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VIVEKANANDHA MEDICAL CARE HOSPITAL

ALLIED HEALTH SCIENCE

SPOT LIGHT

THE STUDENT MAGAZINE

THEME:
MODERN ARTIFICIAL INTELLIGENCE
IN
COMPUTED TOMOGRAPHY IMAGING

This month's edition curated by

THE RADIANT MINDS OF:

B.SC RADIOGRAPHY & IMAGING TECHNOLOGY STUDENTS

EDITORIAL BOARD

CONSPECTUS

INCEPTION:

- Artificial Intelligence (AI) in computed Tomography (CT) scans refers to the use of machine learning algorithms to analyze and interpret medical images.

- This technology has revolutionized the field of radiology enhancing image quality detection and diagnosis.

- Artificial Intelligence (AI) in CT scan reducing radiation exposure and automating tasks, ultimately improving patient care and workflow efficiency.

HISTORICAL TIME LINE OF AI IN CT

Early 1980's

AI algorithm were first used for image reconstruction in CT scan.

1990's

AI was used for noise reduction & artifacts correction in CT.

2000's

AI powered tools for automatic segmentation and analysis of CT images began to emerge.

2010's

Deep learning techniques were applied to CT leading to significant advancements in tasks like lesion detection and characterization.

At present:

AI continues to revolutionize with applications expanding to include personalized dose optimization, image-guided surgery and prediction modeling.

DISPARITY OF

Features	Standard CT	AI in CT
PROCESS	To create cross sectional images of the body to form a 3D Images.	To enhance image quality automate analysis ,potentially reduce radiation exposure.
INTERPRETATION	Does not automatically identify abnormalities	Identifies patterns, measuring lesions & even predicting disease progression.
WORK FLOW	Can be time-consuming and relies heavily on the radiologists experience & expertise.	Speed up interpretation , prioritizing emergency, critical patients, potential leading to faster diagnosis.
APPLICATIONS	To identifying fractures, tumors & other medical conditions.	AI is being used in various application including cardiac imaging , Lung cancer screening & COVID 19 prognosis.

STEP BY STEP GUIDE TO AI IN CT SCANNING

Patient Preparation

- Pre-Scanning preparation
- Contrast Agent
- Patient positioning

Scanning procedure

- Scan parameter selection
- Scout scan
- Helical scan
- Data Acquisition

Post scanning Analysis

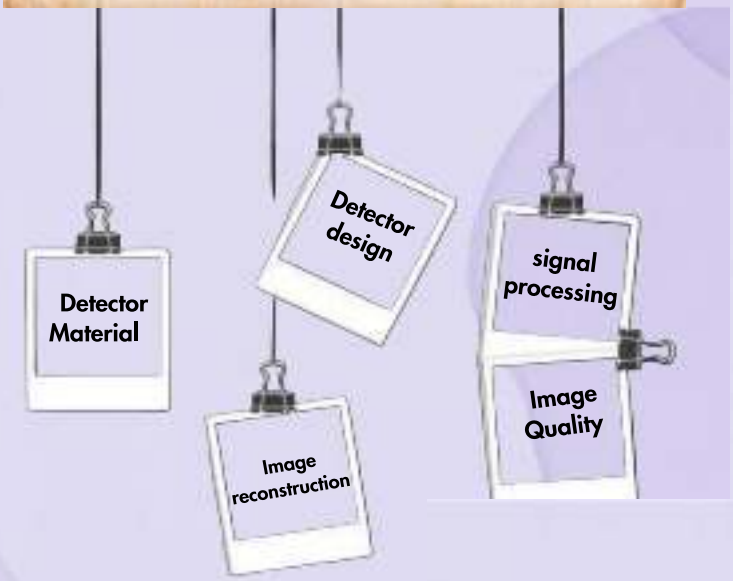
- Image Analysis
- Lesion detection
- Reporting

AI applications in CT scanning

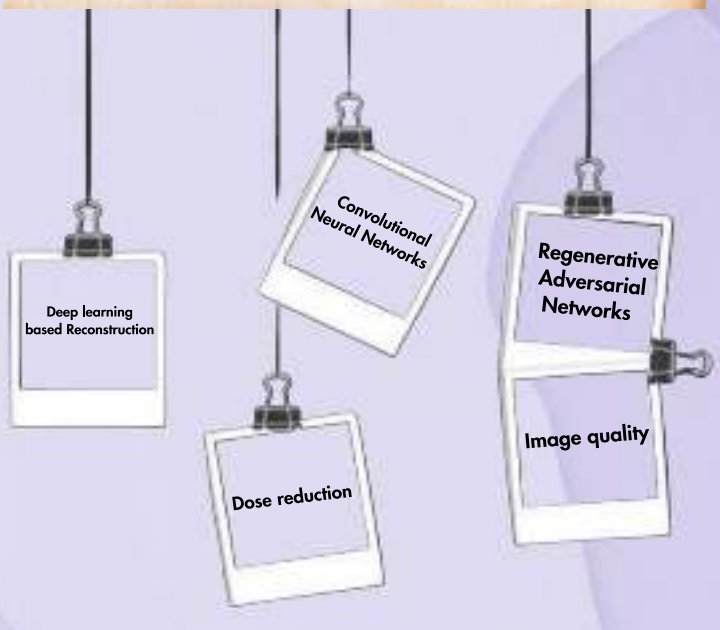
- Automated image analysis
- Improved diagnostic accuracy
- Personalized medicine

AI IN CT DETECTORS & IMAGE RECONSTRUCTION

AI ENHANCED CT DETECTORS



AI ENHANCED CT IMAGE RECONSTRUCTION



AI IN CT OPTIMIZED DOSE MANAGEMENT

AI in CT scan plays a crucial role in optimizing dose management, ensuring that patient receive the minimum required radiation dose while maintaining diagnostic image quality.

AI IN CT ENHANCED ACCURACY & EFFICIENCY

Faster Analysis

Improved Accuracy

Automated Tasks

Personalized treatment

SPECIFIC APPLICATION OF AI IN CT

1 LUNG CANCER SCREENING

AI can help identify pulmonary nodules and categorize them as benign or malignant, aiding in early detection of lung Cancer.

PULMONARY EMBOLISM DETECTION 2

AI software can detect incidental pulmonary embolism (IPE) in chest CT scan with high accuracy and reduce the time to detection.

3 CARDIOVASCULAR DISEASE

AI can be used for coronary artery stenosis diagnosis fractional low reserve prediction and prognosis prediction in patients with cardiovascular disease.

ONCOLOGY 4

It is used for protocol development imaging acquisition, reconstruction, interpretation & clinical care in oncological image.

5 TRAUMA

AI can assist in the rapid detection of rib fractures in CT images of high- energies trauma patient.

TB DETECTION 6

The detection, diagnosis and quantitative severity evaluation of Pulmonary tuberculosis is effectively done by AI technology.

7 EAR DISEASES

AI in enhancing the precision and personalization of surgical planning for ear disease.

BENEFITS OF AI IN CT

Reduced Radiation Exposure

AI based deep learning reconstruction and post processing can improve image quality potentially allowing for lower-dose CT examination.

Improved workflow

AI can automate tasks and improve workflow efficiency, leading to faster turn around times and optimized workflow for radiologists.

Better Patient Outcomes

More accurate and timely diagnosis, coupled with personalized treatment plan, can lead to better patient outcomes.

CHALLENGES AND FUTURE DIRECTIONS

Data Availability and quality

AI algorithms require large amounts of high-quality data to be trained effectively.

Ethical consideration

It's important to ensure that AI algorithms are used ethically and responsibly, and that they do not introduce bias into the diagnostic process.

Interdisciplinary Collaboration

The development and implementation of AI in CT require close collaboration between radiologists, technologist ,engineers, and computer scientists.

Future Research

Future research will focus on developing AI algorithms that can be used to personalize CT scans, predict patient outcomes, and improve the overall quality of care

REFERENCE

Koh D.-M., Papanikolaou N., Bick U., Illing R., Kahn C.E., Kalpathi-Cramer J., Matos C., Martí-Bonmati L., Miles A., Mun S.K., et al. Artificial intelligence and machine learning in cancer imaging. Commun. Med. 2022;2:133. doi: 10.1038/s43856-022-00199-0. [DOI] [PMC free article] [PubMed] [Google Scholar]

An AI deep learning algorithm for detecting pulmonary nodules on ultra-low-dose CT in an emergency setting. https://www.myesr.org/ai-blog/an-ai-deep-learning-algorithm

Artificial intelligence enables low-dose CT scans, faster scan time https://www.nibib.nih.gov/news-events/newsroom/artificial-intelligence-enables-low-dose-ct-scans-faster-scan-time

A fully automatic artificial intelligence–based CT image analysis system for accurate detection, diagnosis, and quantitative severity evaluation of pulmonary tuberculosis https://pmc.ncbi.nlm.nih.gov/articles/PMC8628489/

Use of artificial intelligence in computed tomography dose optimization- C.H. McCollough and S. Lung View all authors and affiliations volume 49 issue 1 https://journals.sagepub.com/doi/10.1177/0146645320940827

STUDENTS ZONE

AI-DRIVEN CT DIAGNOSTICS

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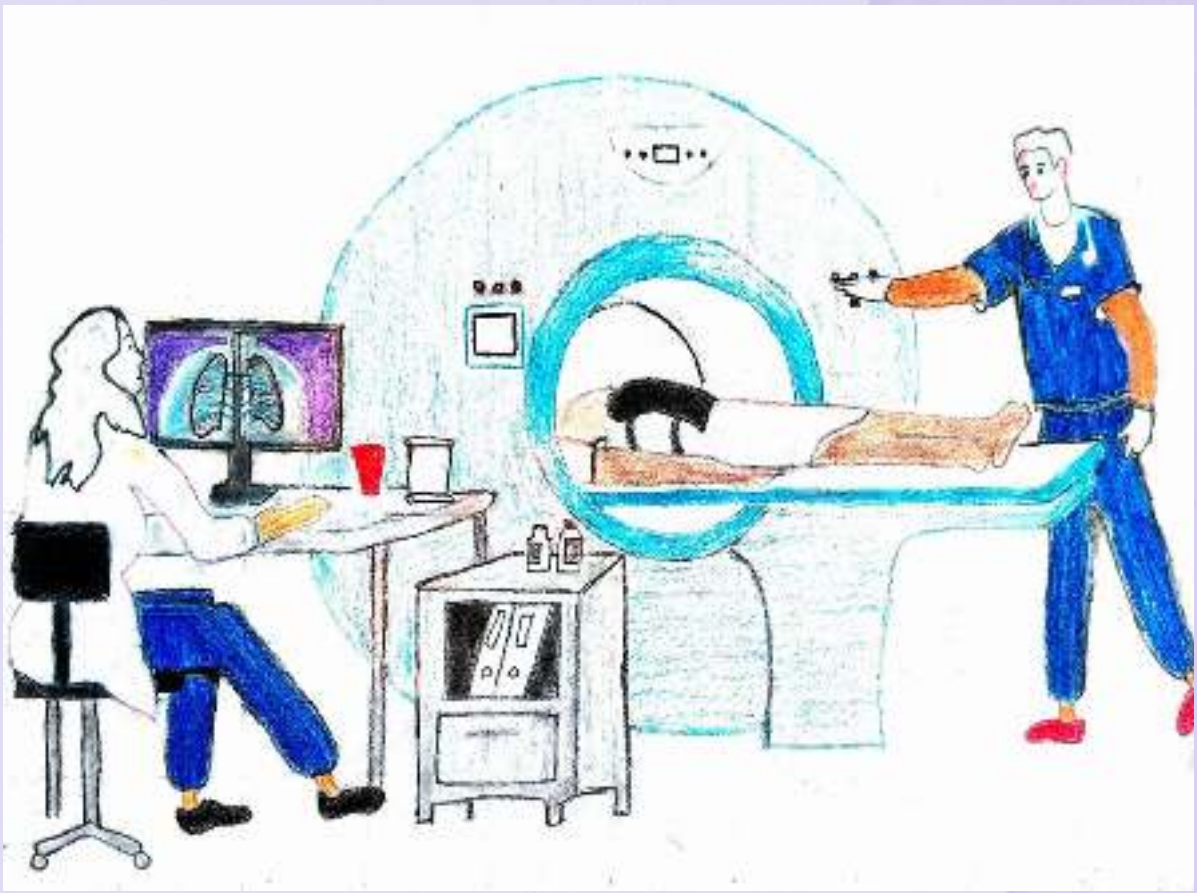
CT EXAMINATION



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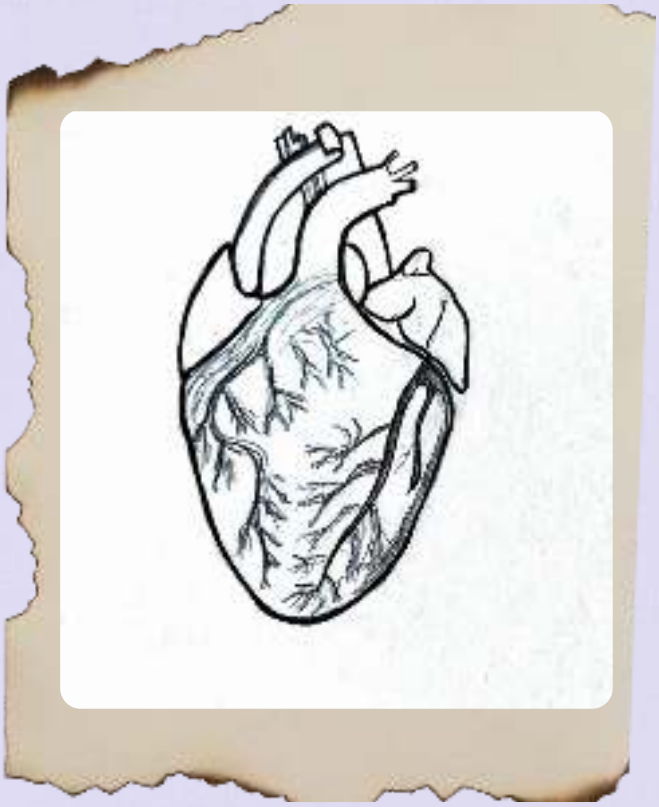
CARDIAC AI IN CT & ANATOMICAL VIEW



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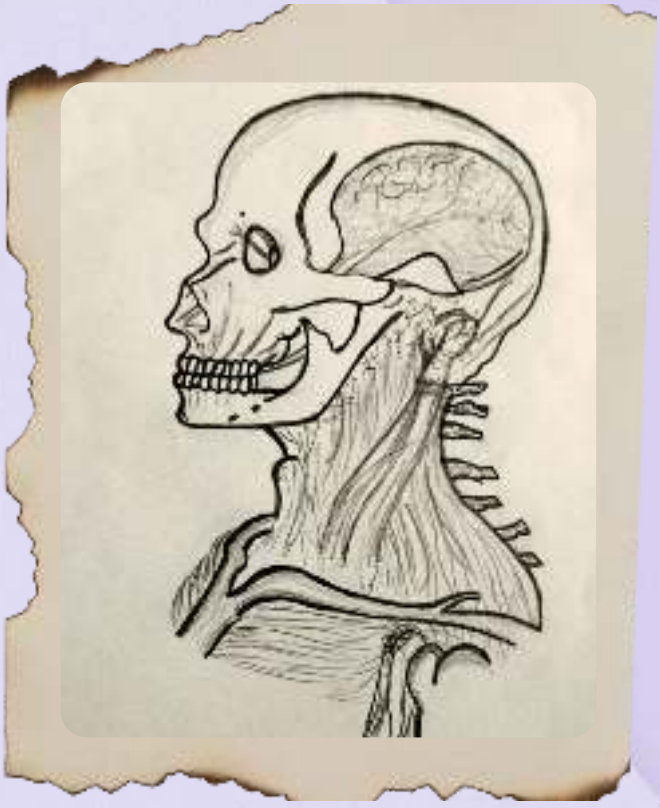

S.VISHNUVARATHAN
I-B.SC., RIT

POETRY

DIGITAL SHADOWS

AMAZING ! BONNY ! SNOWY !
RADIOGRAPHERS IN THIS COUNTRY !
HERE AND THERE !
THE TIME TO SEE IN THE NEWS WILL CHANGE !
ARTIFICIAL INTELLIGENCE WILL COME !
ALL SCANS CAN BE DONE EASILY
TIME IS SHORT!
MACHINES WILL BE START !
SILENT SCANS, A AI'S KEEN EYE HIDDEN ART !
DIAGNOSTIC HEART THROUGH FLESH AND BONE,
IT GENTLY STRAYS !
UNVEILING SECRETS, IN DIGITAL RAYS !
WITH NEURAL NETWORKS, IT LEARNS AND GROWS!!

E.DHARANEESWARAN
III-B.SC., RIT

POETRY

ALGORITHMS OF THE HEART

AIDING RADIOGRAPHERS, AS IMAGES UNFOLD
FRACTURES, TUMORS AND VESSELS SO FINE
AI'S PRECISION, A DIAGNOSTIC DIVINE
AI STANDS WATCH, COME WHAT MAY
IN THE DARK OF NIGHT, OR BUSY DAY
A GUARDIAN OF HEALTH, A VIGILANT GUIDE
AI IN CT, SIDE BY SIDE
ENHANCING IMAGES, WITH SUBTLE CARE
A SYMPHONY OF CODE, A HARMONY OF ART
AI'S ALGORITHMS, A DIAGNOSTIC FLAIR
AI IN CT, A HEALING HEART.

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ALLIED HEALTH SCIENCE

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S.NO	PROGRAMMES OFFERED UG	DURATION
01	BSc. ACCIDENT AND EMERGENCY CARE TECHNOLOGY	4 YEARS
02	BSc. RADIOGRAPHY AND IMAGING TECHNOLOGY	4 YEARS
03	BSc. OPERATION THEATRE AND ANESTHESIA TECHNOLOGY	4 YEARS
04	BSc. CARDIAC TECHNOLOGY	4 YEARS
05	BSc. PHYSICIAN ASSISTANT	4 YEARS
06	BSc. MEDICAL LABORATORY TECHNOLOGY	4 YEARS
07	BSc .DIALYSIS TECHNOLOGY	4 YEARS

KRISHNA INSTITUTE OF OPTOMETRY AND RESEARCH

01	BSc. OPTOMETRY	4 YEARS

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"Vidhya Rathna"

Prof. Dr. M. KARUNANITHI, B.Pharm., M.S., Ph.D., D.Litt.,

Chairman & Secretary

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- ★ SWAMY VIVEKANANDHA MEDICAL COLLEGE HOSPITAL AND RESEARCH INSTITUTE
- ★ VIVEKANANDHA DENTAL COLLEGE FOR WOMEN
- ★ SWAMY VIVEKANANDHA COLLEGE OF PHARMACY
- ★ VIVEKANANDHA COLLEGE OF NURSING
- ★ VIVEKANANDHA SCHOOL OF ANM
- ★ SWAMY VIVEKANANDHA PHYSIOTHERAPY COLLEGE
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- ★ VIVEKANANDHA NURSING COLLEGE FOR WOMEN
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- ★ RABINDHARANATH TAGORE COLLEGE OF EDUCATION FOR WOMEN
- ★ VISWABHARATHI COLLEGE OF EDUCATION FOR WOMEN

★★★

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