



# REVIEW PAPER WRITING FOR VITAMIN DEFICIENCY DETECTION

<sup>1</sup>Mrs.Shivani Devkar R, <sup>2</sup>Dr.Sachin Bere S,

Computer and Science Engineering Department,

Dattakala Group Of Institution Faculty of Engineering College, Swami-Chincholi, Daund, Pune.

## Abstract

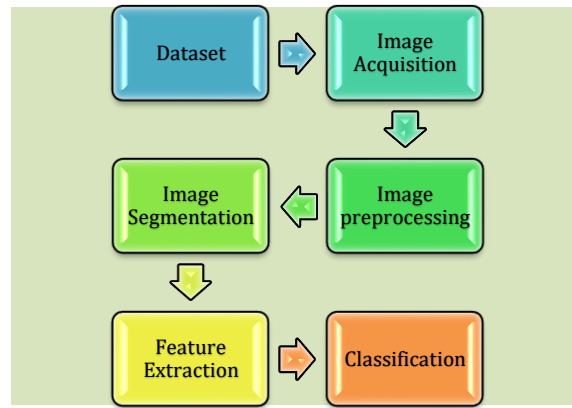
The review paper is on the explanation of vitamin deficiency detection. The term is directly associated with the health of the human being by their daily life routine and activity. For this research sample of blood is collected by using a kit on the finger of a human rather than any other part of the body. Project design and software planning is here for the programming is python 3, HTML and CSS. Therefore, the paper is told about reducing vitamin deficiency among patients by using suitable AI in the upcoming future.

**Key word:** Vitamin deficiency, System architecture, testing of blood, HTML, CNN technology, PYTHON, etc.

## Introduction

Vitamin deficiency is a very common term for modern words. The term is directly associated with the health of the human being by their daily life routine and activity. The detection of vitamin deficiency can be measured by using strong and effective artificial intelligence along with suitable programming. The current study is based on the detecting method of vitamin deficiency with the help of all the adopted methods and technologies. There is also mentioned the probable problems and adopted algorithms for focusing on the entire fact. The adopted hardware and software for the programming are mentioned in the study.

## Problem statement

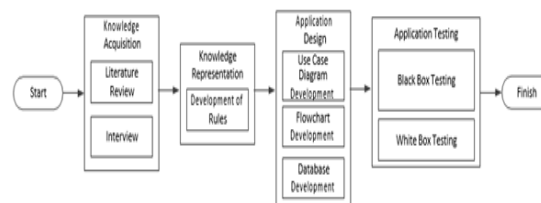


**Figure 1: System architecture**

(Source: Self-Created in MS-word)

Vitamin deficiency can occur through the habit of consuming unhealthy food and an unstable lifestyle. It may reduce the skill and capability of a person with the transformation of time. A blood test should occur to detect the ratio of vitamin deficiency in the human body [1]. The sample of blood is collected by using a kit on the finger of a human rather than any other part of the body. At the same time, there are also several processes for detecting vitamin deficiency via a blood test. The use of image acquisition, image pre-processing and image segmentation played a very crucial role in analyzing the problems related to vitamin deficiency [2]. There is also used feature extraction and classification for enhancing the approach to solving all the problems. The concept of solving all the problems can be possible with the help of collaboration all the factors in a scientific method. The concept of getting the issues and problems of the patients might also have the potential to provide a better lifestyle to them by reducing all the issues and lack of vitamins. It is also applied for ensuring the betterment of the medical infrastructure and expansion by a huge margin.

## Project design



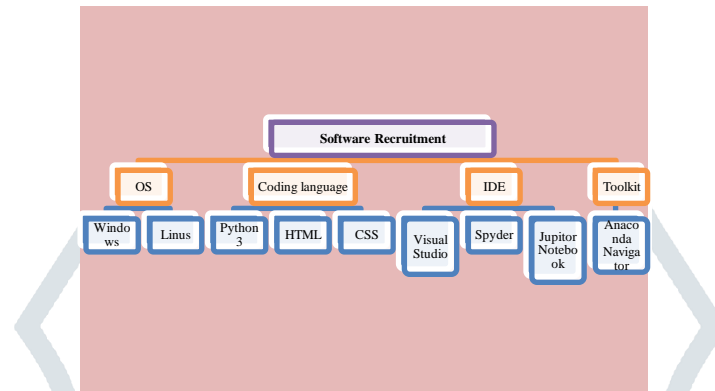
**Figure 2: The current research procedure**

(Source: Tripodi, *et al.* 2020)

The design of the determined project is based on some medical and pathological studies conducted earlier by several scholars. Analyzing the symptoms and their corresponding might play a very important role in the detection of vitamin deficiency [3]. The concept of knowledge acquisition has been done by different books, articles, journals as well as some reliable websites. The interaction with the medical experts is also very helpful for gathering all the important information needed for conducting the study. The interface method has applied forward chaining along with the solution for the deficiency [4]. The used case diagram depends on the UML diagram by adopting two

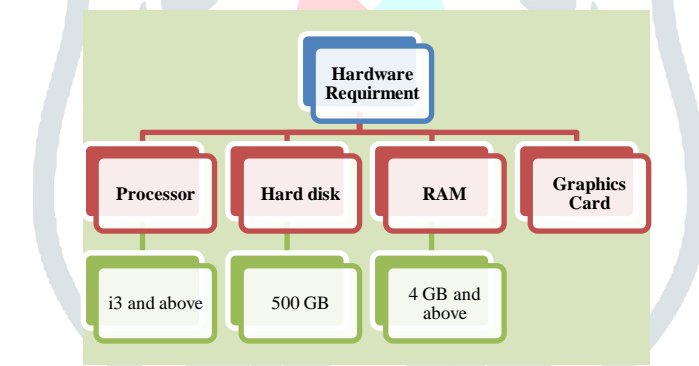
different users at the same time. The certainty factor (CF) related to the parameter can be expressed as “CF (H, E) = MB (H, E) – MD (H, E)”. MB stands for increased belief, whereas MD expressed increased disbelief in the adopted hypothesis. Application testing is the last step for the testing of the application [5]. This step is conducted and controlled by medical experts by using a black box testing method related to vitamin deficiency. The output of the entire application is critically measured and applied by the experts along with the use of the white box testing method. [Referred to Appendix 1]

## Requirement analysis



**Figure 3: Software Requirement of the planning**

(Source: Self-Created in MS-word)



**Figure 4: Hardware Requirement of the planning**

(Source: Self-Created in MS-word)

The requirements for creating the method of detecting vitamin deficiency can be differentiated into three individual parts. The first part belongs to functional requirements. This requirement is based on using video surveillance in the provided anomaly along with automated CNN technology [6]. Both technologies have the potential to save money and time with a low workflow. The second requirement is based on the software used in the process, such as windows and Linux as operating systems, anaconda navigator as a toolkit and many others. The used coding language for the programming is python 3, HTML and CSS. Similarly, Spyder, Visual studio code and Jupyter notebook are used in programming as IDE software [7]. Along with that, the third requirement is related to hardware such as an i3 processor, 500 GB hard disk, 4 GB ram and graphics card. The collaboration of these requirements is applied to present strong and effective detection programming [8]. The responsibility of healthcare experts is very huge for ensuring the quality of all the determinants. Fulfilling the requirements mentioned in the

study is also applied to providing a method of detecting vitamin efficiency in a significant method. The betterment of human life also can be assured by these facts. [Referred to Appendix 2]

## Project planning



**Figure 5: Symptom Database**

(Source: Heiser, *et al.* 2020)

The first criterion of the programming is to implement a sample graphical user interface (GUI). It has the potential to focus on the organs by capturing images of different body parts. Analyzing the method of the samples was conducted on the photos of A x B x 3 colure's [8]. All the layers of the body parts are analyzed by this method along with their actual weight and other important factors. The use of a Convolution Neural Network (CNN) also played a very crucial role in the entire programming and evaluation of the current situations of the neurons [10]. At the same time reducing the bias and negative values are very important for maintaining the accuracy of the output by the programming. The formula for evaluating the sum of the activation range is  $(1) = (W \square(O) + \square i \square \square)$ . The logic membership function used in the method was created by using PYTHON. Adopting the concept of Defuzzification results is very effective for displaying the list of all the required nutritional sources of the detected deficient vitamins [11]. Using this particular planning in the project can play a very effective role in enhancing the significance of the entire project and programming for human beings [referred to appendix 3].

## Implementation method



**Figure 7: Feature Extraction for Each Parameter**

(Source: Wang, *et al.* 2020.)

The method of implementation is based on two different concepts such as mathematical models and test results. The mathematical model is based on cloud computing and TensorFlow format. The method of cloud computing is applied to reduce the time compared to the conventional method. It is also very helpful for achieving accurate

neural training iteration results [12]. On the other hand, TensorFlow can be applied to export a compact file to provide strong and effective results by conducting the test. On the other hand, PYTHON has also played a very crucial role in providing the result of the test in a strong and effective method [13]. The collaboration between C++ format and PYTHON may increase the effectiveness of the detection method implemented by this particular programming used by the study. On the other hand, the results of the conducted test are gathered by accessing some accurate and relevant medical data and the patient's profile [14]. The amount of existing B6 and B12 vitamins in the body of the patients also can be analyzed and evaluated by that particular program. The Fuzzy Logic inference system has the potential to create a strong and effective diagnosis by detecting the vitamin deficiency in the patient's body. [Referred to Appendix 3]

## Algorithm



**Figure 10: Sample Dataset Images (Nails, Lip, Eyes, Tongue)**

(Source: Sambasivam, *et al.* 2020)

Depending on the minerals that the body lacks, a biological process shortage manifests as different symptoms. There are some universals, though. These would consist of: broken nails, mouth sores or fissures in the mouth's corners, trouble to see at night, white expansion on the eyes, and having red eyes Tongue [15]. The symptom often denotes anemia if the nails are yellow. Brittle nails can also be a sign of a vitamin B and vitamin C shortage. Approximately 28% of individuals with mouth ulcers had vitamin B1, B complex, and vitamin B6 deficits, according to several surveys [16]. Artificial intelligence (AI) may include natural language understanding (NLP), which uses computational methods to analyze and synthesize voice and language. In the method of constructing a Neural Network for ailment identification, Machine Learning methods were used. Within the investigation, various iterations of the Convolution Neural Network (CNN) are performed using numerous pictures containing the sought properties, and the humility level of each feature extraction stage is obtained and put into a Mamdani-based formal mathematical Classifier constructed in PYTHON [17]. This method of algorithms has created a huge significance for the entire process of detecting vitamin deficiency from the body of any particular patient in a scientific way.

## Conclusion

After completing the entire study, it is seen that the mentioned methods and ideas have the potential to provide a huge efficiency for detecting vitamin deficiency in the human body. The adopted method of programming has the potential and responsibility to focus on the criteria by increasing the effectiveness of medical science. All the factors and information mentioned in the study are based on different reliable evidence and logical statements from different sources. In conclusion, it can be said that the study can be applied to reducing vitamin deficiency among patients by using suitable AI in the upcoming future.

## Reference List

### Journals

- [1] Fiorentini, D., Cappadone, C., Farruggia, G. and Prata, C., 2021. Magnesium: biochemistry, nutrition, detection, and social impact of diseases linked to its deficiency. *Nutrients*, 13(4), p.1136.
- [2] Khelifa, L., Hu, Y., Jiang, N. and Yetisen, A.K., 2022. Lateral flow assays for hormone detection. *Lab on a Chip*, 22(13), pp.2451-2475.
- [3] Zeng, L., Jiang, W., Liu, L., Song, S. and Kuang, H., 2018. Development of ic-ELISA and lateral-flow immunochromatographic strip for detection of vitamin B2 in an energy drink and vitamin tablets. *Food and Agricultural Immunology*, 29(1), pp.121-132.
- [4] Chiscano-Camón, L., Ruiz-Rodriguez, J.C., Ruiz-Sanmartin, A., Roca, O. and Ferrer, R., 2020. Vitamin C levels in patients with SARS-CoV-2-associated acute respiratory distress syndrome. *Critical care*, 24(1), pp.1-3.
- [5] Sempionatto, J.R., Khorshed, A.A., Ahmed, A., De Loyola e Silva, A.N., Barfidokht, A., Yin, L., Goud, K.Y., Mohamed, M.A., Bailey, E., May, J. and Aebischer, C., 2020. Epidermal enzymatic biosensors for sweat vitamin C: Toward personalized nutrition. *ACS sensors*, 5(6), pp.1804-1813.
- [6] Rostami, M., Tehrani, F.R., Simbar, M., BidhendiYarandi, R., Minooe, S., Hollis, B.W. and Hosseinpanah, F., 2018. Effectiveness of prenatal vitamin D deficiency screening and treatment program: a stratified randomized field trial. *The Journal of Clinical Endocrinology & Metabolism*, 103(8), pp.2936-2948.
- [7] Heiser, K., McLean, P.F., Davis, C.T., Fogelson, B., Gordon, H.B., Jacobson, P., Hurst, B., Miller, B., Alfa, R.W., Earnshaw, B.A. and Victors, M.L., 2020. Identification of potential treatments for COVID-19 through artificial intelligence-enabled phenomic analysis of human cells infected with SARS-CoV-2. *BioRxiv*.
- [8] Tripodi, A., Cohen, H. and Devreese, K.M., 2020. Lupus anticoagulant detection in anticoagulated patients. Guidance from the Scientific and Standardization Committee for lupus anticoagulant/antiphospholipid antibodies of the International Society on Thrombosis and Haemostasis. *Journal of thrombosis and haemostasis*, 18(7), pp.1569-1575.
- [9] Hartman, R.I. and Lin, J.Y., 2019. Cutaneous melanoma—a review in detection, staging, and management. *Hematology/Oncology Clinics*, 33(1), pp.25-38.
- [10] Bhadra, P. and Deb, A., 2020. A review on nutritional anemia. *Indian Journal of Natural Sciences*, 10(59), pp.18466-18474.

- [11] Bhadra, P. and Deb, A., 2020. A review on nutritional anemia. *Indian Journal of Natural Sciences*, 10(59), pp.18466-18474.
- [12] Wang, Z., Ding, R. and Wang, J., 2020. The association between vitamin D status and Autism Spectrum Disorder (ASD): A systematic review and meta-analysis. *Nutrients*, 13(1), p.86.
- [13] Garkani, F., Beitollahi, H., Tajik, S. and Jahani, S., 2019. La<sup>3+</sup>-doped Co<sub>3</sub>O<sub>4</sub> nanoflowers modified graphite screen printed electrode for electrochemical sensing of vitamin B6. *Analytical and Bioanalytical Chemistry Research*, 6(1), pp.69-79.
- [14] Yetim, A., Aygün, E., Yetim, Ç., Ucar, A., Karakaş, Z., Gökçay, G., Demirkol, M., Ömer, B., Gökçay, G., Baş, F. and Erginöz, E., 2021. Measurement of serum vitamin B12-related metabolites in newborns: implications for new cutoff values to detect B12 deficiency. *The Journal of Maternal-Fetal & Neonatal Medicine*, 34(8), pp.1260-1268.
- [15] Sevani, N., Soenandi, I.A. and Saputra, F., 2020, April. Implementation of backpropagation artificial neural network for early detection of vitamin and mineral deficiency. In *IOP Conference Series: Materials Science and Engineering* (Vol. 847, No. 1, p. 012043). IOP Publishing.
- [16] Aleksandrov, V., 2022. Identification of nutrient deficiency in plants by artificial intelligence. *Acta Physiologiae Plantarum*, 44(3), pp.1-10.
- [17] Sambasivam, G., Amudhavel, J. and Sathya, G., 2020. A predictive performance analysis of vitamin D deficiency severity using machine learning methods. *IEEE Access*, 8, pp.109492-109507.

