Computational Approach for Human Bioenergy Field Imaging and Analysis for Human Wellness

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Abstract

Complementary and Alternative Medicine (CAM) researchers' committee stated a term called Biofield in 1994. The previous study shows the substantial evidence of its existence and its impact on the health and thought process of an individual. Due to the lack of its scientific documentation and examination, usage and belief of biofield in various domains are not very popular. The biofield is an extremely weak electromagnetic bio-information field, which is very hard to measure and visualize. It is a field of energy around every seen and unseen, living and non-living, holds a higher order of dynamic information within itself. CAM practitioners challenge that this bioenergy has mind-like properties reflecting ones' physiological thought process, inner qualities, wellness, organ coordination, and others. Due to its invisibility (through naked eyes) and weak strength, scientific measurements, analysis and belief of its existence is questionable. This research article highlights a method for the visualization, analysis, and medical benefits of biofield measurement. Current research also highlights the applications of biofield study in the future, i.e., and its further study will open up new gateways for investigation and bring remarkable changes in society.

Keywords: Complementary and Alternative Medicine (CAM); Human Biofield; Bioenergy; Electromagnetic field; Image processing.

I. Introduction

The biofield is a concept based on an ideology that everything, any object or substance, in this universe, continuously exchange energy with the surrounding. Every object emits this energy by itself [1, 2]. During interference, there is an exchange of energy, as well as the information it carries. When two energy field is in proximity, they interconnect and amend each other via the law of Resonance [3, 4]. Moreover, this is a continuous process, and its surrounding environment affects everyone, either positively or negatively, due to this exchange of energy. Adverse effects can be in the form of medical disease, anger, demotivation, or generation of any other negative emotion.

An extensive study in this field shows that bioenergy patterns are associated with the physiological and psychological properties of living beings and carry a lot of information related to it [5]. This information is related to the changes happening at an atomic level. Changes observed are because of the emission or absorption of energy that results in a shift in biofield pattern around an individual. These changes in the energy pattern, further, causes harmonic changes that are measured by medical diagnostic methods. Presently, medical diagnostic systems have limited capacity to measure or identify the energy level changes in the body, hence only able to detect the harmonic changes. These changes may bring out some grave illness or disease in an individual at the alter stage that may or may not be curable. Hence, to overcome this significant issue, CAM researchers and practitioners suggested studying energy level changes, i.e., biofield of an individual. Pieces of evidence of previous research show that a study on biofield brings exceptional support to the medical diagnosis. Still, there are many unfold in this area that needs to focus on for more reliability, accuracy, and belief.

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Biofield not only links physiological and bioenergy changes but also carries information related to the psychology of an individual. The biofield connected with the seven chakras, namely, Crown Chakra, Third Eye Chakra, Throat Chakra, Heart Chakra, Solar Plexus Chakra, Sacral Chakra and Root Chakra, which carries various emotions of an individual, as shown in figure 1. [6]
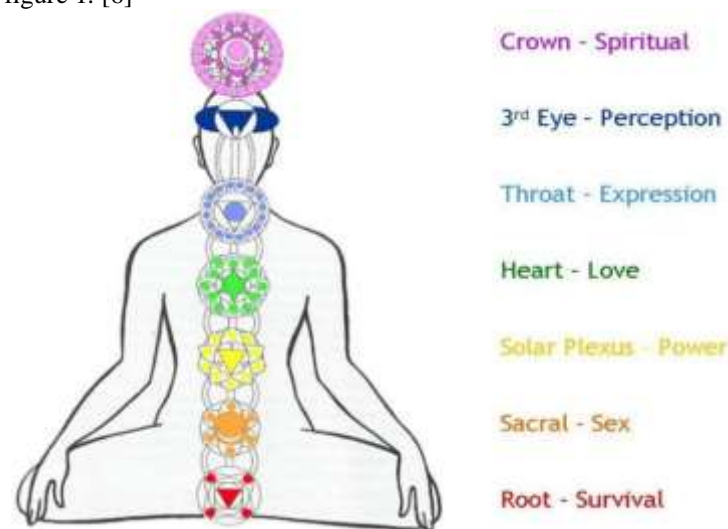

Figure 1 Relation between chakras and human emotions

Therefore, an in-depth study of biofield may also provide the current mental state of an individual, which may further help in the diagnosis of his or her non-medical related issues like anger management, lack of motivation, leadership quality, and stress level and so on. In identifying human psychology, it will be easy to detect that the person is harmful to society or not. Moreover, the psychic study will also help us in understanding ones' mental ability power, which may further help us to identify the weak students, i.e., may help us in improving the academic outcomes of an institution. Thinking beyond this, one can able to handle public relations, love relations, quiet life, and various other personal things that are related to the psychology of an individual directly or indirectly [5, 25].

On the other hand, studying the properties of the biofield is not so easy. The biofield is because of its dynamic nature, i.e., biofield changes with the thought process and by surrounding effects. If the surrounding environment has the availability of metallic or any devices that generates or emits any kind of energy or presences of human or any living or non-living object, will results in a change of biofield [7]. Hence, biofield get changes its pattern very instantly, which makes its analysis and study more difficult.

There are various benefits of biofield's study and research in the future; therefore, there is a requirement of system or methodology, which should be able to solve the related issues. If one should highlight these issues, in studying biofield, those are visualization of biofield, unfolding complex structure of biofield, decoding color patterns, examining and generating facts, analysis of patterns, understanding of dynamic and nonlinear behavior of biofield and many more. Research, in decades, comes up with various solutions but with certain limitations that make people hard to believe and understand the concept and importance of human aura or biofield. Hence, to overcome this situation, this research article shows a methodology, which will help in visualizing the human bioenergy field for better understanding and accessible analysis of the same. In addition, this article highlights a few color codes with their meaning in terms of biofield analysis and its impact on human physiological and psychological factors. After compiling these results, based on outcomes, the final report about an individual will be obtained, which will highlight the overall physical and mental status of that individual at that particular moment. Finally, this article will limelight a few of the future aspects and applications related to biofield that will bring remarkable changes in society.

II. Review of Literature

History and Background of Human Biofield

Auric energy is the ancient technology used by wise to determine the mental and physical health of an individual that further helps to take the necessary remedial solutions. The existence of energy flowing around human has drawn into the limelight by Sir Isaac Newton in 1660. Other researcher name Stephen hales in 1733, claims dynamic power as electricity. In the year 1924, two researchers William Einthoven and Robert O. Becker, discover the ECG signals and deduce the association between psychic behavior and acupuncture. In 1939, Semyon Kirlian discovered Kirlian photography. This photographic technique utilized the concept of the high voltage supply, in which a photographic plate placed over the conducting plate. A high voltage frequency and voltage passed through these conducting plates, and as a result, auric energy surrounded the shadow of an object captured. By considering this method as a base prof, Korotkov developed aura capturing technique entitle as Gas Discharge Visualization (GDV) [8] [9] [36-42]. This research work act as a base for application in the biological and medical system.

Following, table 1, is the preliminary research that has carried in capturing and proving the existence of auric energy.

Table 1 Study on history and background discoveries

S. No.	Year	Remark
1.	1570	William Gilbert discovers the presence of electrostatic force and claims that the earth is composed of magnets. For the experiment, he constructs earth made up of loadstone, place compass at various points where compass indicates horizontal and vertical dip angle movements. Compare the results of the experimental earth with the actual earth points. Due to the presence of irregularity nature of earth bed. Then he considers the fact that earth rotates around a line and having two opposite poles. He also observes that the moon is revolving around the earth, having the same face. Then he concludes the concept of electrostatic force.
2.	1660	Isaac Newton discovers the presence of dynamic energy around the human body and also liable for life cycle functions
3.	1733	Stephen Hales considers Newton's work as a base and examines the function of nerve and even claims that nerve in the human body act as a conductor while the energy in the human body act as electricity.
4.	1818	Shelley's driven the work of galvani's and examine the flow of dynamic energy in animals.
5.	1831	Carlo Matteucci testified the generation of electricity from the wounded tissues
6.	1859	Charles Darwin discussed the origin of species in the context of bioelectric organs.
7.	1868	D'Arsonval published research and suggested that if the change in the energy field applied to the human mind, then it will result in the perception of light. Luis Bernstein suggested the theory of nerve action, in which he discussed how the ion transports from the neural membrane.
8.	1924	Willem Einthoven awarded with the Nobel prize for the discovery of ECG

		Robert O. Becker deduced the connection between psychic phenomena, limb generation, bioelectricity, and acupuncture.
9.	1939	Kirlian photography presented a simple technique for capturing electromagnetic biofields. High voltage current is passed between metal plates, objects, and record the coronal discharge. The recorded electric discharge is drawn on the film. This technique is heavily dependent on hardware, and system setup cost is moderate. [10]
10.	1980's	Oldfield developed poly-contrast interference photography (PIP). The advanced techniques analysis was able to distinguish between the electromagnetic light intensities. Oldfield claims that PIP helps for medicinal diagnosis. In this method, the aura generated after going through various observations in the static environment. This technique is not productive, hardware-dependent, and not readily utilized by society. [11]
11.	2006	Katherine Creath developed Measurement of bioluminescence and thermal fields from humans: Comparison of three techniques for imaging biofields. They elaborated on three methods for imaging biofields. The first technique utilizes highly sensitive, low noise CCD sensitive to radiation ranges (400-1000) nm. The second technique termed Dynamic Interferometry (DI), which used for tracing the thermal field that exists around the body, and the third technique utilizes an imaging technique for measuring infrared area (IR) emitted from the biological object. A noteworthy observation was that the proposed method is hardware dependent and economically expensive. [12, 13]
12.	2011	Aura reader developed copyright software, which utilizes the photographic technique. It involves scanning the digital image and later apply AR filtering technique termed as 'selective pixel manipulation' on it, which reveals an energy spectrum (after applying Adobe Photoshop). The remarkable observation was, although it is less hardware dependent but uses adobe Photoshop, image-editing tools. Thus, the realization of such an editing tool brings researchers in disbelief of the research [14].
13.	2015	Shreya Prakash, Anindita Roy Chowdhury, Anshu Gupta, worked on Monitoring the Human Health by Measuring the Biofield "Aura": An Overview. They had discussed the scientific techniques for capturing human aura and the symptoms of disease before its appearance in the human body. This method is not economically productive and not beneficial to the society, because it is hardware dependent and highly probable to electromagnetic interference by the environment [15, 16]

Image & Its types

Image is an array of pixels to represent the visualization feature of human perception in various formats. Images can be classified according to dimensions: 2D or 3D, based on color: Black & White images, Colored images, based on multiple formats: JPEG, PNG, GIF, and so on. In this article, images are discussed and classified based on bit size format, i.e., 2-bits, 8-bits, 16-bits, 24-bits, and so on [17]. A lot of confusion illustrated based on the bit size of an image. Broadly, 8 bit, 16 bit, 32-bit images indicate the *number of bits per channel.* There exists, basically, three channels in RGB image, so that is like 24 bit, 48 bit, 96 bit, respectively. A digital image made up of Red, Blue, and Green as primary colors. Each of these is known as a color channel. They can have any range of color intensity values

depending on the depth of the bit. Often, there is a confusion that there are three channels in a colored image, i.e., RGB for an 8 bit/channel; it would have 24 bits/pixel and total it can have 16.8 M colors available. Whereas in 16 bits/channel would have 48 bits/pixel and so on [17].

On the other hand, a 32-bit image often refers to 24 bit, as 32 bit is 8 bit per channel with an extra "*alpha*" channel for storing depth i.e., transparency of color value. Mostly in PNG, BMP and PSD file formats support alpha channels. The most 32-bit channel is primarily for graphic design than of photography because the human eye can perceive up to 10 million colors, and 8 bit/channel already exceeds 16 million colors. Hence working with 8bit/channel is more worth than 16bit/channel or 32bit/channel. It will just make computations cost high than actual benefits [17].

Table-2 shown below highlights various image types, bytes per pixel, possible color combinations that can be generated, and the compatible file formats with each. This information helps in a deep understanding of an image that will further aid in working on images more conveniently.

Table 2 shows different types of images and related details [17]

Image Type	Bytes per pixel	Possible color combinations	Compatible File Types
1 bit Line art	$^1/_8$ byte per pixel	2 colors, 1 bit per pixel. One ink on white paper	TIF, PNG, GIF
8-bit Indexed Color	Up to 1 byte per pixel if 256 colors	256 colors maximum. For graphics use today	TIF, PNG, GIF
8-bit Grayscale	1 byte per pixel	256 shades of gray	Lossy: JPG Lossless: TIF, PNG
16-bit Grayscale	2 bytes per pixel	65636 shades of gray	TIF, PNG
24 bit RGB (8-bit mode)	3 bytes per pixel (one byte each for R, G, B)	Computes 16.77 million colors max. 24 bits is the "Norm" for photo images, e.g., JPG	Lossy: JPG Lossless: TIF, PNG
32 bit CMYK	4 bytes per pixel, for Prepress	Cyan, Magenta, Yellow and Black ink, typically in halftones	TIF
48-bit RGB (16-bit mode)	6 bytes per pixel	2.81 trillion Colors max. Except we don't have 16-bit display devices	TIF, PNG

While working with colored images, it is preferred to convert the images into the grayscale to reduce the computation cost. There are methods available to convert the RGB image into a grayscale image while working with 24bit/pixel images. While working with 32-bit images, simply extract the preferred 8-bit plane from the image, as
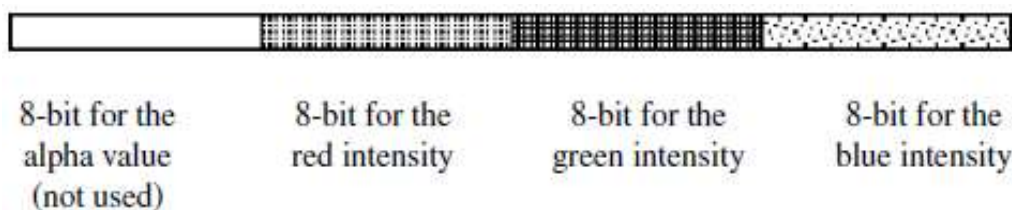
shown in figure 2:

| 8-bit for the alpha value (not used) | 8-bit for the red intensity | 8-bit for the green intensity | 8-bit for the blue intensity |

Figure 2 Representation of 32-bit RGB image

Existing Techniques:

Measuring human aura is very weak-intensity, complex, and dynamic. It consists of different electromagnetic frequencies, those changes with time, environment, and other factors. Human biofield involves a large number of active elements within and many networks of interactions, like energies of various organs, are responsible for its formation. Therefore performing computations on biofield is quite tricky. Previous research under this umbrella comes out with some solutions, which has given some directions in capturing, understanding, and computing such a complex field. Although these methods are available with their limitations, one can still find a ray of hope in a darkroom to proceed further. Some of the existing techniques for the measurement of human biofield are mentioned in this section, below.

- **Pranic Healing method**

Pranic healing is one of the old-fashioned ways used for natural healing to treat illness. It is one of the simple but powerful techniques that can use to provide immediate benefits to the patient. Laws of physics state that every matter exists in the universe made up of energy, and this energy can only be transformed in one form to the other. Thus, every feeling and thought in an individual is nothing but energy waves. The fascinating thing is that humans can handle and modify these energy patterns. Moreover, if one can understand how to work with these energies, it can help transform all the negative energies into positive ones. This transformation helps other individuals in attaining a peaceful life with good relations [18].

Pranic healing deals with the same kind of energy transformation. This method is a manual way of healing, i.e. there is no requirement of any instruments to measure the energy waves. Experts in this area, known as cosmic healers, means they are energy-sensitive people. Such practitioners can feel the presence of biofield around an individual. Under this process, a Pranic healer helps in modifying the imbalanced energy field and transfer universal energy to the patient. Pranic healers are well-trained people who can access and transfer life energy, i.e., unlimited energy to the patient using some specific technique for specific diseases and conditions [18, 19]. During this process, there is no physical contact between the healer and the patient and have the power to heal the spiritual, physical, emotional, and mental levels of an individual. To do this procedure, it contains three steps, scanning of energies, removal of abnormal energy waves, replenishing, and revitalizing with life force.

- **Gas Discharge Visualization (GDV)**

Gas Discharge Visualization (GDV) is an advanced form of electrography, which works on the principle of Kirlian Photography, developed by Dr. Korotkov. This method is also known as Electro-Photonic Imaging (EPI). It refers to the process in which a biological subject generates, and optical radiation is placed between the electromagnetic field and amplified by gas discharge. Then it is using some dedicated computer software, and biofield can be visualized. Various applications of GDV has observed in the field of medical diagnosis. This technique brings remarkable observations in identifying pre-detection and post-conditions of patients after using alternative medicine remedies. The scientists also claim that future enhancements may help in the pre-identification of critical diseases like cancer, heart diseases, and so on [18-20] [25] [36-42].

- **Resonance Field Imaging (RFI)**

Resonance Field Imaging (RFI) is another device used to measure the bioenergy field generated around living organisms. It helps in identifying the type and function of this biofield. It uses image representation techniques to create a color energy chart of objects like plants, animals, and so on. With the help of RFI imaging, medical experts can generate Psychological and Health level interpretations about an individual and can make decisions accordingly.

It is possible because of RFI imaging able to create psychological profiling and map the psychological effects on human health. It uses the electromagnetic field sensing instrument to scan the human body. While it isn't expected for therapeutic determination of specific diseases, RFI gives complete data about patient's wellbeing conditions and provides point by point and specialized degrees of data that wellbeing experts can use as a factor in their expert choices [18-21].

It is a test electromagnetic estimation and imaging process like the NMR imaging system. RFI needs an RF advanced recurrence counter with a reception apparatus tunable over a broad scope of frequencies (much lower than required for X-ray), which is pointed at each piece of the radiation field. A sensor gives data about the resounding recurrence in the standard explicit unit. The RFI innovation provides target information and useful translation for the radiation field and recognizes the sort and capacity of bio-energies present in explicit districts in the human mind. The RFI framework precisely recognizes and deciphers 15 shades of bioenergy, speaking to each of the 15 discernable shades of the optical range, giving it the extremely conceivable helpfulness for point-by-point and exact pictures and understandings. Information acquired can be utilized to create full bioenergy diagrams of the people with the assistance of a product program [18, 21].

- **Poly contrast Interference Photography (PIP)**

Poly contrast Interference Photography or PIP visualizes patterns of light radiating from biological organisms and inanimate objects. In the late 1980s, using microchip technology, Harry Oldfield developed a scanner that could provide a real-time, moving image of the energy field. This system became known as Poly contrast Interference Photography or PIP [14]. Oldfield thought that the human energy field might interfere with photons both ways when the incident ray traveled towards the object and when the reflected beam bounced off the object. Oldfield devised a computer program that would analyze the radiation intensities of different frequencies being reflected from the person or object being scanned [14, 18, 22]. To see the bod's energy field with PIP, ideally, the person should be in a room with full-spectrum lighting at the controlled output, standing against a white backdrop. A specialized video camera takes photographs using various filters that get analyzed by special PIP software. PIP examines photon (light) interference and its changes in and around the body. This interference is generated when ample spectrum radiation falls on the energy field. Depending on the density of the energy in the energy field, various color shades are produced (the word "color" here is only indicative of multiple frequencies). The computer program tests these color shades. The PIP software program allocates a number to each specific grade or rate of the radiation and then recodes every value into the visible light range so that we can see it; otherwise, the interference pattern is invisible. PIP uses the software on a PC with a video feed and takes a scan of bio-energy and light energy interference [18, 19]. An image is generated live on a monitor where signals from the video camera are graded into clearly visible colors. The computer screen then displays a picture of the energy field from and around the body. The PIP system shows up many patterns and colors in which a trained eye can relate to a person's energy balance and well-being. Although some of these things are expected to be connected to health, the system in the present state of affairs does not take the place of routine medical examination or diagnosis. Further research is required in this field to use PIP as a diagnostic tool [18, 19, 22].

- **Quantum Magnetic Resonator (QMR)**

The Quantum Resonance Magnetic (QRM) analyzer is an instrument to gauge and investigate the wellbeing state of a person through the discharge of electromagnetic waves through the human body. The human body has a massive number of cells that always develop, create, split, recover, and pass on. An examination expresses that, in a grown-up, above twenty-five million cells split up each second and recharge themselves at the speediness of 100 million every moment. During the way toward parting and restoration of cells, human-cells discharge electromagnetic (EM) waves consistently. It happens because the cell body contains a charged core and negatively charged particles that are moving at rapid and evolving never-endingly. These EM waves, produced from the human-body, portrays the

particular state of human's wellbeing conditions. Variety in the sign of EM waves produced by the states of good wellbeing, sub-wellbeing, infections, and so forth [18, 19].

The QRM analyzer is a quick and straightforward technique to check the human wellbeing condition. It breaks down 36 parameters investigated in only sixty seconds. Vitality and attractive recurrence that discharges from the human-body is frail; consequently, one sensor is there in the QRM analyzer to gather the signatures. An implicit enhancement procedure and counts by the chip, input sign are contrasted, and the standard quantum range joined in the framework. The examination is performed utilizing the Fourier methodology and dependent on which investigation and judgment be made on wellbeing conditions and different issues of tried people. QRM analyzer can recognize more than thirty distinct functionalities, for example, Liver capacity, Kidney work, Brain, Heart, Skin, Vitamins, Eye, Gallbladder, glucose, etc. It incorporates both major and minor functionalities alongside fundamental components of the human-body (BMI, BMR, etc.). It tells the general wellbeing state of a person [18, 26].

- **Biopulsar Reflexograph**

The Biopulsar Reflexograph is an estimating gadget utilized for vitality estimations of the human-body that help to produce results as complete physique quality pictures, chakras action, and diagrams of various organs. It takes a shot at the idea that specific pieces of hands or reflex-zone have an association with the organs of the body. Every organ transmits vitality as electromagnetic waves, which subsidizes to the arrangement of human biofield. Biopulsar is dependent on Eastern and Western elective energy and therapeutic sciences. It expresses that the individual reflex-zone close by is not just associated with the body organs and cognizance yet besides with inconspicuous vitality focuses and meridians. In the wake of perusing vitality from every reflex-zone, it changes over the vitality frequencies into shading codes around the body. It creates a human visual picture of biofield. The human-body organs are inter-connected with different pieces of the cerebrum, which resounds certain feelings and manner of thinking. It causes an individual to recognize different sorts of scatters, sickness, and indications and can use to comprehend the intensity of contemplations and inter-connection with the body [18, 19, 23].

III. Proposed Methodology

In this research, a new colorspace model has been introduced to provide a novel solution for the problem, as mentioned earlier. As discussed in the literature review, related issues associated with each of them, there is a need for a better approach in this field. Hence, this research comes up with an innovative method for the visualization of Human Biofield. This method deals with an RGB color image captured via the digital camera in a controlled environment. Various study shows that a digital camera captures the electromagnetic spectrum while capturing an image. Still, due to the limitation of human perception, one can see the visible spectrum as an image, whereas other energies seem to be invisible. It happens because the frequency of surrounding energy is too low, which cannot be seen through naked eyes [24]. Therefore, robust technical processing is required, on captured images, to visualize this energy for its better understanding. Thus, the focus of this analysis is to convert this invisible bio-energy to the visible one.

Present work focuses on designing of image processing technique or algorithm that will help in converting a digital image into aura-image. This aura-image will represent various energy changes around an individual in the form of multiple colors. Each color is then interpreted, based on the previous study, to give an outcome report indicating the current physical and psychological status of an individual [19, 24].

Figure 3, shown below, indicates the underlying architecture of the proposed methodology for the current research. The execution is deliberated in three phases. The first phase is an initial aura-capturing phase, in which one task is performed. In the capture image frame task, an individual snap is captured using a digital camera without a flashlight. The pixel quality of the camera should be higher than five megapixels.
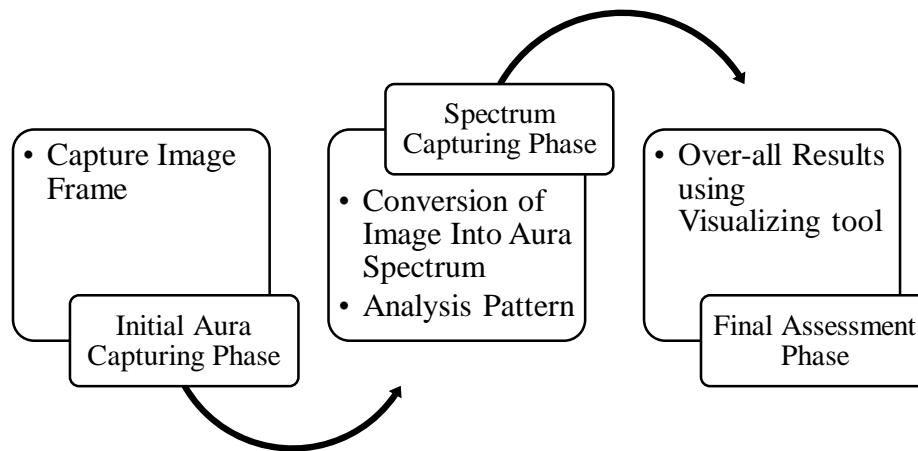
Figure 3 Basic Architecture of Proposed Method

The second phase is the spectrum-capturing phase, where two tasks are performed. In this phase, the snap of that individual is converted into a visible aura spectrum. This conversion is performed by utilizing image processing techniques. The output of the aura spectrum is taken as an input that is further used for analysis purposes.

The third phase is the Final Assessment Phase. In this phase, Aura Visualizer shows the diagnosis results of that individual by utilizing some analytical and visualizing tools.

The working of the spectrum capturing phase is further divided into three phases, elaborated working diagram is shown in figure-4. In the first phase, the individual snap is obtained using any digital camera. In the second phase, identification of aura regions of the captured image frame is executed, and in the third phase, the aura is captured for analysis.

After the setup of the aura capturing environment, a digital camera captures the individual's image, which is used further in the identification phase. This RGB image is used for the identification of pixels frequency. Whenever we want to access the geometrical characteristics of an image, pixel frequency identification is used.
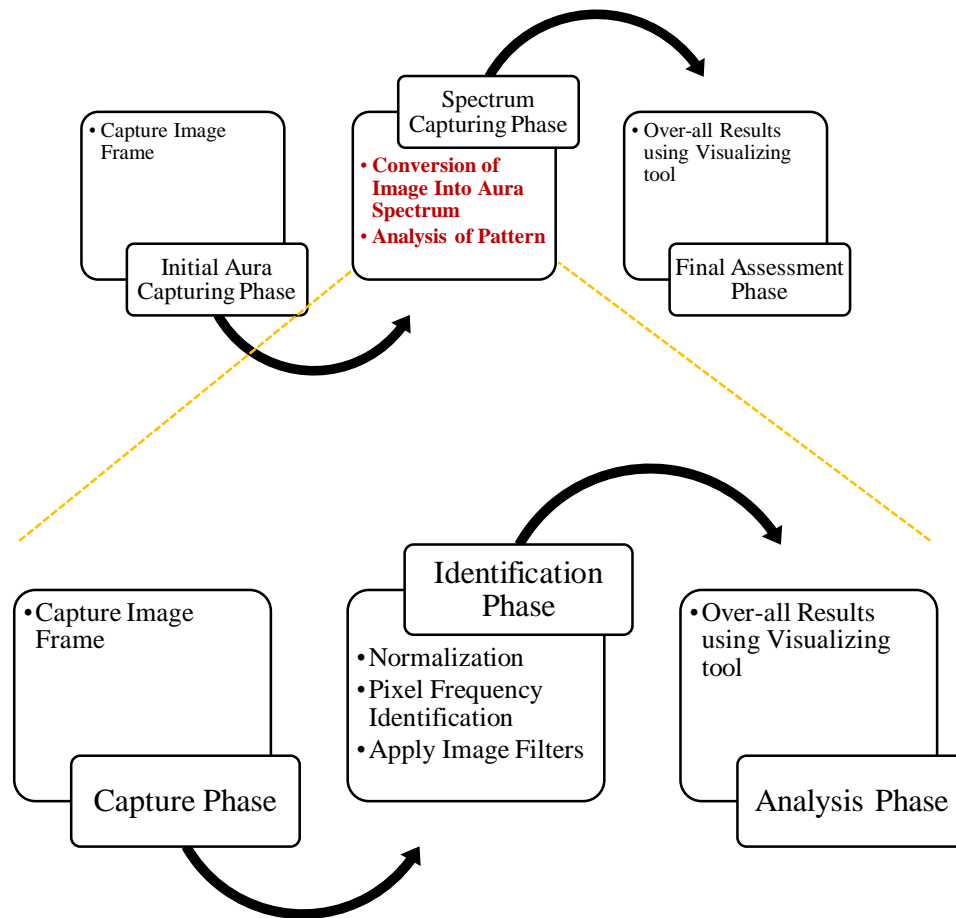
Figure 4 Elaborative methodology of the approach

After determining frequency, the next task is to perform the mapping between determined pixel frequency and electromagnetic range, i.e., trying to find out the pixel frequency that best matches with the electromagnetic spectrum. In the end, the algorithm determines an electromagnetic spectrum every pixel of an image and allocate the desired colors to each pixel. In the analysis phase, based on the colors obtained, interpretations will be performed that will be further used for medical purposes [36-42].

Algorithm

In this section, a systematic explanation is mentioned to provide a solution for the given problem. This methodology includes the image processing technique to obtain the outcome. Further, to validate and verify the result acquired, a comparative analysis of an individual, including medical examination, with existing solutions or techniques has been executed. The following are the steps required to solve the given problem statement.

Step- I: Original Input Image (captured in the static environment)

The image captured in a controlled environment setup. To obtain the picture, one can make use of a digital camera of 5-mega pixel to 10-mega pixel. The background wall should either be pure black (absorbs all the colors) or be pure white (reflects all the colors). Tripod stand with a camera, to capture the image, should be at the distance of 2.25mts, and an individual must be at the gap of 25cm from the wall. An individual must not carry any electronic gadget and not wearing any metallic or non-metallic substances. An individual is recommended to wear a solid white-colored dress. There should not be any electric or electrical devices near to the capturing area and also surrounding should be free from any kind of networking devices. It is because to avoid signal interference. The image should be captured in

white light, but there should not be any sunlight or natural light, causing shadowing effects on the background wall [24].

Step- II: Conversion of colored image into Grayscale image

Under this computation, the original image captured in RGB format is converted into a Grayscale image. This computation is performed to reduce the computation, as computations on RGB images are very complex. Therefore to reduce this complexity, the grayscale conversion is performed. There are various ways to convert an image into grayscale; hence, one can use any of those methods. Here following formulae are used:

gray[x][y]= int (round(0.2989 * rgb[x][y][0] + 0.5870 * rgb[x][y][1] + 0.1140 * rgb[x][y][2]))

As mentioned in the previous section (literature survey), while working with either 24-bit or 32-bit colored images, one can use the same method for the conversion.

Step-III: Image enhancement

In this step, the removal of white noise and balancing of contrast and brightness of the image is performed. Initially, a local copy of the input image is generated, and the histogram of the grayscale image will be computed. Secondly, computation is performed to identify the cumulative histogram. At the final step, lower and the upper bound is evaluated for the enhancement of the image, and histogram stretching is performed to get the final normalized image.

Step- IV: Feature Extraction and Chakra Representation

During this process image, features are extracted, and the Haar Cascade classifier using the Adaboost technique is used to represent chakras (all seven chakras) - the outcome is shown in the result section. Seven Chakras, named as a crown-chakra, third eye-chakra, throat-chakra, heart-chakra, sacral-chakra, solar-chakra, and root-chakra, are responsible for balancing human well-being and stabilizing an individual's mental process.

Table 3 shows the relationship between Chakras, their associated glands, and hormone functions

Name of Chakra	Endocrine Glands	Hormones	General Gland & Hormone function
Crown-Chakra	Pineal- gland	Serotonin, Melatonin	Regulates diurnal rhythms; adrenal functions
Third Eye-Chakra	Pituitary-gland	Control hormones: ACTH, TSH, FSH, LH & PRL, STH	Master gland: regulates the activity of several endocrine glands
Throat-Chakra	Thyroid/ parathyroid-gland	Thyroxin, Calcitonin/ Parathormone	Regulates general rate of metabolism
Heart-Chakra	Thymus-gland	Thymosines	Regulates immune system and defends against infections
Solar Plexus-Chakra	Pancreas-gland	Insulin, Glucagon	Regulates glucose to produce and maintain stores of energy
Sacral-Chakra	Gonads/ Ovaries	Testosterone, Oestrogen, Progesterone	Regulates sexual hormones
Root-Chakra	Adrenals-glands	Aldosterone, Adrenaline, Cortisone	Regulates water balance in the body, response to stress, metabolism, the immune system, and influences digestion and urinary system

Table 3, shown above, indicates the major seven chakras of human being and associated glands and their hormone functions. When there are energy level changes, the organs associated with respective chakras get affected, and hormone functions get disturbed. The misbalanced or disturbance in energies took place due to the life activities performed by an individual.

Step- V: Generation of new colorspace (Aura Visualizer Algorithm)

In this process, a new colorspace is a design for the visualization of aura-colors. As mentioned in the previous section, the aura energy field is an invisible layer around the human body; hence, to visualize the same, a new color model is required. The systematic steps for the computation of the aura image are mentioned below.

Because the gray image has only 256-color values, build the new color space accordingly. As 0-72 gray image pixels are pure black, pixel values beyond 240 are pure white, whereas pixel value between 73 and 240 shows the grayscale variations. Hence, keeping that into consideration following computations are used.

1. when the gray value is lower than 72, set the new color values to following value, i.e.,

    aura_color((x - 1) * 6 + y , :) = [0, 0, 35];

    aura_color(x * 6 + y, :) = [x * 10, 0, 0];

    aura_color((x + 1) * 6 + y, :) = [1, 0, 35];

    aura_color((x + 2) * 6 + y, :) = [x * 20, 0, x * 20];

    aura_color((x + 3) * 6 + y, :) = [x * 10, x * 5, x * 5];

    aura_color((x + 4) * 6 + y, :) = [x * 10, 0, x * 4];

y = 1,6

      when value is 1~6, color is Blue (eg.[0, 0, 35]), when value is 7~12, color is Red (eg.[x * 10, 0, 0]) and similarly other values will be evaluated.

2. when the gray value is larger than 240, set the new color values to following value, i.e.,

    aura_color((x-1) * 6 + y, :) = [0, x * 10, 30];

    aura_color(x * 6 + y, :) = [0, x * 10, 30];

    aura_color((x + 1) * 6 + y, :) = [0, x * 10, 30];

    aura_color((x + 2) * 6 + y, :) = [x * 10, 0, 0];

    aura_color((x + 3) * 6 + y, :) = [x * 10, 0, 0];

    aura_color((x + 4) * 6 + y, :) = [x * 10, 0, 0];

y = 1,6

      when value is 241~246, color is Green (eg.[0, x * 10, 30]), when value is 247~252, color is Green (eg.[0, x * 10, 30]), when value is larger than 253, color is Red (eg.[x * 10, 0, 0])

      where x >= 240.

3. when the gray value is 73~240, set the new color values to following value, i.e.,

    aura_color((x - 1) * 6 +y, :) = [0, 0, x * 6];

    aura_color(x * 6 + y, :) = [0, x * 6, x * 6];

    aura_color((x + 1) * 6 + y, :) = [0, x *6, 0];

    aura_color((x + 2) * 6 + y, :) = [x * 6, x * 6 , 0];

    aura_color((x + 3) * 6 + y, :) = [x * 6 , 0, x * 6];

    aura_color((x + 4) * 6 + y, :) = [x * 6, 0, 0];

y = 1,6

Thus, obtain the colors with the period of 36 but the period color is more strong color value when x value is increase. At the final step, mix the origin image and the new color values according to the gray image.

      for n = 1:wid

for n1 = 1: hei

InputIMG(n, n1,1) = int16((InputIMG(n, n1, 1) + aura_color(grayIMG(n, n1) + 1, 1)) / 1.2);

InputIMG(n, n1, 2) = int16((InputIMG(n, n1, 2) + aura_color(grayIMG(n, n1) + 1, 2)) / 1.2);

InputIMG(n, n1, 3) = int16((InputIMG(n, n1, 3) + aura_color(grayIMG(n, n1) + 1, 3)) / 1.2);

    end

end

Here RGB colorspace is used to represent aura-colors based on the pixel values obtained after the above computations. RGB code has a 24-bit format that serves 0 to 7 as blue, 8 to 15 as green, and 16 to 23 as red values. Hence, based on the energy frequencies obtained, RGB and their respective variations of colors have been assigned accordingly. Outcomes have been discussed in the upcoming section.

Step- VI: Representation of Aura Colors and Its interpretation results

In this process, colors obtained at different chakras have been represented in the form of a pie chart. The pixel values obtained at every chakra indicates the physical and mental status of an individual. Hence, the report has been generated, indicating the details about the current well-being status of the person. Every chakra has its meaning, functioning (both physical and mental) attached, and interpretations are made as per the table-4 given below [27, 28, 29]. These interpretations of chakras are obtained during previous researches in this field [28, 29].

Table 4 Chakras and related psychological and physical functioning effects

Name of Chakra	Location	Color	Emotions	Psychological Functions			Physical Dysfunction
				Deficient	**Balanced**	**Excessive**	
Crown	Top of head	White/ Violet	Bliss, Spirituality	Lack of creativity, Indecisive, lack of joy	No fear of death, miracle worker, open to the divine.	You are frustrated, Depressive, migraines, manic.	Depression, Mental Illness, Neural confusion.
Third Eye	Between Eyebrows	Indigo	Imagination, Intuitions	Undisciplined, afraid of success, oversensitive	Non-material, no fear, total vision, master of oneself.	Egoistic, arrogant, manipulative.	Blindness, vision, headaches, earaches, migraines, fear, sleep disorder.
Throat	Centre base of the neck	Blue	Self-expression, Healing	Unable to express thoughts, unreliable, manipulative	Excellent speaker, artistic, live in the now, centered.	Will force opinions on others, arrogant, talks excessively	Thyroid, flu, fevers, infections, itching, toothache, speech disorder, PMS, mood swings, Tonsillitis.
Heart	Centre of chest	Green	Balance, love	Feels unloved, afraid of	Unconditional love,	Very critical, mood swings, tense,	High blood pressure, Passiveness,

				letting go, sorry for oneself	emotionally balanced	demanding, depressive.	Asthma, breathing problems, tension in muscles, various issues related to heart, chest infections
Solar Plexus	Below sternum and above the navel	Yellow	Purpose, self-definition	Lack of personal energy, confusion, insecurity	Joyful, good, self-esteemed, multi-skilled, relaxed	Workaholic, too intellectual, resents authority.	Ulcers, diabetes, Hepatitis, blood sugar disorders, Constipation, Jaundice, poor memory.
Sacral	Between the navel and above genitals	Orange	Emotions, Desires	Very shy, un-trusting, buries emotions, sexual guilt	Creative, friendly, concerns for others	Aggressive, self-serving, manipulative,	Eating disorders, Drug use, Allergies, Uterine problem, Impotence, Depression
Root	Base of Spine	Red	Passions, self-preservations	Low sex drive, feel insecure, lack of self-esteemed	Master of oneself, limitless energy, grounded	Egoistic, selfish, dominating.	Anemia, Fatigue, Bladder infection, numbness, obesity, body temperature, rebuilds blood cells, and hemoglobin.

In addition to this, when chakras get imbalanced, different energies released from the human body are of different frequencies, which will produce variation colors around the body. Further, each color has its meaning that indicates the well-being or the status of an individual. These color interpretations have been identified in the past decades. Table-5 shown below highlights some of the color interpretations [27, 28, 29]. By using the following data, the present research is carried out, and outcomes have been decided.

Table 5 Aura Color Interpretations

S. No.	Region	Name of the Color	Interpretation/Meaning
1	Head	White	Direct Connection with God or whoever you believe in.
		Violet, Muddy/Dirty Violet	Very spiritual, great speaker, writer, or leader. Living in the future, not in the present, learning disabilities, sleep problems
		Blue/Turquoise Blue/ Muddy Blue/ Dirty Blue	They may not know what it is yet, but they have always known that they will do a lot in this lifetime/Growing more in their spirituality/ Opening up to new Spiritual beliefs/ Self-critical/Distrustful, over-ambitious, domineering
		Indigo/Dirty Indigo	Very intuitive, has a higher vision of life and how the Soul evolves/ Conflicted thoughts, addictive

			personality, food sensitivities causing scattered thoughts
		Muddy Brown	Negative Thoughts
		Green	Lives in balance and harmony with their Spirituality and with all things. Feels their beliefs are right for them about God and the Universe. Peaceful.
		Yellow	Overly analytical, overthinking, can't seem to shut the mind off, would find it hard to meditate due to too many thoughts. He/She Likes to learn and take classes.
		Light Orange/ Orange/ Muddy Orange/ Dirty Orange	Depression/ Creative, Out-going, Social, Enthusiastic/ Lacks creativity, anti-social, withdrawn, living in the past, possible headaches/ Negative thoughts, moody, manipulative
		Red	Passionate
		Gray	Lower consciousness probably does not believe in God. Possible dehydration, possible stroke, may have the illness, lack of oxygen to the brain, maybe Alzheimer's. Ask if the person has had seizures.
2	Arms and Upper Legs	White/Pink	They want to escape from life. They may be contemplating suicide.
		Violet/Muddy Violet/Dirty Violet	Quite Spiritual whether they believe it or not/ Daydreamer, no clarity – not certain what they believe in/ Feels superior to others
		Indigo/Muddy Indigo/Dirty Indigo	Wants to move forward more on an intuitive level. Essential to use their intuition more/Sacrifices for others/Conflicting thoughts about moving forward.
		Blue/Dirty blue/muddy blue	Time to bring knowledge and wisdom forward/ Natural Healer/ May have picked up negative energy from others or are being negative about moving forward
		Yellow/Dirty yellow/Muddy yellow	Thinking about what they want to do in life and how they can move forward/ Lacking clarity/confidence/ Thinking only of themselves when moving forward
		Orange/Dirty Orange/Muddy Orange	Move forward on a creative level/ Moody/ Lacking clarity
		Red/Muddy Red/Dirty Red	Passion, energy, vitality/ Feeling angry/ Feeling discouraged/frustrated
			If there are multiple colors on the arms except for blue and green, then there is probably a pain in the arms, shoulders, or leg area.

3	General vitality of your organs and glands. Immune System.	White, Pink, Violet or Indigo	The immune system has just started to overwork. Check if they have any health challenges. Ask about immune disorder diseases such as Lupus, Lymes Disease, Cancer, etc.
		Turquoise Blue/ Green	Immune System healthy
		Yellow, Orange, Red or Gray	The immune system has been challenged for some time. May relate to chronic illness.
4	Heart	Yellow, Orange, Red or Grey	Heart, lungs, or both are not functioning correctly. It would probably be a more long-term illness. Here is where I would see lung disease, heart disease, breast cancer.
		Grey	The heart is shut down. In heart and lung area - grief
		Red	Anger in relationships. May have not forgiven yet and are probably not ready to forgive. It is perhaps something that has happened more recently.
		Orange	They have been hurt in a relationship. They have not forgiven the person that hurt them.
		Yellow	Protecting their hearts. They do not want to be hurt again.
		Blue and Green	Organs are functioning well. Colors you would want to see. They are loving, giving, and caring people. They have a good relationship with themselves and those around them.
		Indigo	Gets to know people on a heart to heat basis, soul to soul basis. Gets to know who they are. Honors their soul.
		Violet	Coming into the heart area, no breaks. Maybe someone is coming into your life that may be addicted. Could be someone you know, could be your addiction or it could be someone that you will meet soon. Be cautious about this person. Meets people heart to heart or soul to soul
		Pink	Love for humanity and animals
		White	Feeling overwhelmed. May be giving more than they are receiving in love.
		White, Pink, Violet, indigo	Heart and Lungs are overworking – not a good sign. Heart – may have heart problems. Check with Dr. Lungs – Ask if they are a smoker or have ever smoked. If no, ask if they have been around a wood bring stove, fireplace or whatever, Also ask if they have mold allergies.

5	Eyes	White	You see the world through God's eyes. You try not to judge others. You might still judge, but you decide not to. Seeing people as they indeed are without judgment.
		Pink	You see the world through a love for humanity
		Violet/ Indigo	You can psychically see. It means that you might see auras or colors; you might get psychic visions or prophetic dreams. You may be able to read people when you first meet them.
		White, Pink, Violet, Indigo	Eyes are just starting to feel stressed. Suggest getting an eye test done. Ask if they are sensitive to the sunlight. They may need to wear sunglasses.
		Blue & Green	You see things through balanced eyes, meaning that not too many people can pull the wood over your eyes. You can usually see people for who they are. Also, your eyesight is good.
		Yellow	You question other people's motives. Wondering what they want. Questioning the world around you. Curious about how things work, etc.
		Orange	You see things through creative eyes. You have a creative eye and probably have artistic skills of some sort.
		Red	You see things through angry or frustrated eyes right now. Something recent probably has upset you, and you haven't quite resolved it.
		Gray	You don't want to see anything that's going on in your life. Or the world around you. Probably your eyesight is wholly inadequate as well.
		Yellow, Orange, Red, Gray	Again I would suggest getting the clients' eyes checked. This problem has been going on for more long-term, so they may be vision problems and may need glasses.
6	Mouth	White	You speak God's words. You talk to people on a higher level. You probably talk more about spirituality.
		Pink	You speak about humanitarian issues that are close to your heart.
		Violet	You speak about your spiritual beliefs
		Indigo	You speak more on an intuitive level
		Blue	You speak the truth
		Green	You speak more about environmental issues.

		Yellow	You would speak more about knowledge, things that you have learned, the courses that you have taken.
		Orange	You speak more about your emotions
		Red	You would speak with passion about the things that you love. Great Motivational speaker. It could also be an infection.
		Gray	Probably does not speak of anything as afraid they will get into trouble or will not be heard or might hurt someone's feelings.
7	Throat	White	You talk about God's love and what you believe about God.
		Pink	You would speak about Universal Love
		Violet	You would speak about your spirituality
		Indigo	You would speak what you felt intuitively
		Blue/periwinkle blue	You would speak your truth. You would probably do the writing of some form as you would be an excellent writer/You would talk about your knowledge and wisdom. Also, you could write about this knowledge and understanding.
		Green	You would speak more about the environment. You would also think before you speak and choose your words wisely so as not to offend anyone.
		Yellow	You would speak more about yourself and your interests. We might have a hard time listening to what other people are talking about as you are thinking about your response.
		Orange	You swallow your feelings and probably don't speak your true feelings. You don't want to hurt other people, therefore consume rather than say what you think
		Red	There are angry words that stuck into your throat. I would suggest that they are just writing down what they would like to say, burn it, ask God or the Universe to deal with it. That way, it is out of their throat and dealt with.
		Gray	Their throat is closed. They do not feel that they are being heard or feel like they can speak their true feelings. They feel like the words stuck into their throat with no outlet. Again, I would suggest writing it down, etc.

Using the above interpretations, one can identify the well-being of an individual. To cross-validate the results, many types of research take help from psychiatrists along with the medical examination of an individual [30-32]. Since minimal analysis is being carried out in this field, one cannot blindly use these interpretations. These outcomes can be used as a supporting document to indicate his/her state of body and mind. Futuristic advancements in this area of research will bring remarkable changes in medical and other related fields.

IV. Results and Discussion

The algorithm discussed in the previous section gives out human-aura visualization along with its final interpretations. The algorithm is applied to the random population; some of the outcomes are discussed and shown below. Figure number 5 to 9 shows the precise result of the algorithm, and the final report, interpretations, are made based on the colors obtained.

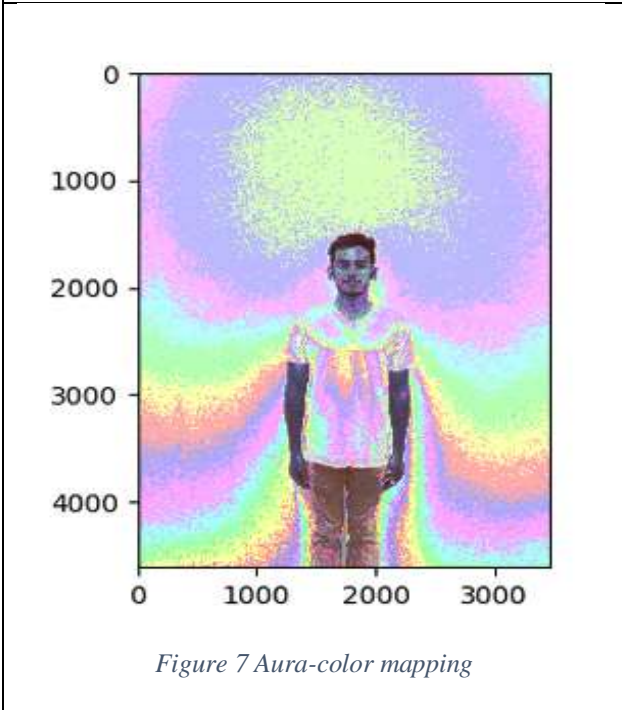*Figure 5 Original Image*
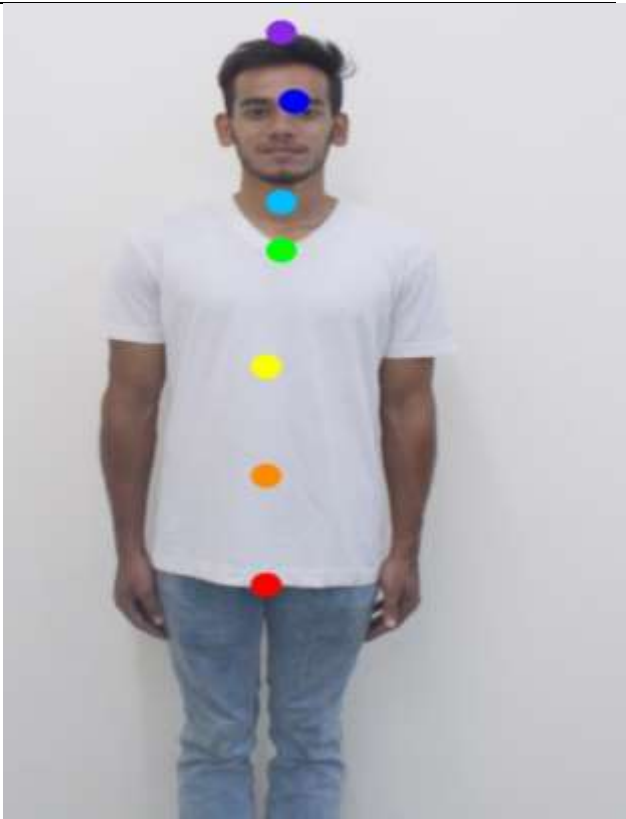
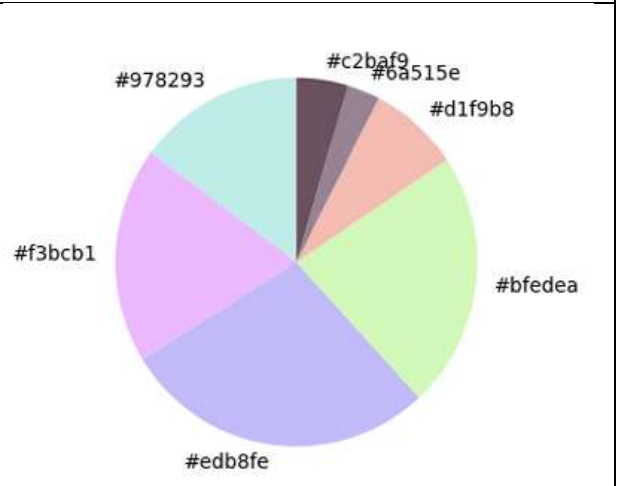*Figure 6 Chakra Representation*

Figure 7 Aura-color mapping

Figure 8 Aura-colors pie-chart representation

Figure 9 Human-aura final Image

Interpretations:

1. Unconditional love for humanity, feeling supported by other people.
2. Motivational speaker, speaks about love
3. Love for humans and animals
4. Eyes and ears are working well. You are a good listener
5. The immune system is weak.

These interpretations are made based on the colors obtained around the human body. After the analysis of human aura colors, a person is suggested dos and don'ts.

As this individual is having a problem with immunity, he is advised to work on it. Rest, everything is working fine.

The algorithm is further applied to various individuals, approx. 60, for experimentation. The algorithm was used on the randomly selected population without any prior examination. The images captured in the static environment and then aura images were obtained. The final report generated by the proposed method was shared with the concerned people. Further, to validate and verify the results obtained, the number of steps have been taken. Firstly, the same person is allowed to undergo the examination with other existing methods and instruments: Bio-pulsar Reflexograph, Quantum Magnetic Resonance (QMR), and manual analysis. Secondly, to verify the outcome, a medical examination followed by one-to-one interrogation was performed. After performing all the possible validation and verification methods, results were compared between existing practices and the proposed technique. On comparing, it has been observed that the accuracy of the proposed method is approximately 88%, as shown in figure 10 below, based on mean values.
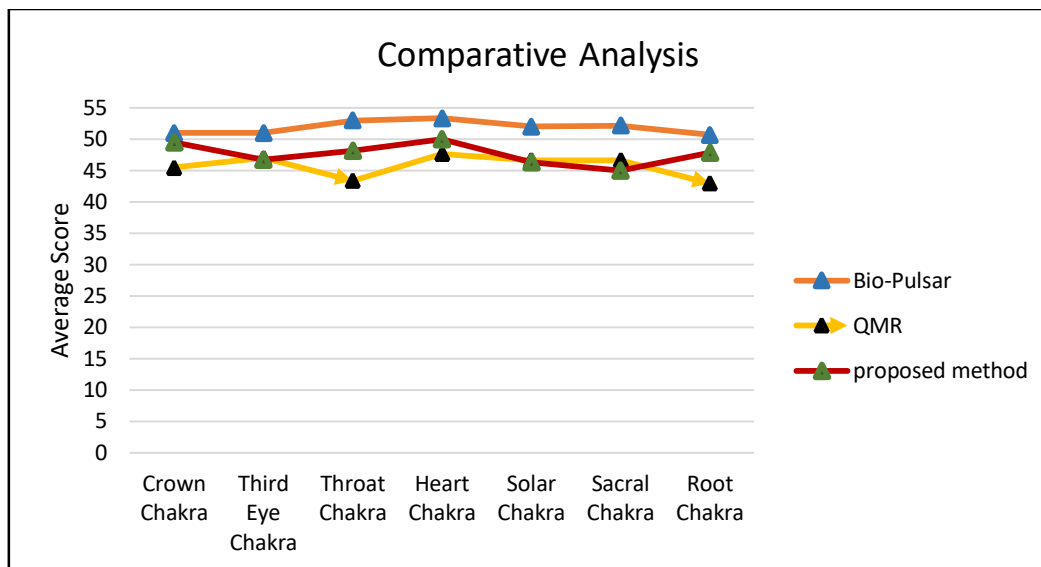
Figure 10 showing the comparison between existing methods and the proposed method.

This research brings out the fact that biofield examination can be used for the medical status prediction of a living being. It reflects both mental and physical condition about the humans, and by examining human-aura colors, one can know the status well in advance. Hence, this can be used as supporting evidence or documents in the medical field [33, 36-42]. This research uses the image-processing method, which is again a cost-effective way, with less intervention of hardware. Figure-11 shown below shows the comparative analysis based on accuracy percentage.
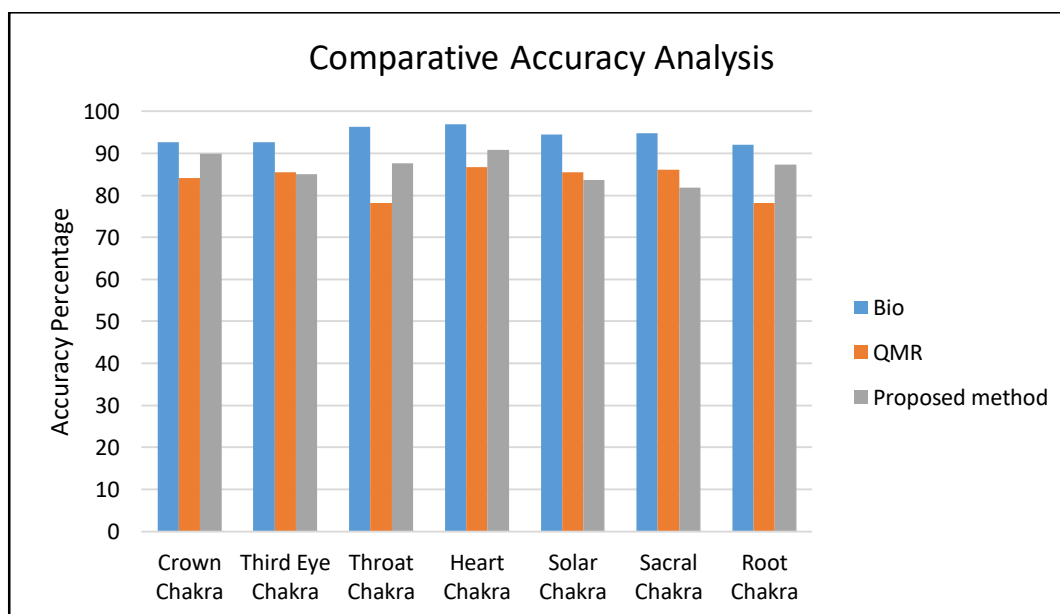

Figure 11 Comparative analysis based on accuracy percentage

Future of Biofield: Enhancements and Applications

The current research highlights a technique to visualize the human biofield by using the image-processing method. The present study opens up various gateways to new technologies and research opportunities [33]. The present work done is at the beginning stage and needs to be enhanced in the future. Current work has been conducted under a static

environment, which can be expanded to a dynamic environment approach. Further, this work has been done with 2D images; hence it can be extended to 3D images and towards video processing as well. Many other enhancements are possible by using some advanced techniques of Artificial Intelligence and Machine learning [34. 35].

The human biofield analysis can be used in various applications of healthcare informatics, human health management, human identification as a new biometric trait, and many more. Further, wearable technologies can be designed to monitor human's biofield live for various purposes. Not only in terms of technologies, but also in terms of management biofield analysis can be used like employee's progress analysis, stress management, relationship management, skills management, self-development analysis, and so on. Thus, studying human biofield and their report will bring an incredible revolution in the field of science and technology [33, 35].

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