ACCSCIENCE PUBLISHING

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REVIEW ARTICLE

Applications of 3D bioprinting in neurogenic bladder following spinal cord injury: Research and clinical translation to artificial intelligence-empowered prospects

Supplementary File

Table S1. Summary of core references related to artificial intelligence in this paper

Document serial number	Document title	Conclusion	Citation basis and logical connection
1	Computer image analysis with artificial intelligence: a practical introduction to convolutional neural networks for medical professionals.	As a deep learning model, CNN extracts image features through convolutional layers and can process visual information far beyond the range of human perception. It has demonstrated diagnostic performance comparable to or better than that of experts in multiple fields, including radiology, histopathology, and medical photography, and can also perform image segmentation and object detection.	The literature systematically elaborates on the working principles of CNN in medical image analysis and its extensive application capabilities in image segmentation tasks, providing a solid methodological foundation for this paper to use CNN technology to accurately segment spinal cord injury regions, identify bladder morphological abnormalities, and locate nerve innervation areas from patients' imaging data.
2	A novel CNN-based image segmentation pipeline for individualized feline spinal cord stimulation modeling	The developed CNN-based segmentation process can accurately segment six tissue types, including spinal cord gray matter, white matter, dorsal roots, and ventral roots, with segmentation quality approaching that of human experts.	The literature provides directly applicable technical solutions and verification methods for achieving accurate, three-dimensional segmentation of spinal cord injury regions. This study confirms that CNN can automatically learn discriminative multi-level features and achieve high-precision segmentation of fine anatomical structures of the spinal cord (including key structures such as nerve roots), providing empirical evidence for the "three-dimensional accurate segmentation of spinal cord injury" described in this paper.
3	Synthesis of microscopic cell images obtained from bone marrow aspirate smears through generative adversarial networks	Prove that synthetic data generated by GAN can be used in real medical experiments and promote the development of the medical field.	The literature, through experiments, confirms that GANs have excellent capabilities in generating high-quality medical images, balancing dataset distributions, and improving the performance of downstream classification tasks.
4	Understanding GANs: fundamentals, variants, training challenges, applications, and open problems. Multimedia tools and applications.	In small-sample scenarios, the "bionic" structures generated by GANs may be only simple reorganizations of limited samples from the training set, rather than truly innovative designs. They may even amplify the anatomical variation noise in the training data and generate guiding structures that deviate from physiological reality.	The literature systematically elaborates on the basic principles and training mechanisms of GANs, providing a theoretical foundation for this paper's use of GANs to design bionic structures for neural scaffolds. More importantly, the literature clearly points out the possible limitations of GAN-generated content under small-sample conditions, namely "simply reorganizing limited samples" and "amplifying anatomical variation noise."

(*Cont'd...*)

Table S1. *Continued*

Document serial number	Document title	Conclusion	Citation basis and logical connection
5	O-Net: A novel framework with deep fusion of CNN and transformer for simultaneous segmentation and classification.	Deep learning on multimodal data can produce more accurate and robust predictions than on single-modal data. However, model performance is highly dependent on the completeness and quality of data from each modality. In data-scarce settings, it is difficult to learn the true cross-modal correlations, and predictions may be dominated by the modality with more data.	The multimodal fusion framework proposed in the literature provides technical ideas for the manufacturing of "tailor-made" bladder patches or nerve scaffolds in this paper. By integrating patients' imaging data (anatomical structure) with physiological/genetic information (tissue functional status), the optimal pair of printing parameters is accurately predicted, enabling precise regulation of personalized sizes and cell ratios.

Abbreviations: CNN: Convolutional neural network; GAN: Generative adversarial network.

References

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