

Revolutionizing Histopathology: Applications of Artificial Intelligence in Digital Pathology for Diagnosing Gastrointestinal Cancers

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Gastrointestinal (GI) cancers are a prevalent form of cancer worldwide, characterized by high morbidity and mortality rates. Histopathological examination of a biopsy or surgical specimens plays a crucial role in diagnosing and treating GI cancers by providing critical information about cancer's morphology, grade, and stage, which determine the prognosis and treatment options. However, traditional histopathological examination is a time-consuming, labour-intensive, and subjective process, requiring the manual examination of numerous tissue samples and slides under a microscope.

Recent advances in digital pathology present a promising alternative to conventional histopathology. Digital pathology digitises histopathological slides into high-resolution digital images that can be analysed and interpreted using computer-based techniques, including artificial intelligence (AI). AI has the potential to revolutionise the histopathological examination process by automating and standardising diagnostics, reducing subjectivity, and enhancing diagnostic accuracy, thereby facilitating personalised treatment plans for cancer patients.

In this paper, we provide a comprehensive overview of the latest trends in using AI for diagnosing GI cancers in digital pathology. We also highlight the ethical considerations and limitations of this technology to provide a complete perspective on the potential of digital pathology and AI for diagnosing GI cancers and its implications for personalized medicine. We discuss the

challenges and opportunities of applying AI to digital pathology and provide insights into the current state-of-the-art AI algorithms used to diagnose GI cancers. Additionally, we outline potential future directions of the field and review the existing literature on the clinical validation of AI-based digital pathology systems for GI cancer diagnosis.

Our aim is to present a comprehensive and organised analysis of the use of AI in digital pathology for diagnosing GI cancers. This paper will contribute to the advancement of this field and serve as a valuable resource for clinicians, researchers, and policymakers interested in the applications of AI in digital pathology for the diagnosis of GI cancers.