vitamin insufficiency, and disturbing information appears the most results of this lack. For example, more than 1.2 billion individuals encounter zinc insufficiency each year, [1][2] which causes half a million passes [3]. Press lack of frailty moreover causes more than 100,000 passes each year. Ninety percent of the UAE populace endures from vitamin insufficiency.

Cheap processed junk food has finally become the norm, making solid food really expensive in countries like the US. The situation is complicated by the fact that the mineral content of vegetables has declined in recent decades, and scientists report a surprising decline in soil mineral concentrations. Vitamin deficiencies are still common when dieting. The startling data appears to be that 50 percent of Americans are deficient in several important vitamins, including A, C and magnesium, 70 percent of older Americans, and 90 percent of Americans are deficient in vitamin D.[4]

After studying the extent and consequences of this problem, we want to take serious measures to reduce the harmful effects of vitamin deficiency on human health and well-being. This speaks to how common vitamin deficiency is. 90% of the UAE population is deficient in certain vitamins. This trend is exacerbated by the widespread availability of cheap processed junk food, which lowers the cost of

healthier alternatives even in developed countries like the United States. Even worse, scientists have mistakenly attributed the decline in plant mineral content in recent decades to a decline in soil mineral concentration. Therefore, vitamin deficiency can also affect those who know how to eat healthily.

Given these alarming trends, addressing vitamin deficiencies is imperative for global health. To better understand vitamin deficiency and its wide-ranging effects, this article explores its complex origins and the urgent need for new approaches to raise awareness, improve diagnosis, and improve intervention techniques. Observing the scope and consequences of this urgent problem, we want to initiate important measures to mitigate the harmful effects of vitamin deficiency on public health and well-being.

II.OBJECTIVE

The overarching point of the MobileNet-based infinitesimal picture investigation framework for anticipating vitamin lacks is to create an imaginative and commonsense arrangement custom fitted particularly to address the challenge of recognizing lacks in fundamental vitamins A, B, C, D and E. Through the utilization of MobileNet, an proficient convolutional neural network [13][14] organizing design well-suited for picture classification errands, the venture endeavors to form a flexible and dependable framework competent of analyzing tiny pictures transferred by clients through the Wire informing stage.

The most objective of the activity is to make strides in availability and early discovery of vitamin lack among clients. The system endeavors to precisely classify little pictures of natural tests and distinguish signs of insufficiency in key vitamins A, B, C and D utilizing MobileNet's picture classification capabilities. This proactive approach to wellness observing advances early conclusion and treatment, which in turn leads to superior wellbeing results.

To realize the objective, the extent combines a few primary components and strategies. MobileNet serves as the spine of an picture examination framework that empowers effective and exact classification of minuscule pictures. By preparing the MobileNet demonstration on different infinitesimal pictures delineating indications of vitamin lack, the framework learns to recognize designs and characteristics that show particular lacks, empowering solid prescient capabilities.

In expansion, the extension incorporates user-friendly highlights and client interfacing that empower smooth communication and utilize the framework. Through integration with Telegram's informing stage, clients can helpfully transfer tiny pictures for examination and get real-time input on potential vitamin shortages. A natural client interface guides clients through the method, guaranteeing a consistent and effortlessly available involvement for those capable of different specialized abilities.

The system's multilingual back encourages incremental engagement by permitting clients to connect with the framework and get input in their favored dialect. This dialect adaptability is appropriate for diverse client socioeconomics and advances openness around the world.

In rundown, the essential objective of the venture is to create a MobileNet-based minuscule picture examination framework that would foresee insufficiencies of basic vitamins A, B12 [6][7], C, D and E. Utilizing progressed convolutional neural arrange[13][14] calculations, natural client interfacing, and multilingual bolster, the framework points to empower clients to identify and mediate early, eventually advancing wellbeing and well-being.

The main purpose of the project are mentioned below:

- MobileNet Engineering for Picture Examination: Illustration of MobileNet Engineering for Infinite Picture Examination. A clarification of how MobileNet improves the precision and productivity of categorization operations.
- Early identification of vitamin deficiencies: An overview of the project's emphasis on early identification of probable vitamin deficiencies. A discussion on how the framework proactively detects signs of vitamin A, B, C, D and E deficiencies..
- Integration with user-friendly interface: Shows the user-friendly highlights and interface of the framework. An explanation of how the integration with Wire's data management facilitates the valuable presentation of small images for analysis.
- Back in different dialects for global availability: discuss the multilingual support part of the system to suit many customers. An explanation of how global openness is ensured through language alignment.
- Early mediation capabilities for clients: A depiction of how the framework gives early discovery and intercession capabilities for clients. Dialog of how the venture advances wellbeing results and well-being by encouraging opportune intercession and tending to potential deficiencies.

III.PROJECT SCOPE

The Vitamin Insufficiency Location venture points to supply a steady and successful strategy for early discovery of insufficiencies in key vitamins A, B, C, D and E utilizing infinitesimal pictures. The activity employs an assortment of technologies and approaches to supply exact discovery and opportune mediation for individuals at chance of deficiency-related problems.

The center of the venture centers on the utilization of progressed picture examination methods, especially the

MobileNet calculation, to classify minuscule pictures that portray certain vitamin insufficiency indications. By preparing the MobileNet demonstration with diverse sets of tiny pictures, the framework points to distinguish designs and characteristics related with insufficiencies of critical vitamins.

In expansion to picture classification, the venture coordinates consistent client interaction and availability highlights. The framework gives a user-friendly interface available through the Wire informing stage, permitting clients to helpfully transfer minuscule pictures for investigation and get real-time input on potential leaks. Multi-language bolster guarantees inclusivity, empowering clients from different etymological foundations to be associated with the framework comfortably.

The use of extensive testing and optimization techniques that give priority to accuracy over speed is necessary to ensure the unwavering quality of the framework. We adjust calculations and settings to ensure productive operation while optimizing asset usage and responsiveness on the selected stage.

Overall, the scope of the project encompasses the development of a powerful and accessible system for early detection of vitamin deficiencies, with a focus on accuracy, usability, and inclusivity.

IV. PROPOSED SYSTEM

In general, the extent includes the improvement of a productive and open framework for the early location of vitamin insufficiency, centering on exactness, convenience and commitment. The framework planned for the Vitamin Insufficiency Location Extend is outlined to utilize state-of-the-art innovation. innovations and strategies for exact distinguishing proof and classification of basic vitamins A, B, C and D lacks from dermoscopy pictures. Coordination progressed computer vision procedures, profound learning calculations and Python programming, the framework points to supply clients with noteworthy experiences and suggestions to address potential insufficiencies.

Operation:

- **Image Acquisition:** Dermoscopy pictures that record skin indications related with vitamin insufficiency are gotten with a computerized camera or other imaging gadget. These pictures are input information within the consequent investigation prepare.
- **Image Processing:** Acquired dermoscopy images[10][11] are preprocessed with OpenCV (Open Source Computer Vision Library). This step includes image quality enhancement, noise reduction, and image contrast optimization to prepare images for analysis.[12]
- **Pattern Recognition:** To survey clean pictures, profound learning strategies are utilized, especially convolutional neural systems (CNNs). Based on various dermoscopy photographs showing particular signs of vitamin deficiency, these information were calculated. The system is competent at precisely classifying imperfections in input photographs by creating the capacity to distinguish between designs and images that compare to unmistakable defects.

- **Deficiency Identification:** Based on designs recognized by profound learning calculations, the framework decides the nearness and classification of vitamin lack in dermoscopy pictures. Each lack is classified concurring to the related vitamin (A, B12 [6][7], C or D), empowering focused on suggestions and interventions.
- **User Interaction:**For clients to lock in with the explanatory discoveries, the framework offers a user-friendly interface. In addition to getting to individualized exhortation for assembly their dietary needs, clients may transfer dermoscopy photos and get prompt criticism on any potential insufficiencies.

V. IMPLEMENTATION

The scope of the Vitamin Insufficiency Location Venture is broad and points to create a vigorous and effective framework for early location of genuine vitamin A, B, C and D insufficiencies based on minuscule pictures. The extend incorporates different innovations and strategies to guarantee precise location and opportune mediation of individuals at hazard of complications related to the deficiency.

At its center, the venture centers on leveraging progressed picture investigation methods, especially through the utilization of the MobileNet calculation, to classify minuscule pictures delineating side effects demonstrative of particular vitamin deficiencies. By preparing the MobileNet demonstration on an assorted dataset of minuscule pictures, the framework points to recognize designs and highlights related with lacks in fundamental vitamins.

In expansion to picture classification, the extent coordinating smooth client interaction and openness highlights. The framework offers a user-friendly interface, gotten to through the informing stage Wire, which permits clients to helpfully transfer infinitesimal pictures for examination and get real-time input on potential absconds. Multilingual bolster guarantees incorporation by permitting clients with distinctive dialect foundations to comfortably connect with the framework.

The scope of the Vitamin Lack Discovery extend is comprehensive, pointing to develop a vigorous and proficient framework for early distinguishing proof of lacks in basic vitamins A, B12 [6][7], C, D and E from infinitesimal pictures. The venture includes different innovations and techniques to guarantee exact location and opportune mediation for people at risk of deficiency-related complications.

The center of the extend centers on the utilization of progressed picture investigation strategies, especially the MobileNet calculation, to classify minuscule pictures showing indications demonstrative of certain vitamin insufficiencies. By preparing the MobileNet show on distinctive tiny picture datasets, the framework points to recognize designs and characteristics related with genuine vitamin deficiency.

In expansion to picture classification, the venture coordinates consistent client interaction and openness highlights. The framework gives a user-friendly interface open by means of the Wire informing stage, permitting clients to helpfully transfer minuscule pictures for

investigation and get real-time criticism on potential insufficiencies. Multi-language bolster guarantees inclusivity, empowering clients from different etymological foundations to be associated with the framework comfortably.

In expansion, MobileNet employs procedures such as bump normalization and ReLU actuation to progress merging speed and normality, which progresses the generally soundness and strength of the demonstration.

By and large, MobileNet building could be a major breakthrough in profound learning that provides speedy and successful bolster for classification occupations with constrained equipment. MobileNet employs significance dispersion circuits and other optimization approaches to achieve a trade-off between accuracy, computational complexity, and execution assessment. When CPU assets are limited, MobileNet is an fabulous choice for including and transmitting costly apps.

Fig.1.Flow chart

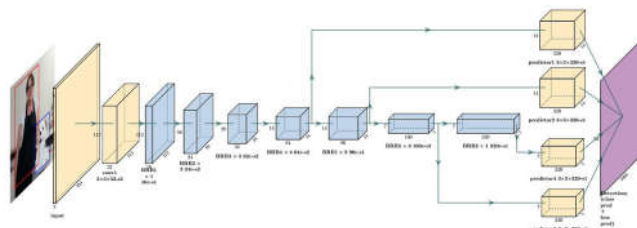


Fig.2 Mobilenett Architecture

VI. ARCHITECTURE

MobileNet could be a convolutional neural organization engineering[13] particularly planned for versatile and inserted gadgets that gives a lightweight but proficient arrangement to picture classification assignments. The engineering comprises an arrangement of deep-separated convolution layers taken after by a point-to-point convolution layer. This special plan permits a noteworthy lessening in demonstrating measure and computational complexity whereas keeping up tall exactness for classification assignments.

Described by depthwise divisible convolutions, MobileNet engineering mixes ordinary convolutions and depthwise convolutions followed by pointwise convolutions. The separation of temporal and channel-wise convolutions facilitates more efficient parameter use and reduces computational overhead, which makes it suitable for scenarios wherever resources are limited, such mobile devices.

By plan, MobileNet comprises distinctive layers gathered into squares, each containing depth-distributed convolutional layers taken after by bundle normalization and ReLU enactment. A depth-based convolution layer performs convolution operations on the person channels of the input highlight maps, whereas a point-based convolution layer combines the yield channels of the depth-based convolution to create a last inserting outline. This disconnected structure empowers adaptable scaling and adjustment to diverse input sizes and computational imperatives, making MobileNet appropriate for a wide range of applications.

In expansion, MobileNet incorporates strategies such as deep-separated convolutions, direct bottlenecks, and quick associations to assist optimize show execution and productivity. The utilization of straight bottlenecks diminishes the number of parameters and computational fetch, whereas easy route joins encourage information stream and slope proliferation all through the organization.

VII. RESULT AND DISCUSSION

The advance of our investigation is an imperative step forward within the assessment and advancement of a show based on dermoscopy pictures for the discovery of vitamin insufficiency. With the cautious arrangement and treatment of flexible picture fabric, we have guaranteed comprehensive scope of different skin maladies that show different insufficiencies. Utilizing progressed TensorFlow strategies, counting demonstrate engineering plan and chart development, we have made a vigorous system that can proficiently extricate and anticipate highlights from dermoscopy pictures.

Our broad involvement in thorough preparation and assessment has brought about in tall precision and generalization over different datasets and clinical scenarios. We utilized comprehensive picture preprocessing methods to improve information quality and consistency, in this manner guaranteeing dependable prescient show yield. Errands such as resizing, arrangement, and micrographic examination were fastidiously executed to optimize and illustrate performance.

The prepared show appeared noteworthy precision and adaptability, affirming its unwavering quality and appropriateness in genuine clinical settings. In expansion, input instruments and ceaseless optimization techniques illustrate our commitment to persistent advancement. These endeavors guaranteed the significance and unwavering quality of the demonstration over time and affirmed its adequacy in clinical hone.

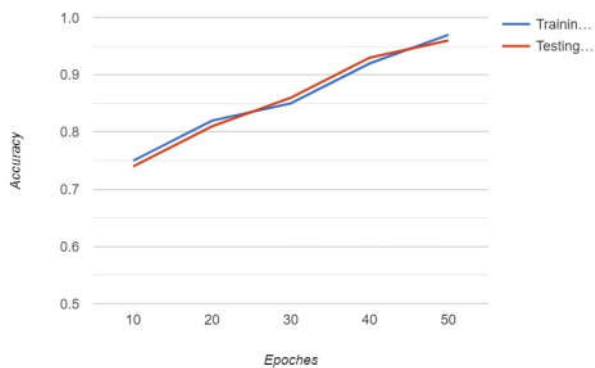


Fig.3 Graphical Representation of accuracy

In summary, our investigation is a vital step forward within the application of manufactured intelligence in healthcare, particularly within the field of restorative picture examination. By presenting inventive approaches to the location of vitamin insufficiencies, we point to advance early conclusions and compelling treatment techniques. Our demonstrated guarantees to back healthcare experts to move forward understanding results through opportune intercession and personalized treatment plans, eventually making strides in the quality of care in clinical practice.

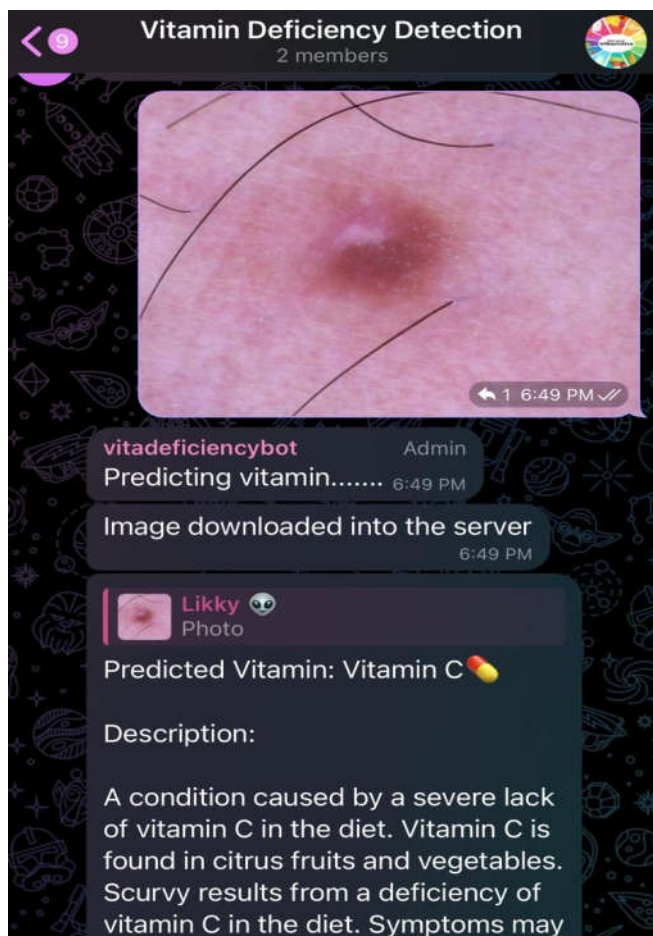


Fig.4 Example Output 1

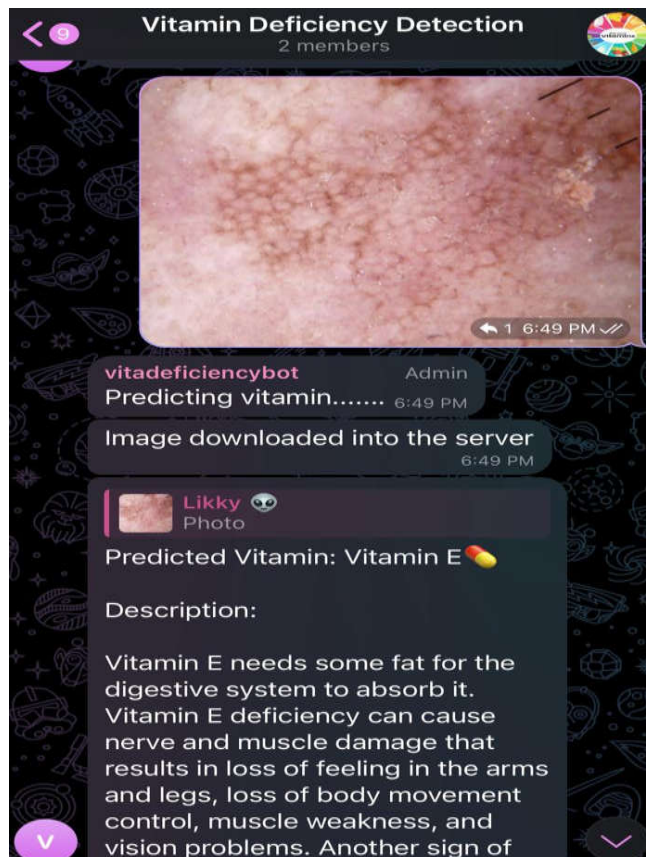


Fig.5 Example Output 2

VIII. CONCLUSION

Our application for recognizing vitamin insufficiency based on infinitesimal pictures has illustrated significant guarantee and appropriateness inside genuine healthcare settings. Through fastidious curation of the dataset and utilization of advanced machine learning methods, our framework accomplishes exceptional exactness and F1 score in foreseeing different vitamin lacks from little dermoscopic pictures. This accomplishment underscores the adequacy of our approach in leveraging cutting-edge innovation to address basic wellbeing challenges..

In expansion to specialized accomplishments, our application is an imperative apparatus for advancing wellbeing results. By giving non-invasive and effective ways to survey wholesome status, it permits wellbeing experts to intercede early and focus on mediations that can possibly anticipate negative well being results related with vitamin insufficiency. This proactive approach to wellbeing administration is steady with the general objective of preventive medication and contributes to a by and large enhancement in quiet well-being..

Also, the flexibility and flexibility of our program make it a profitable resource for integration into existing healthcare systems. Its capacity to consistently connect with built up frameworks increments its utility and encourages its appropriation in clinical home. In expansion, the iterative nature of our advancement handle guarantees nonstop enhancement and advancement that guarantees the

proceeding significance and unwavering quality of the program over time..

In conclusion, our application speaks to a major development in helpful imaging and prescient modeling that will revolutionize the distinguishing proof and treatment of vitamin lacks. Bridging the crevice between cutting-edge innovation and clinical hone, our framework advances way better human well-being by encouraging early discovery and focused on mediations, eventually driving to way better human wellbeing.

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