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Filing Date :NA

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(57) Abstract :
The invention introduces a state-of-the-art system for biomedical image feature extraction. By integrating artificial intelligence, this system is tailored to automatically identify and extract salient features across various medical imaging modalities. Unique in its design, the system offers self-learning capabilities, allowing it to refine its methods based on continuous input and feedback. Further, it seamlessly integrates with electronic health records, ensuring comprehensive feature extraction based on both imaging and patient historical data. Cross-modality consistency, real-time processing, cloud-based functionalities, and robust data privacy measures further enhance its applicability and relevance in contemporary medical diagnostics. Accompanied Drawing [FIGS. 1-2]

No. of Pages : 19 No. of Claims : 10

"**FORM 1** THE PATENTS ACT 1970 (39 of 1970) and THE PATENTS RULES, 2003 **APPLICATION FOR GRANT OF PATENT** (See section 7, 54 and 135 and sub-rule (1) of rule 20)				(FOR OFFICE USE ONLY)	
		Application No.			
		Filing date:			
		Amount of Fee paid:			
		CBR No:			
		Signature:			
1. APPLICANT'S REFERENCE / IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)					
2. TYPE OF APPLICATION [Please tick (✓) at the appropriate category]					
Ordinary (✓)		Convention ( )		PCT-NP ( )	
Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )	Divisional ( )	Patent of Addition ( )
3A. APPLICANT(S)					
Name in Full		Nationality	Country of Residence	Address of the Applicant	
Andhra University		Indian	India	Visakhapatnam, Andhra Pradesh, India. Pin Code: 530003	
3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]					
Natural Person ()		Other than Natural Person			
		Small Entity (✓)	Startup ()	Others ()	
4. INVENTOR(S) [Please tick (✓) at the appropriate category]					
Are all the inventor(s) same as the applicant(s) named above?		Yes ()		No (✓)	
If "No", furnish the details of the inventor(s)					
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3. Mr. Rajendra Prasad Banavathu	Indian	India	Research Scholar, Department of CS & SE, Andhra University, Visakhapatnam, Andhra Pradesh, India. Pin Code: 530003
4. Mr.K. Joseph Noel	Indian	India	Associate Professor, Department of Mechanical Engineering, Wellfare Institute of Science, Technology & Management (WISTM), Pinagadi, Pendurthy, Visakhapatnam, Andhra Pradesh, India. Pin Code: 531173
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5. TITLE OF THE INVENTION		
"A SYSTEM AND METHOD FOR BIOMEDICAL IMAGE FEATURE EXTRACTION"		
6. AUTHORISED REGISTERED PATENT AGENT(S)	IN/PA No.	
	Name	
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~~**8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION**~~		

~~COUNTRY, PARTICULARS OF CONVENTION APPLICATION~~

~~Country~~	~~Application Number~~	~~Filing date~~	~~Name of the applicant~~	~~Title of the invention~~	~~IPC (as classified in the convention country)~~

~~9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY (PCT)~~

~~International application number~~	~~International filing date~~

~~10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST) APPLICATION~~

~~Original (first) application No.~~	~~Date of filing of original (first) application~~

~~11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT~~

~~Main application/patent No.~~	~~Date of filing of main application~~

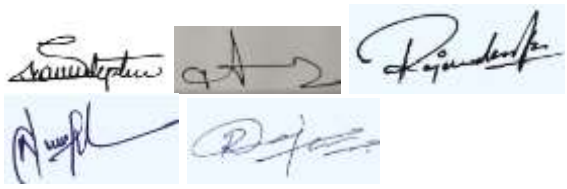
12. DECLARATIONS

i) Declaration by the inventor(s)

(**In case the applicant is an assignee**: the inventor(s) may sign herein below or the applicant may upload the assignment or enclose the assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period).

I/We, the above named inventor(s) is/are the true & first inventor(s) for this Invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date 25/08/2023

(b) Name	(c) Signature
1. Prof. James Stephen Meka 2. Prof.Augustine Tarala 3. Mr. Rajendra Prasad Banavathu 4. Mr.K. Joseph Noel 5. Mr.K.Raj Kumar	

~~(ii) Declaration by the applicant(s) in the convention country~~

~~(In case the applicant in India is different than the applicant in the convention country:~~ ~~the applicant in the convention country may sign herein below or applicant in India may upload the assignment from the applicant in the convention country or enclose the said assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period)~~

~~I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.~~

~~(a) Date~~

~~(b) Signature(s)~~

(c) ~~Name(s) of the signatory~~

(iii) Declaration by the applicant(s)

I/We the applicant(s) hereby declare(s) that: -

- ☐ ~~I am/~~ We are in possession of the above-mentioned invention.
- ☐ The ~~provisional~~/complete specification relating to the invention is filed with this application.
- ☐ ~~The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by me/us before the grant of patent to me/us.~~
- ☐ There is no lawful ground of objection(s) to the grant of the Patent to me/us.
- ☐ ~~I am~~/we are the true & first inventor(s).
- ☐ ~~I am/we are the assignee or legal representative of true & first inventor(s).~~
- ☐ ~~The application or each of the applications, particulars of which are given in Paragraph-8, was the first application in convention country/countries in respect of my/our invention(s).~~
- ☐ ~~I/We claim the priority from the above mentioned application(s) filed in convention country/countries and state that no application for protection in respect of the invention had been made in a convention country before that date by me/us or by any person from which I/We derive the title.~~
- ☐ ~~My/our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph-9.~~
- ☐ ~~The application is divided out of my /our application particulars of which is given inParagraph-10 and pray that this application may be treated as deemed to have been filed on DD/MM/YYYY under section 16 of the Act.~~
- ☐ ~~The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph-11.~~

13. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION

(a) Form 2

Item	Details	Fee	Remarks
Complete/ ~~Provisional~~ specification) #	No. of pages: 15		
No. of Claim(s)	No. of claims: 10 No. of pages: 02		
Abstract	No. of pages: 01		
No. of Drawing(s)	No. of drawings: 02		

	No. of pages: 01		

In case of a complete specification, if the applicant desires to adopt the drawings filed with his provisional specification as the drawings or part of the drawings for the complete specification under rule 13(4), the number of such pages filed with the provisional specification are required to be mentioned here.

(b) Complete specification (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).

(c) Sequence listing in electronic form

(d) Drawings (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).

(e) Priority document(s) or a request to retrieve the priority document(s) from DAS (Digital Access Service) if the applicant had already requested the office of first filing to make the priority document(s) available to DAS.

(f) Translation of priority document/Specification/International Search Report/International Preliminary Report on Patentability.

(g) Statement and Undertaking on Form 3

(h) Declaration of Inventorship on Form 5

(i)Power of Authority

(j)**Total fee ₹…….in Cash/ Banker's Cheque /Bank Draft bearing No..... Date on ……. Bank.**

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters slated herein are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this 25th day of August 2023

Applicant: Andhra University

To,

The Controller of Patents

The Patent Office, at Chennai

Note: -

* Repeat boxes in case of more than one entry.
* To be signed by the applicant(s) or by authorized registered patent agent otherwise where mentioned.
* Tick ()/cross (x) whichever is applicable/not applicable in declaration in paragraph-12.
* Name of the inventor and applicant should be given in full, family name in the beginning.
* Strike out the portion which is/are not applicable.
* For fee: See First Schedule";

FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

&

The Patent Rules, 2003

COMPLETE SPECIFICATION

(See section 10 and rule 13)

TITLE OF THE INVENTION

"A SYSTEM AND METHOD FOR BIOMEDICAL IMAGE FEATURE EXTRACTION"

Applicant

NAME	**NATIONALITY**	**ADDRESS**
Andhra University	Indian	Visakhapatnam, Andhra Pradesh, India. Pin Code: 530003

The following specification particularly describes the nature of the invention and the manner in which it is performed:

FIELD OF THE INVENTION

[001] The present invention generally relates to the domain of medical imaging and diagnostics. More specifically, the invention pertains to a system and method for extracting and analyzing features from biomedical images. This extraction process aims to derive valuable and informative attributes from medical images, which can further be utilized for diagnostic, research, and therapeutic purposes. The system and method can be applied to various forms of biomedical imaging modalities, including but not limited to, Magnetic Resonance Imaging (MRI), Computed Tomography (CT), Positron Emission Tomography (PET), X-ray, Ultrasound, and Optical Coherence Tomography (OCT).

BACKGROUND OF THE INVENTION

[002] The following description provides the information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

[003] Further, the approaches described in this section are approaches that could be pursued, but not necessarily approaches that have been previously conceived or pursued. Therefore, unless otherwise indicated, it should not be assumed that any of the approaches described in this section qualify as prior art merely by virtue of their inclusion in this section.

[004] Medical imaging has seen remarkable advancements over the past few decades, enabling clinicians to visualize the inner workings of the human body in unprecedented detail. From identifying pathologies to guiding surgical interventions, these imaging modalities have become indispensable in modern

medical practice. However, as imaging technologies have evolved, so has the complexity and sheer volume of the data generated. With this surge in data, there arises a critical need to develop methods that can extract pertinent information from these images effectively, ensuring that the subtleties and nuances within the image do not go unnoticed and are accurately interpreted.

[005] Traditionally, the evaluation of biomedical images has been reliant on the expertise of radiologists and clinicians. They visually assess the images, identify abnormal patterns, and make diagnostic decisions. This manual evaluation, while grounded in years of training and experience, can sometimes be subject to oversight, fatigue, and human error. Moreover, some features within the images may be so subtle or intricate that they might be challenging to discern with the naked eye. The need to quantitatively evaluate and characterize these images has, therefore, become more pronounced.

[006] In parallel, with the growth of computational power and the advent of machine learning and artificial intelligence, there has been a burgeoning interest in automating aspects of medical image analysis. The primary objective of such automation is not just to replicate human-like recognition but to uncover patterns and features that might be imperceptible or overlooked during manual assessments. Feature extraction, in this context, refers to the process of identifying and quantifying specific attributes or patterns in an image that are informative or relevant to a given task. The extracted features can provide insights into the underlying anatomy, pathology, or physiological processes and can be used to classify, segment, or predict clinical outcomes.

[007] Despite these technological strides, challenges persist. Many existing systems often require intricate pre-processing steps, might not be generalizable

across different imaging modalities or may not adequately account for the variability inherent in biomedical data. Furthermore, some methods might be computationally intensive, rendering them unsuitable for real-time applications or in settings with limited computational resources.

[008] Therefore, there has been an ongoing quest for a more efficient, robust, and versatile system and method for biomedical image feature extraction that can navigate the intricacies of medical images, streamline the diagnostic process, and harness the full potential of the data at hand. This invention aims to address these challenges and set a new benchmark in the realm of biomedical image analysis.

[009] The ultimate goal of biomedical imaging is not just to capture images but to decipher the stories these images tell about the human body. Every pixel and every contour can reveal insights about the structural and functional aspects of our anatomy. Yet, as the volume and diversity of biomedical images grow, so does the complexity of their interpretation. Traditional systems primarily focus on global features, often missing the intricate details or patterns that might be more informative of the early stages of a disease or a subtle physiological change. As medical interventions become more targeted and personalized, the granularity of understanding these images becomes even more crucial.

[010] Current systems, while technologically advanced, might still operate in silos. For instance, a feature extraction system optimized for MRI might not necessarily perform well with ultrasound images due to the inherent differences in the nature and quality of data captured by these modalities. Cross-modality integration is a significant challenge in the field, as is the customization of these

systems to account for patient-specific variables like age, gender, and medical history.

[011] Moreover, with the rise of telemedicine and globalized healthcare, there's a pressing demand for systems that are not just accurate but also agile. The modern healthcare ecosystem requires feature extraction methods that can seamlessly integrate with electronic health records, offer cloud-based analyses, and provide real-time feedback. Furthermore, as medical data becomes more interconnected, there's an increasing emphasis on ensuring that these systems are compliant with privacy regulations, ensuring that patient data is not just analyzed accurately but also securely.

[012] The integration of artificial intelligence (AI) in medical imaging presents its own set of challenges and opportunities. While AI-driven methods can sift through vast datasets and identify patterns beyond human cognition, they require vast amounts of annotated data for training. In the world of medical imaging, obtaining such labeled data is both time-consuming and expensive. Thus, there's a growing interest in systems that can operate efficiently with limited data or can leverage unsupervised or semi-supervised learning paradigms.

[013] Furthermore, for any AI-driven biomedical feature extraction system to gain traction in the clinical world, it needs to be interpretable. Clinicians and radiologists need to understand the rationale behind the system's findings to make informed decisions. A black-box model, regardless of its accuracy, might find limited acceptance in the medical community due to the high stakes involved in patient care.

[014] Title: Method and System for Medical Image Feature Extraction

Abstract: The patent describes an approach to extract features from medical images using convolutional neural networks. It highlights the use of multiple layers of filters to identify various patterns in the image.

Relevance: Directly related to feature extraction using neural networks.

[015] Title: Adaptive Biomedical Image Analysis System

Abstract: This invention presents an adaptive system that adjusts its feature extraction techniques based on the type of biomedical image provided. It employs a feedback loop to optimize extraction parameters.

Relevance: Highlights adaptability in feature extraction, which can be significant for cross-modality integration.

[016] Title: Method for Real-time Medical Image Processing

Abstract: This patent proposes a method to extract features from medical images in real-time using optimized algorithms that reduce computational requirements.

Relevance: Emphasizes the need for real-time analysis in biomedical image processing.

[017] Title: Automated Biomedical Image Annotation System

Abstract: While the primary focus is on annotating images, this system employs feature extraction to identify regions of interest and label them accordingly.

Relevance: Highlights the link between feature extraction and subsequent image-related tasks like annotation.

[018] Title: Integrated System for Biomedical Image Analysis and Diagnosis

Abstract: This invention integrates feature extraction with diagnostic algorithms to provide an end-to-end solution for clinicians.

Relevance: Connects the dots between feature extraction and direct clinical applications.

[019] In this respect, before explaining at least one object of the invention in detail, it is to be understood that the invention is not limited in its application to the details of set of rules and to the arrangements of the various models set forth in the following description or illustrated in the drawings. The invention is capable of other objects and of being practiced and carried out in various ways, according to the need of that industry. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

[020] These together with other objects of the invention, along with the various features of novelty which characterize the invention, are pointed out with particularity in the disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

SUMMARY OF THE PRESENT INVENTION

[021] The proposed invention presents a novel system and method designed for the extraction of features from biomedical images. Leveraging advancements in both medical imaging and computational technology, this innovation is tailored to distill valuable and informative attributes from a diverse array of medical images. Unlike traditional methods that rely predominantly on the human interpretation of radiologists and clinicians, this system automates the extraction process, ensuring a more comprehensive, precise, and consistent analysis.

[022] Furthermore, it is engineered to address prevalent challenges in the field, such as the need for real-time analysis, cross-modality integration, and the nuances of different patient-specific variables. The integration of artificial intelligence (AI) propels this system to not only replicate human-like recognition but also to uncover intricate patterns that might otherwise be imperceptible. Despite its reliance on AI, a key feature of this invention is its interpretability, ensuring that the medical community can understand and trust its outputs.

[023] Moreover, in response to the current digital age and privacy concerns, the system seamlessly integrates with electronic health records, offers potential cloud-based functionalities, and upholds stringent data privacy standards. Overall, the invention sets forth a groundbreaking approach to harness the full potential of biomedical images, paving the way for enhanced diagnostics, research, and therapeutic strategies.

[024] In this respect, before explaining at least one object of the invention in detail, it is to be understood that the invention is not limited in its application to the details of set of rules and to the arrangements of the various models set forth in the following description or illustrated in the drawings. The invention is capable of other objects and of being practiced and carried out in various ways, according to the need of that industry. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

[025] These together with other objects of the invention, along with the various features of novelty which characterize the invention, are pointed out with particularity in the disclosure. For a better understanding of the invention, its

operating advantages and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[026] When considering the following thorough explanation of the present invention, it will be easier to understand it and other objects than those mentioned above will become evident. Such description refers to the illustrations in the annex, wherein:

[027] FIG. 1, illustrates a general functional working diagram, in accordance with an embodiment of the present invention.

[028] FIG. 2, illustrates a concept of the functional flow diagram, accordance with an embodiment of the present invention.in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[029] The following sections of this article will provide various embodiments of the current invention with references to the accompanying drawings, whereby the reference numbers utilised in the picture correspond to like elements throughout the description. However, this invention is not limited to the embodiment described here and may be embodied in several other ways. Instead, the embodiment is included to ensure that this disclosure is extensive and complete and that individuals of ordinary skill in the art are properly informed of the extent of the invention.

[030] Numerical values and ranges are given for many parts of the implementations discussed in the following thorough discussion. These

numbers and ranges are merely to be used as examples and are not meant to restrict the claims' applicability. A variety of materials are also recognised as fitting for certain aspects of the implementations. These materials should only be used as examples and are not meant to restrict the application of the innovation.

[031] Referring now to the drawings, these are illustrated in FIG. **1**&**2,** The proposed invention provides a revolutionary leap in the realm of biomedical image analysis, addressing the ever-growing need for a precise, robust, and streamlined method for extracting critical features from diverse medical images. As medical imaging technologies continue to advance, producing images of increased depth and detail, the complexity of understanding these images also rises. The heart of this invention lies in its ability to distill this complexity, unveiling insights that would otherwise remain hidden or unobserved.

[032] Drawing inspiration from traditional methods where radiologists and clinicians visually interpret images, this invention automates this analysis, ensuring a consistent and objective examination every time. By harnessing the power of state-of-the-art computational techniques, it can sift through vast amounts of data rapidly, identifying patterns, anomalies, and areas of interest. The system is meticulously engineered to not only handle images from a single modality but to be versatile enough to process images across multiple modalities, from MRIs and CT scans to X-rays and ultrasounds. This cross-modality capability ensures that regardless of the source or type of image, the system can reliably extract relevant features.

[033] However, what truly sets this invention apart is its incorporation of artificial intelligence (AI). Instead of merely relying on predefined algorithms, the system

continually learns and adapts. By processing countless images and possibly receiving feedback, the AI refines its methods, making its feature extraction more accurate over time. This continual learning ensures that as medical imaging evolves or as new diseases emerge, the system remains relevant and effective. Importantly, while many AI systems remain inscrutable "black boxes", this invention prioritizes transparency. Medical professionals can understand and trace the logic behind the extracted features, instilling greater trust in the system's outputs.

[034] But the vision for this invention goes beyond just feature extraction. In an era where healthcare is becoming increasingly digitalized and interconnected, the system is designed with integration in mind. Whether it's connecting with electronic health records to provide a comprehensive patient overview or offering cloud-based functionalities to enable remote analysis, this invention stands at the crossroads of cutting-edge technology and healthcare. Moreover, recognizing the sanctity of patient data, the system embodies the highest standards of data privacy and security. Not only does it meticulously analyze images, but it also ensures that any sensitive or identifying information remains protected at all times.

[035] But beyond its technological prowess, one must also consider the broader implications of such an innovation. In a healthcare landscape where timely and accurate diagnostics can mean the difference between life and death, the system's speed and precision could drastically reduce diagnostic delays. This not only translates to better clinical outcomes but also has the potential to ease the burden on overworked medical professionals, allowing them to focus on patient care rather than the exhaustive analysis of images.

[036] Furthermore, the invention's emphasis on adaptability ensures its longevity and relevance in a rapidly evolving field. As medical imaging continues to advance, introducing newer modalities and higher resolutions, many traditional systems might become obsolete or require extensive overhauls. However, the self-learning nature of this system ensures that it remains attuned to the latest developments, continuously updating its algorithms to provide the most accurate and relevant feature extraction.

[037] The global reach of healthcare also means that medical images are not just limited to high-tech hospitals in urban centers. In remote areas or in settings with limited resources, there might be a dearth of expert radiologists to interpret complex images. Here, the invention's potential for cloud-based functionalities shines brightly. By allowing images to be uploaded and analyzed remotely, it can bridge the expertise gap, ensuring that even patients in the most remote locations have access to top-tier diagnostic insights.

[038] Moreover, the growing emphasis on personalized medicine, where treatments and interventions are tailored to individual patients, requires a deep understanding of patient-specific variables. The system's capability to integrate with electronic health records means that it doesn't just analyze images in isolation. It considers the patient's medical history, genetics, and other relevant data, ensuring that the feature extraction is holistic and individualized.

[039] On the ethical front, the invention's commitment to data privacy cannot be understated. In an age where data breaches and unauthorized access are genuine concerns, the system's robust security protocols ensure that while images are analyzed in depth, the patient's identity and personal information remain sacrosanct.

We Claim:

1. A system for biomedical image feature extraction comprising an artificial intelligence module trained to identify and extract pertinent features from a plurality of biomedical imaging modalities.
2. The system of claim 1, wherein the artificial intelligence module utilizes a self-learning algorithm that refines its feature extraction methods based on continuous feedback and new data inputs.
3. The system of claim 1, wherein the system is integrated with electronic health records, allowing for the extraction of features based on both image data and historical patient data.
4. The system of claim 1, wherein it includes a cross-modality integration feature, allowing for consistent feature extraction across different imaging modalities such as MRI, CT scans, ultrasounds, and X-rays.
5. A method for extracting features from biomedical images, said method comprising the steps of inputting the image into the system of claim 1, processing the image using the artificial intelligence module, and outputting a detailed report of extracted features.
6. The system of claim 1, wherein it incorporates a cloud-based functionality, allowing for remote uploading, processing, and analysis of biomedical images.
7. The system of claim 1, equipped with stringent data privacy protocols ensuring that extracted features and associated patient data remain secure and protected from unauthorized access.
8. A method for real-time biomedical image feature extraction using the system of claim 1, wherein images are processed immediately upon being uploaded, delivering rapid results to medical professionals.

9. The system of claim 1, wherein the artificial intelligence module includes an interpretable AI component, allowing users to trace and understand the rationale behind each extracted feature.

10. The system of claim 1, wherein it incorporates an adaptive algorithm that adjusts its feature extraction techniques based on the type and quality of the biomedical image provided, ensuring optimal accuracy and relevance in all scenarios.

Dated this 25th day of August 2023

Applicant

Andhra University

ABSTRACT

A SYSTEM AND METHOD FOR BIOMEDICAL IMAGE FEATURE EXTRACTION

[040] The invention introduces a state-of-the-art system for biomedical image feature extraction. By integrating artificial intelligence, this system is tailored to automatically identify and extract salient features across various medical imaging modalities. Unique in its design, the system offers self-learning capabilities, allowing it to refine its methods based on continuous input and feedback. Further, it seamlessly integrates with electronic health records, ensuring comprehensive feature extraction based on both imaging and patient historical data. Cross-modality consistency, real-time processing, cloud-based functionalities, and robust data privacy measures further enhance its applicability and relevance in contemporary medical diagnostics.

Accompanied Drawing **[FIGS. 1-2]**

Dated this 25th day of August 2023

Applicant

Andhra University

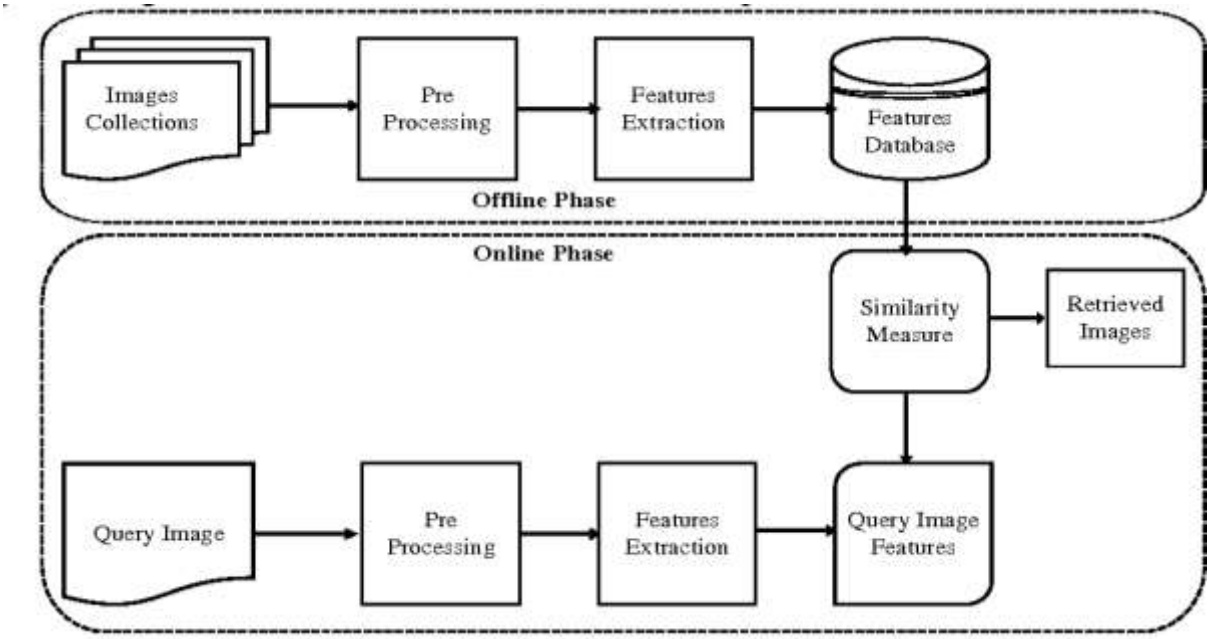


Figure 1

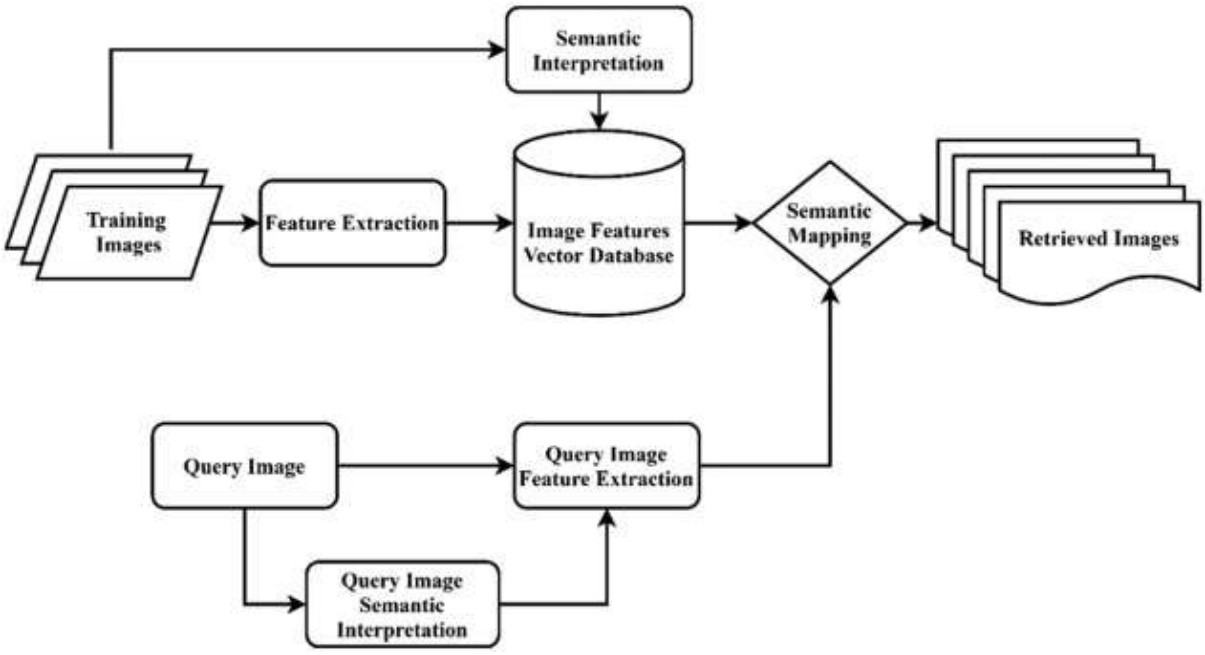


Figure 2

Dated this 25th day of August 2023