

ANALYSIS MATHEMATICS MODEL AND AI-ENHANCED MAMMOGRAPHY FOR EARLY BREAST CANCER DIAGNOSIS: A REVIEW

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ABSTRACT

Breast cancer remains a significant health concern worldwide, emphasizing the critical need for effective early detection strategies. Leveraging advancements in mathematics and artificial intelligence (AI) presents a promising avenue to enhance breast cancer screening methods. This abstract explores the integration of mathematics and AI techniques in the early detection of breast cancer. It highlights the role of AI algorithms in analysing medical imaging data, such as mammograms, ultrasound images, and MRI scans, to detect subtle abnormalities indicative of early-stage tumours. Furthermore, it discusses how mathematical models optimize screening schedules, personalize risk assessments, and improve diagnostic accuracy. Additionally, the abstract touches upon the potential of AI-driven predictive modelling to stratify individuals based on their risk factors and guide personalized screening recommendations. The synergy of mathematics and AI offers a transformative approach to breast cancer screening, paving the way for earlier detection, improved outcomes, and ultimately, saving lives.

Keywords- Breast cancer, early detection strategies, Mathematics and Artificial intelligence

1. INTRODUCTION

Breast Cancer using Mathematics and AI

AI algorithms can be trained on large datasets of mammograms to detect early signs of breast cancer. These algorithms can analyse images to identify patterns and abnormalities that may not be visible to the human eye. Mathematics, particularly statistical analysis, is used to validate the effectiveness of these algorithms and to optimize their performance.

Mathematical models can be developed to assess an individual's risk of developing breast cancer based on factors such as age, family history, genetic markers, and lifestyle factors. AI techniques can enhance these models by incorporating more complex data and improving predictive accuracy.

AI algorithms can analyze genomic data to identify genetic mutations and variations associated with breast cancer. Mathematical techniques such as machine learning can help identify patterns in the data and predict how specific genetic alterations may impact disease progression and treatment response.

AI-driven models can analyze patient data, including tumor characteristics, treatment history, and outcomes, to personalize treatment plans and optimize therapeutic strategies. Mathematical optimization techniques can be used to find the most effective treatment combinations while minimizing side effects and treatment costs.

Machine learning models can analyze various clinical and molecular features to predict patient prognosis and survival outcomes. Mathematics is used to develop and validate these prediction models, ensuring their accuracy and reliability.

AI and mathematical modeling can accelerate the discovery of new drugs and therapeutic targets for breast cancer treatment. By analyzing large datasets of molecular and biological data, AI algorithms can identify potential drug candidates and predict their effectiveness in targeting specific cancer pathways.

Mathematics and AI in Self Breast Examination

AI-powered mobile applications can provide step-by-step guidance on how to perform a self-breast examination effectively. These applications can use mathematical algorithms to analyze user interactions and provide personalized instructions based on individual needs.

AI algorithms can analyze images or videos captured during self-breast examinations to identify potential abnormalities such as lumps or changes in skin texture. Mathematical techniques like image processing, pattern recognition, and machine learning can aid in the accurate detection of abnormalities. AI can provide instant feedback during self-examination, highlighting areas that may require further attention or evaluation. Mathematical models can

assess the risk of breast cancer based on factors such as age, family history, and lifestyle habits, providing users with personalized risk assessments.

AI-powered reminder systems can help users maintain a regular self-examination schedule. These systems can leverage mathematical algorithms to predict the optimal timing for examinations based on individual risk factors and historical data.

AI-driven educational platforms can deliver relevant information about breast health, risk factors, and self-examination techniques. Mathematics can be used to develop personalized learning pathways and adaptive educational materials tailored to the user's knowledge level and preferences.

AI and mathematical techniques can facilitate the tracking and analysis of self-examination data over time. Users can input their examination results into mobile applications or web platforms, which can then analyze trends, detect changes, and provide insights into breast health status.

AI can help ensure the privacy and security of self-examination data by implementing robust encryption techniques and access control mechanisms. Mathematical algorithms can be used to detect potential security breaches and prevent unauthorized access to sensitive information.

Mathematics and AI in Signs and Symptoms of Breast Cancer

AI algorithms can be trained on large datasets containing information about various signs and symptoms associated with breast cancer. These algorithms can learn to recognize patterns indicative of the disease, enabling more accurate and timely detection.

Mathematical models can integrate multiple signs and symptoms, along with other patient data such as medical history and demographic information, to generate diagnostic probabilities or risk scores. AI-powered decision support systems can assist healthcare providers in interpreting these scores and

AI techniques, such as deep learning, can analyze medical imaging data (e.g., mammograms, ultrasound images) to detect subtle abnormalities that may indicate the presence of breast cancer. Mathematical algorithms play a crucial role in image processing and feature extraction, enabling AI models to accurately identify suspicious lesions or masses.

NLP algorithms can analyze text-based medical records, including clinical notes and pathology reports, to extract information about signs, symptoms, and diagnostic findings related to breast cancer. Mathematical methods are used to preprocess text data, extract relevant features, and train AI models for classification and information extraction tasks.

AI models can predict an individual's risk of developing breast cancer based on a combination of demographic factors, genetic markers, lifestyle habits, and known risk factors. Mathematical techniques such as logistic regression, random forest, or support vector machines can be used to develop predictive models that stratify individuals into different risk categories.

AI algorithms can analyze longitudinal data to identify temporal patterns in the progression of breast cancer symptoms and their association with clinical outcomes. Mathematical methods such as time series analysis and survival analysis can be applied to model disease trajectories and predict future

AI-driven approaches can tailor treatment recommendations based on individual patient characteristics, including the presence and severity of specific signs and symptoms. Mathematical optimization techniques can be used to identify the most effective treatment strategies while minimizing potential side effects and optimizing patient outcomes.

Mathematics and AI in Risk Factors for Early Detection of Breast Cancer

AI algorithms can integrate multiple risk factors such as age, family history, genetic predisposition, hormonal factors, lifestyle habits, and mammographic density to assess an individual's risk of developing breast cancer. Mathematical models like logistic regression, decision trees, or ensemble methods can be employed to develop predictive risk assessment models.

AI-driven risk prediction models can tailor screening recommendations based on an individual's risk profile. For instance, women identified as high-risk may be advised to start screening at an earlier age or undergo more frequent screenings. Mathematics is crucial in optimizing screening schedules and

AI algorithms can analyze genetic data, including single nucleotide polymorphisms (SNPs) and genetic mutations associated with breast cancer risk, to provide personalized genetic risk scores. Mathematical methods such as polygenic risk scoring can combine information from multiple genetic variants to estimate an individual's genetic predisposition to breast cancer.

AI techniques can analyze mammograms, ultrasound images, and other imaging modalities to detect subtle abnormalities indicative of early-stage breast cancer. Mathematical algorithms aid in image processing, feature extraction, and classification of lesions. Additionally, AI can analyze blood or tissue biomarkers to identify molecular signatures associated with early-stage breast cancer.

NLP algorithms can extract information from electronic health records, clinical notes, and patient histories to identify risk factors and symptoms relevant to breast cancer. Mathematics helps in preprocessing text data, extracting relevant features, and training AI models for risk prediction and early detection.

AI systems can continuously monitor changes in risk factors and update risk predictions over time. Mathematical methods such as Bayesian inference or dynamic modeling can be used to update risk estimates based on new data and refine predictive models as additional information becomes available.

AI and mathematical models can inform public health interventions aimed at early detection and prevention of breast cancer. These models can identify high-risk populations and prioritize resources for screening programs, genetic counseling, and targeted interventions to reduce breast cancer incidence and mortality.

Mathematics and AI in Breast Cancer Screening for Early Detection

AI algorithms can analyze mammograms, the primary imaging modality for breast cancer screening, to detect subtle abnormalities indicative of early-stage tumors. Mathematical methods such as convolutional neural networks (CNNs) enable the extraction of features from mammographic images, aiding in the accurate detection of lesions.

CAD systems, powered by AI, assist radiologists in interpreting mammograms by highlighting suspicious areas for further review. Mathematical algorithms in CAD systems help reduce false positives and improve the sensitivity of mammography screening by automating the detection of potential abnormalities.

AI-driven risk prediction models can personalize screening recommendations based on an individual's risk factors, including age, family history, genetic predisposition, and breast density. Mathematical algorithms integrate these factors to stratify women into different risk categories and recommend appropriate screening intervals or modalities.

AI can integrate data from multiple imaging modalities, such as mammography, ultrasound, and magnetic resonance imaging (MRI), to improve the accuracy of early breast cancer detection. Mathematical fusion techniques combine information from different modalities to enhance lesion detection and characterization.

AI algorithms can automatically characterize detected lesions based on their morphology, texture, and other features extracted from imaging data. Mathematical methods enable quantitative analysis of lesion characteristics, aiding in distinguishing between benign and malignant lesions and reducing

AI-driven temporal analysis of longitudinal imaging data allows for the detection of subtle changes over time, which may indicate the development or progression of breast cancer. Mathematical modeling techniques, such as time-series analysis and pattern recognition, help identify evolving abnormalities and trigger timely interventions.

AI and mathematical models optimize resource allocation in breast cancer screening programs by identifying high-risk populations and prioritizing screening efforts accordingly. These models consider factors such as screening capacity, cost-effectiveness, and patient outcomes to maximize the impact of screening on early detection and mortality reduction.

AI systems continuously learn from new data to improve screening accuracy and performance over time. Mathematical techniques like reinforcement learning and adaptive modeling enable AI algorithms to adapt to evolving data distributions and update screening protocols for better early detection outcomes.

Mathematics and AI in Diagnostic Tests

AI algorithms analyze medical imaging data such as mammograms, ultrasound images, and MRI scans to detect suspicious lesions or abnormalities. Mathematical techniques like convolutional neural networks (CNNs) enable the extraction of features from images, facilitating the accurate identification of potential tumors.

CAD systems assist radiologists in interpreting imaging results by automatically detecting and highlighting areas of concern. AI algorithms in CAD systems integrate mathematical methods for image processing and pattern recognition, improving the sensitivity and specificity of diagnostic tests.

AI-driven genomic tests analyze genetic data from tumor samples to identify mutations, gene expression patterns, and molecular subtypes associated with breast cancer. Mathematical algorithms aid in interpreting genomic data and identifying clinically relevant biomarkers for diagnostic purposes. AI models combine various clinical and demographic factors, along with imaging and genomic data, to predict an individual's likelihood of having breast

cancer. Mathematical techniques such as logistic regression, support vector machines, or ensemble methods are used to develop predictive models that aid in diagnostic decision-making.

AI algorithms analyze circulating tumor cells (CTCs) or cell-free DNA (cfDNA) in blood samples to detect genetic alterations indicative of breast cancer. Mathematical methods assist in the quantification and interpretation of biomarkers detected in liquid biopsies, enabling non-invasive diagnostic testing.

NLP algorithms analyze text-based medical records, pathology reports, and literature to extract relevant information for diagnostic tests. Mathematical techniques in NLP preprocess text data, identify key features, and facilitate the interpretation of clinical findings.

AI-powered decision support systems integrate patient data, imaging results, genomic findings, and risk assessments to provide clinicians with personalized diagnostic recommendations. Mathematical algorithms aid in synthesizing and analyzing diverse data sources to assist in diagnostic decision-making.

Mathematics plays a crucial role in validating the performance of diagnostic tests through statistical techniques such as cross-validation, receiver operating characteristic (ROC) analysis, and clinical validation studies. These methods ensure the reliability and accuracy of diagnostic algorithms before their clinical implementation.

Mathematics and AI in Treatment

AI algorithms analyze genomic and molecular data to identify specific tumor characteristics and predict treatment responses. Mathematical models integrate multi-omics data (genomic, transcriptomic, proteomic) to personalize treatment strategies, such as targeted therapies or immunotherapies, based on the molecular profile of the tumor.

Mathematical optimization techniques optimize treatment regimens by considering various factors such as tumor size, stage, genetic markers, patient characteristics, and treatment goals. AI-driven decision support systems help clinicians select the most effective and least toxic treatment options for individual patients, improving treatment outcomes.

AI models predict patient responses to different treatment modalities based on clinical and biological data. Mathematical techniques such as machine learning and statistical modeling identify predictive biomarkers and treatment response signatures, guiding treatment selection and improving patient

AI accelerates drug discovery by analyzing large-scale biological data to identify potential drug targets and predict drug efficacy. Mathematical models simulate drug-target interactions, pharmacokinetics, and toxicity profiles to prioritize drug candidates for preclinical and clinical development, expediting the drug discovery process.

AI-driven adaptive therapy approaches continuously monitor tumor response and dynamically adjust treatment parameters (e.g., drug dosage, treatment schedule) based on real-time patient data. Mathematical models predict tumor evolution and optimize treatment schedules to delay drug resistance and improve long-term outcomes.

AI algorithms optimize radiation therapy planning by analyzing medical imaging data to precisely target tumors while minimizing radiation exposure to surrounding healthy tissues. Mathematical techniques in radiation oncology optimize dose distribution, treatment planning, and treatment delivery to improve therapeutic efficacy and reduce toxicity.

AI and mathematical models optimize clinical trial design, patient recruitment, and treatment allocation to accelerate the development of novel therapies for breast cancer. AI algorithms analyze patient data to identify eligible participants, predict treatment responses, and stratify patients based on predictive biomarkers, enhancing the efficiency and success of clinical trials.

Mathematical models such as survival analysis estimate patient survival probabilities and identify prognostic factors associated with treatment outcomes. AI algorithms analyze patient data to predict long-term survival rates and guide treatment decisions, improving patient prognosis and quality of life.

Mathematics and AI in Coping with the Diagnosis and Treatment

AI-powered chatbots equipped with natural language processing capabilities can provide emotional support and companionship to individuals coping with the diagnosis and treatment of breast cancer. These chatbots can engage in empathetic conversations, offer coping strategies, and provide resources for emotional well-being.

AI algorithms can predict the likelihood and severity of treatment-related side effects based on individual patient characteristics, treatment regimens, and genetic factors. Mathematical models help quantify the risk of adverse events and inform patients about potential side effects, enabling them to better prepare and cope with treatment challenges.

AI-driven mobile applications can monitor and manage treatment-related symptoms such as pain, fatigue, nausea, and depression. These apps use mathematical algorithms to track symptom severity, provide personalized recommendations for symptom management, and connect patients with support resources and healthcare providers as needed.

Virtual reality (VR) platforms powered by AI algorithms can offer immersive experiences aimed at reducing stress, anxiety, and pain associated with breast cancer treatment. Mathematical modeling techniques optimize VR environments for relaxation, mindfulness, and distraction, providing patients with effective coping mechanisms during treatment.

AI-driven decision support systems assist patients in making informed decisions about treatment options, clinical trials participation, and supportive care interventions. Mathematical models integrate patient preferences, treatment outcomes data, and risk-benefit analyses to guide shared decision-making and empower patients to take an active role in their care.

AI algorithms analyze patient data to generate personalized recommendations for supportive care interventions, including nutrition counseling, physical therapy, psychological counseling, and complementary therapies. Mathematical models consider individual patient needs, preferences, and treatment goals to optimize supportive care strategies and enhance overall well-being.

AI platforms facilitate connections among breast cancer patients and survivors through online peer support networks. These platforms use mathematical algorithms to match individuals based on shared experiences, treatment trajectories, and psychosocial needs, fostering a sense of community, empathy, and empowerment among users.

AI-powered CBT tools deliver evidence-based cognitive-behavioral interventions to help individuals manage distress, anxiety, and depression associated with breast cancer diagnosis and treatment. Mathematical algorithms personalize therapy sessions, track progress over time, and adapt interventions based on individual response patterns.

Mathematics and AI Preparing for Your Appointments

AI algorithms can analyze appointment data, patient preferences, and clinic schedules to optimize appointment scheduling. Mathematical optimization techniques ensure efficient allocation of resources, minimize wait times, and accommodate patient preferences, enhancing the overall patient experience.

AI-powered tools can review electronic health records (EHRs) and gather relevant information about previous appointments, test results, medications, and treatment plans. Mathematical algorithms help extract and organize key details from medical records, providing a comprehensive overview for discussion during appointments.

AI-driven mobile apps enable patients to track symptoms, medication adherence, and lifestyle factors leading up to their appointments. Mathematical models analyze symptom patterns over time, identify potential concerns, and generate summary reports to facilitate discussions with healthcare providers.

AI-powered chatbots or virtual assistants can generate personalized lists of questions for patients to ask during their appointments based on their medical history, treatment plan, and current concerns. Mathematical algorithms ensure that questions are relevant, comprehensive, and tailored to the individual's needs.

AI algorithms can assess an individual's risk of disease progression or treatment-related complications based on their clinical profile and treatment history. Mathematical models quantify risks and provide decision support recommendations to guide discussions with healthcare providers and inform treatment decisions.

AI-driven educational platforms provide information about various treatment options, including benefits, risks, and potential side effects. Mathematical algorithms personalize educational materials based on individual preferences, learning styles, and treatment preferences, empowering patients to make informed decisions.

AI-powered reminder systems send appointment reminders and preparation tips to patients via email, text message, or mobile app notifications. Mathematical algorithms predict optimal reminder timing, customize messaging based on appointment type, and provide guidance on how to prepare for specific appointments.

AI-powered language translation tools assist patients who prefer to communicate in languages other than their primary language. Mathematical models enable accurate translation of medical terminology, facilitating communication between patients and healthcare providers during appointments.

Using AI and mathematics in the early detection of breast cancer offers several significant advantages

AI algorithms can analyze large volumes of complex data, including medical images and genetic information, with high precision and accuracy. Mathematical models enhance the robustness of AI algorithms, improving the detection of subtle abnormalities indicative of early-stage breast cancer.

By integrating various risk factors and patient characteristics, AI-driven models provide personalized risk assessments for individuals. This allows for tailored screening recommendations based on an individual's unique risk profile, optimizing the allocation of healthcare resources and improving patient outcomes.

Mathematics helps optimize screening schedules and resource allocation, ensuring that screening programs are efficient and cost-effective. AI algorithms can prioritize high-risk individuals for more intensive screening protocols, leading to earlier detection of breast cancer in those most likely to

AI algorithms, trained on vast datasets, can help reduce false positives and negatives in breast cancer screening. Mathematical techniques ensure that AI models are robust and generalize well to diverse patient populations, minimizing diagnostic errors and unnecessary interventions.

Early detection of breast cancer through AI-powered screening allows for timely intervention and treatment, improving patient outcomes and survival rates. By detecting cancer at an early stage, patients have a higher chance of successful treatment and reduced morbidity.

AI-driven approaches enable continuous learning from new data, allowing algorithms to adapt and improve over time. Mathematics ensures that AI models are updated and refined as new information becomes available, enhancing their performance and reliability in breast cancer detection.

AI and mathematics in breast cancer screening offers numerous benefits

AI algorithms can analyze large datasets with precision, leading to more accurate detection of abnormalities in medical images and genetic data. This enhances the reliability of screening results and reduces the likelihood of false positives and false negatives.

By integrating various risk factors and patient characteristics, AI-driven models provide personalized risk assessments. This allows for tailored screening recommendations based on individual risk profiles, optimizing resource allocation and improving patient outcomes.

AI-powered screening facilitates the early detection of breast cancer, enabling timely intervention and treatment. Early detection increases the likelihood of successful treatment outcomes, reduces morbidity, and potentially saves lives.

Mathematics helps optimize screening schedules and resource allocation, ensuring that screening programs are efficient and cost-effective. AI algorithms can prioritize high-risk individuals for more intensive screening protocols, maximizing the impact of screening efforts.

By improving the accuracy of screening and reducing unnecessary interventions, AI-driven approaches can help lower healthcare costs associated with breast cancer diagnosis and treatment. Early detection and intervention also lead to reduced long-term healthcare expenses.

AI algorithms enable continuous learning from new data, allowing for ongoing refinement and optimization of screening models. This ensures that screening methods remain up-to-date and effective in detecting breast cancer early.

AI-driven screening methods offer a more personalized and efficient healthcare experience for patients. Personalized risk assessments and tailored screening recommendations empower patients to make informed decisions about their health, leading to increased satisfaction and engagement.

By facilitating early detection and intervention, AI-driven screening methods have the potential to reduce breast cancer mortality rates. Timely diagnosis allows for prompt initiation of treatment, improving patient outcomes and survival rates.

Challenges:

Access to high-quality, diverse datasets is essential for training robust AI algorithms. However, data accessibility, interoperability, and privacy concerns pose significant challenges. Addressing these issues requires collaboration among healthcare institutions, policymakers, and technology developers to establish data sharing frameworks while ensuring patient privacy and data security.

AI algorithms may exhibit biases or lack transparency in their decision-making processes, leading to potential disparities in screening outcomes. Addressing algorithmic bias and ensuring algorithm interpretability are critical for building trust in AI-driven screening methods. Developing standardized evaluation metrics and regulatory guidelines can help mitigate bias and enhance algorithm transparency.

Validating AI-driven screening methods in real-world clinical settings is essential to demonstrate their effectiveness and safety. However, integrating AI technologies into existing healthcare workflows poses logistical and regulatory challenges. Collaborative efforts between researchers, clinicians, regulatory agencies, and healthcare institutions are needed to validate AI algorithms, streamline deployment, and ensure seamless integration into clinical practice.

Implementing AI-driven screening programs requires significant upfront investment in infrastructure, technology, and training. Limited financial resources and healthcare infrastructure in certain regions may hinder widespread adoption

of AI technologies. Developing cost-effective solutions and incentivizing investment in AI infrastructure are essential to overcome these barriers and ensure equitable access to advanced screening methods.

AI-driven screening raises complex ethical and legal concerns related to patient privacy, informed consent, liability, and equity. Ensuring ethical AI development and deployment requires adherence to ethical guidelines, transparency in algorithm development, and proactive measures to mitigate potential harms. Regulatory frameworks must also evolve to address emerging ethical challenges in AI-driven healthcare.

Effective implementation of AI-driven screening requires interdisciplinary collaboration among clinicians, data scientists, mathematicians, policymakers, and patient advocates. Bridging disciplinary silos, fostering collaboration, and promoting knowledge sharing are essential for advancing AI technologies and maximizing their impact on breast cancer screening outcomes.

2. CONCLUSION

The integration of mathematics and artificial intelligence (AI) holds immense potential in revolutionizing the early detection of breast cancer. Through sophisticated algorithms and mathematical models, AI empowers clinicians and patients alike with improved screening accuracy, personalized risk assessments, and optimized treatment strategies. By harnessing AI's capabilities to analyze medical imaging data, predict treatment responses, and facilitate shared decision-making, we can enhance patient outcomes and quality of life. Moreover, AI-driven approaches enable continuous learning and adaptation, ensuring that screening and treatment protocols evolve with emerging evidence and individual patient needs. As we continue to advance in the fields of mathematics and AI, we are poised to transform breast cancer screening from a one-size-fits-all approach to a tailored, proactive strategy that saves lives through early detection and intervention. This convergence of science and technology offers hope for a future where breast cancer is detected earlier, treated effectively, and ultimately, eradicated.

3. REFERENCES

- [1] Sriram, V.P., K.K. D., Archana, T., Gopatoti, A., Swapna, B. & Yadav, A.S. (2022). Design of voice based virtual assistant using internet of things, International Conference on Augmented Intelligence and Sustainable Systems (ICAISS), Publisher: IEEE
- [2] Goud, D.S., Vigneshwari, M., Aparna, P., Vijayasekaran, G., Yadav, A.S. & Kumar, Ashok., (2022). Text localization and recognition from natural scene images using AI, International Conference on Automation, Computing and Renewable Systems (ICACRS), Publisher: IEEE
- [3] Mohammed, S., Krishna, S.H., Mudalkar, P.K., Verma, N., Karthikeyan, P. & Yadav, A.S. (2023). Stock market price prediction using machine learning, 5th International Conference on Smart Systems and Inventive Technology (ICSSIT), Publisher: IEEE
- [4] Sheeba, M., Kumar, D.R., Kirubakaran, S., Dixit, I., Rani, D.L. & Yadav, A.S., (2023). An investigation and development into the Use of AI-based analytical methods for forecasting the stock market, 4th International Conference on Smart Electronics and Communication (ICOSEC), Publisher: IEEE
- [5] Nitalikar, M.S., Thakur, V., Ayyub, S., Khidse, S.V., Sucharitha, K. & Yadav, A.S. (2023). ECMS: Implementation of System Design to Evaluate the Data Transmission Efficiency Over Vehicular AdHoc Network, International Conference on Self Sustainable Artificial Intelligence Systems (ICSSAS), Publisher: IEEE
- [6] Kiran, K.R., Kumar, B.H., Mishra, B.S., Yadav, A.S., Nagendar, Y. & Tiwari, M. (2023). Artificial Intelligence Integrated with Machine Learning for Enhancing Business in E-World, 5th International Conference on Inventive Research in Computing Applications (ICIRCA), Publisher: IEEE
- [7] Shamout, M.D., Chaubey, P.K., Agarwal, P., Adwan, Ibrahim A.I., Sharma, A.K. & Yadav, A.S. (2022). Role of industrial automation in terms of providing predictive maintenance in the transportation and logistics sector, International Interdisciplinary Humanitarian Conference for Sustainability (IIHC), Publisher: IEEE
- [8] Nethagani, S., Yadav, A.S., Kanagala, S., Valavala, M., Ganesh, R. & Rao, N.S. (2021). Machine learning based Energy management system for better optimisation of power in electric vehicles, 5th International Conference on Electronics, Communication and Aerospace Technology (ICECA), Publisher: IEEE
- [9] Rai, A.K., Singh, M., Kumar, A., Yadav, A.S. & Kar, N.R. (2023). Artificial Intelligence based Enhanced Drug Discovery in Pharmaceutical Industries, International Conference on Inventive Computation Technologies (ICICT), Publisher: IEEE

- [10] Kate, C., Kalpana, C., Sharma, A., Yadav, A.S., Kumar, A. & Kumar, S.S. (2023). Investigation of Machine Learning Algorithms for Pattern Recognition in Image Processing, 5th International Conference on Inventive Research in Computing Applications (ICIRCA), Publisher: IEEE
- [11] Ronaldo, R., Arora, T.K., Agarwal, S., Lobanova, A., Vladimirovna, V.T. & Yadav, A.S. (2022). AI Based Periodic Forecasting Rate Prediction with Secured Optimized Cryptographic Method Sales Forecasting in Retail Business Sector, International Interdisciplinary Humanitarian Conference for Sustainability (IIHC), Publisher: IEEE
- [12] Ravi, K.C., Dixit, R.R., Singh, S., Gopatoti, A. & Yadav, A.S. (2023). AI-Powered Pancreas Navigator: Delving into the Depths of Early Pancreatic Cancer Diagnosis using Advanced Deep Learning Techniques, 9th International Conference on Smart Structures and Systems (ICSSS), Publisher: IEEE
- [13] Mustare, N.B., Singh, B., Sekhar, M.V., Kapila, D. & Yadav, A.S. (2023). Iot and Big Data Analytics Platform to Analyze the Faults in the Automated Manufacturing Process Unit, International Conference on New Frontiers in Communication, Automation, Management and Security (ICCAMS), Publisher: IEEE
- [14] Balaji, V., Vijai, R., Rajesh, V., Chandra, M.D. & Yadav, A.S. (2024). Multidetector CT in the Analysis of Pulmonary Thromboembolism, 5th International Conference on Mobile Computing and Sustainable Informatics (ICMCSI), Publisher: IEEE
- [15] Navalakha, A.K., Krishnan, S.D., Pachar, S., Patil, P., Yadav, A.S. & Kumar, S. (2022). A Holistic Approach based computing Authentication System, 2nd International Conference on Innovative Sustainable Computational Technologies (CISCT), Publisher: IEEE
- [16] George G. Cheng, Yong Zhu, and Jan Grzesik, Microwave Imaging for Medical Diagnosis, General Assembly and Scientific Symposium, 1-4 (2011) 93.
- [17] S. Petroudi and M. Brady, Breast density segmentation using texture, International Workshop on Digital Mammography, 616-625 (2006) 94.
- [18] H. D. Li, M. Kallergi, L. P. Clarke, V. K. Jain, and R. A. Clark, Markov random field for tumor detection in digital mammography, IEEE Trans. Med Imaging, 14, 565-76 (1995) 95.
- [19] Christina M. Shafer, Victoria L. Seewaldt, Joseph Y. Lo, Validation of a 3D hidden-Markov model for breast tissue segmentation and density estimation from MR and tomo synthesis images, Biomedical Sciences and Engineering Conference, 1-4 (2011) 96.
- [20] J.R.Parker, Algorithms for Image Processing and Computer Vision. New York: John Wiley & Sons, 2, (1997) 97.
- [21] R.M. Haralick and L. G. Shapiro, Computer and Robot Vision, 11, (1992) 98.
- [22] Teshnehlal M., Aliyari Shoorehdeli M. and Keyvanfard F., Feature selection and classification of breast MRI lesions based on Multi classifier, International Symposium on Artificial Intelligence and Signal Processing (AISP), 54-58 (2011) 99.
- [23] R. Rotman, Recent Advances using Microwaves for Imaging, Hyperthermia and Interstitial Ablation of Breast Cancer Tumors, Microwaves, Communications, Antennas and Electronics Systems, 1-4 (2011)