Defeat Cancer with CNNs

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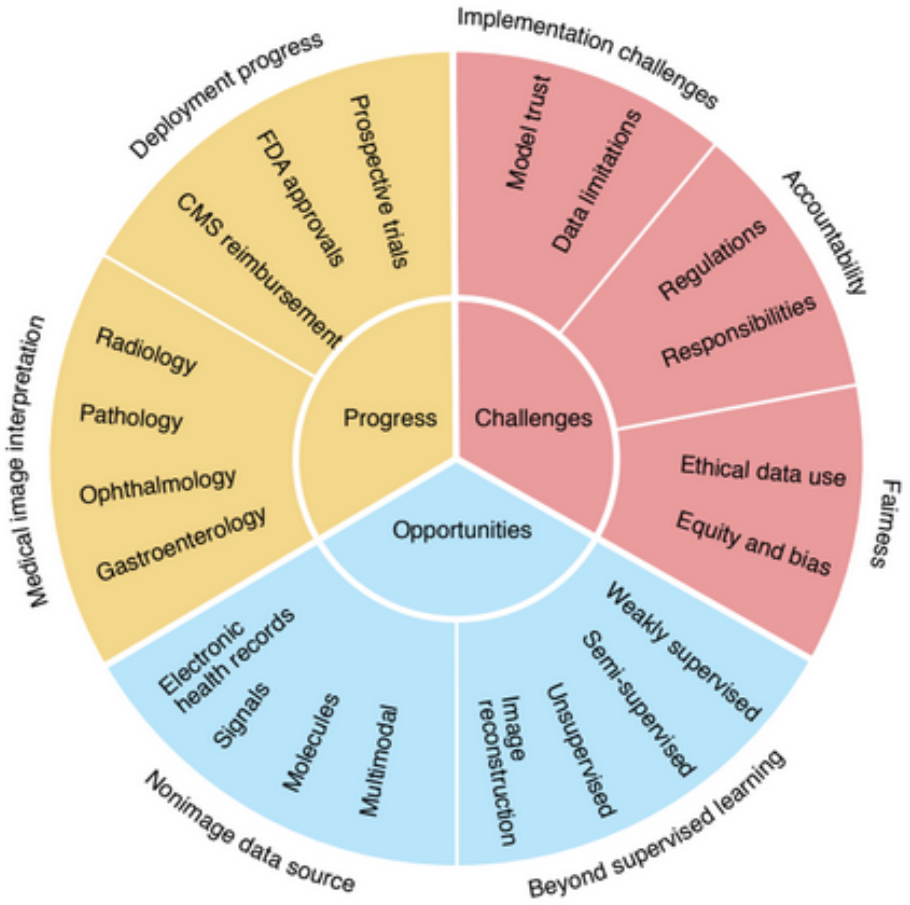
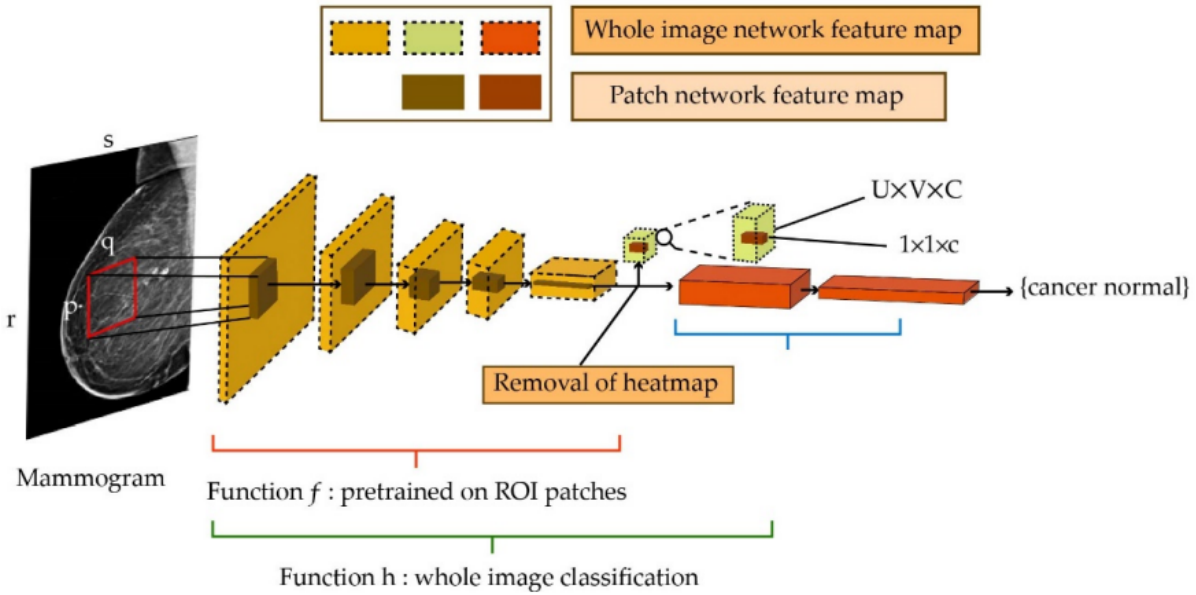


Impact of AI in Medicine

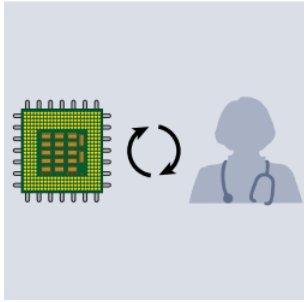
Artificial Intelligence is revolutionizing the field of medicine, with its potential to diagnose and treat diseases more accurately and efficiently than ever before.



Interpreting images

Artificial intelligence is changing the way medical images are analyzed and interpreted. AI algorithms can detect patterns in medical images that may be difficult for humans to recognize, allowing for more accurate diagnoses and treatments.

Setups beyond human versus AI

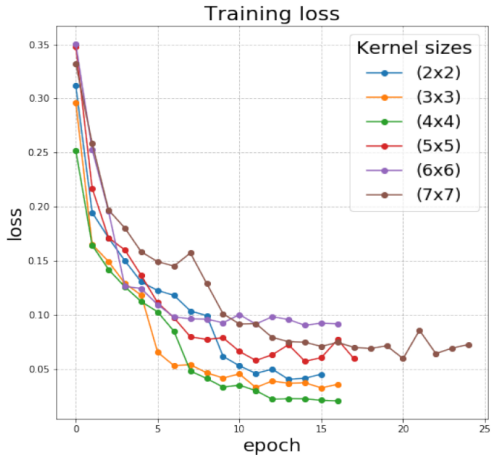


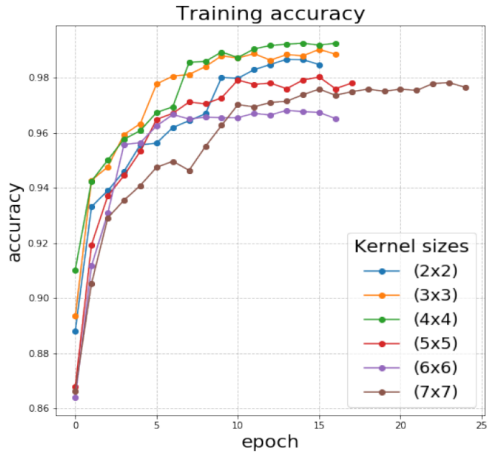
Benefits of collaboration between radiologists and AI

AI serves as a valuable tool to enhance the accuracy and efficiency of radiologists' diagnoses. By leveraging AI, radiologists can effectively prioritize cases, streamline workflow, and reduce diagnosis time, enabling them to dedicate more attention to complex cases and patient care.

Multiple studies on a variety of tasks have shown that clinical experts and AI in combination achieve better performance than experts alone.

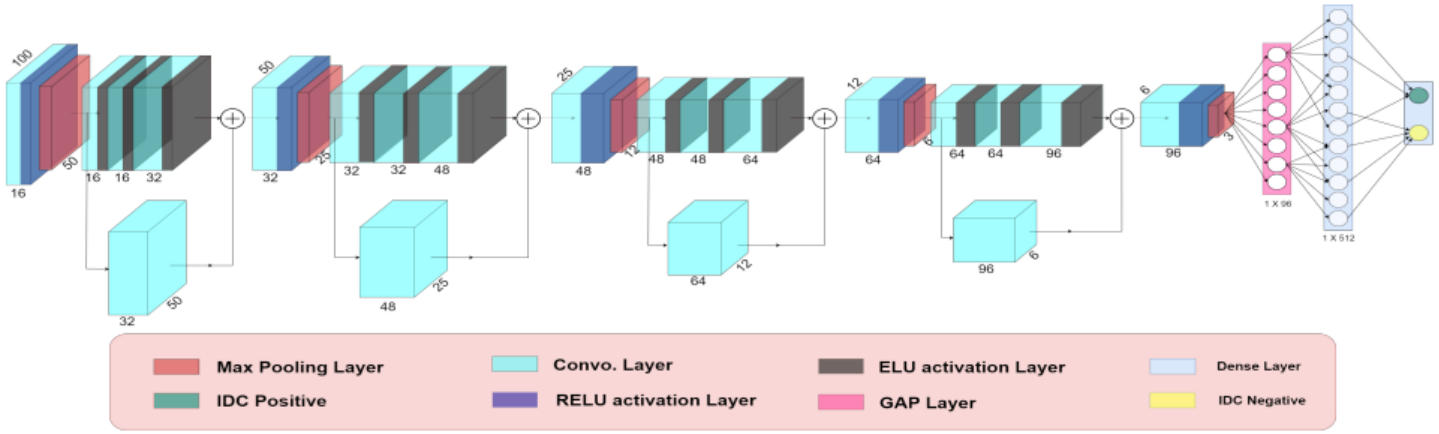
CNNs





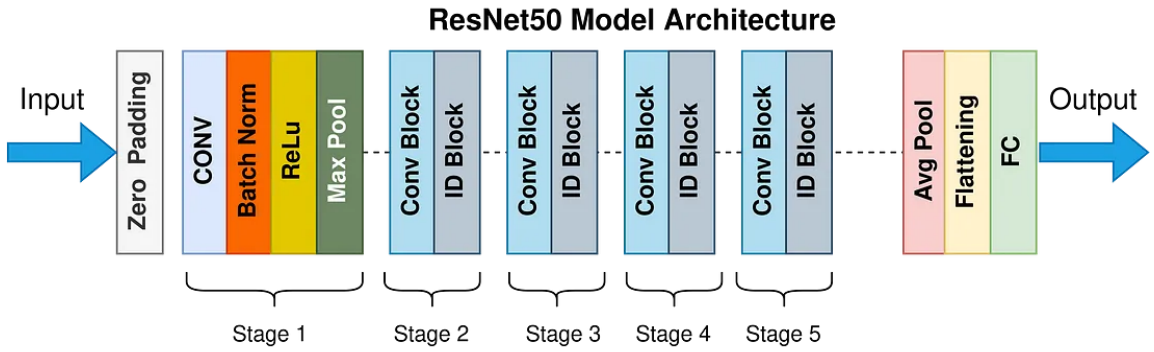
Convolutional Neural Networks can process large volumes of histopathology images quickly, enabling faster diagnosis and treatment planning.

In particular, the proposed model achieves a high accuracy rate of 99.29% in predicting IDC in histopathology images, with an AUROC score of 0.9996.



ResNet-50

To increase the robustness of the classifier, it is possible to employed the transfer learning of the ResNet-50 CNN pretrained on ImageNet, reaching an average accuracy of 99%.

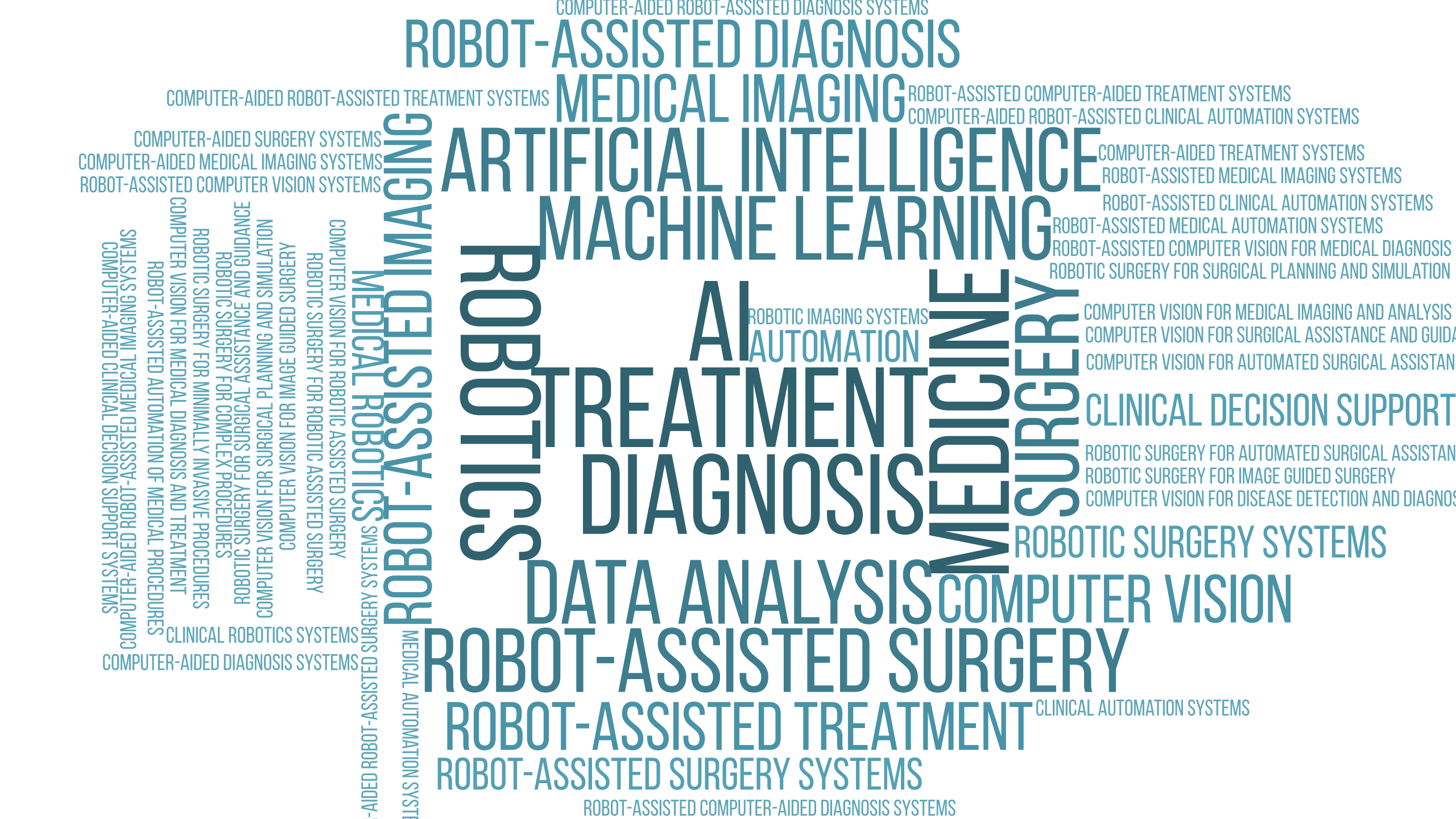


Research	Method	Accuracy
Gour et. al., 2020 [26]	Customized ResHist [152- Residual Learning-CNN]	84.34%
Gupta et. al., 2020 [27]	Hybrid CNN [Employed Several Pre-Trained CNNs)	93.27%
Dabeer et. al., 2019 [28]	Customized LeNet-5 CNN	93.45%
Sagar et. al., 2019 [29]	Pre-Trained DenseNet201CNN	98.30%
Kassani et. al., 2019 [30]	Pre-Trained Combined CNNs [DenseNet201+ VGG19 + MobileNetV2]	98.13%
Gandomkar et al., 2018 [31]	Pre-Trained ResNet-152 CNN	98.77%
Adeshina et. al., 2018, [32]	New Deep CNN/14 Layers (DCNN-14)	91.5%
Han et al., 2017 [33]	New Class Structure-Based Deep CNN (CSDCNN)	93.20%
Sun, et. al, 2017 [34]	Pre-Trained GoogLeNet CNN	95.00%
Spanhol et al. 2016 [35]	Pre-Trained AlexNet CNN	84.60%
Proposed Method	Pre-Trained ResNet-50 CNN	**99.10 %**

Limitations and Future of CNNs for Breast Cancer Detection

- Data quality and representativeness
- Privacy and data sharing
- Prospective clinical studies
- Regulatory considerations
- Legal challenges

In the future, medical records should be transformed into intelligible processes, shared openly for point-of-care access, and integrated with "omics-based" data. Simplification, readability, and clinical applicability must be prioritized.


COMPUTER-AIDED ROBOT-ASSISTED DIAGNOSIS SYSTEMS
ROBOT-ASSISTED DIAGNOSIS
COMPUTER-AIDED ROBOT-ASSISTED TREATMENT SYSTEMS
MEDICAL IMAGING
ROBOT-ASSISTED COMPUTER-AIDED TREATMENT SYSTEMS
COMPUTER-AIDED ROBOT-ASSISTED CLINICAL AUTOMATION SYSTEMS
COMPUTER-AIDED SURGERY SYSTEMS
COMPUTER-AIDED MEDICAL IMAGING SYSTEMS
ROBOT-ASSISTED COMPUTER VISION SYSTEMS
ARTIFICIAL INTELLIGENCE
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