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COMMENTARY

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Current Trends and Insights of Digital Pathology

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Commentary Article

Pathology is the mechanism that propels healthcare towards a better understanding of diseases. Digital pathology model will be the mainstream in the future. The field of digital pathology is rapidly expanding around the world. A digital pathologist will make a diagnosis by interacting with images on computer screens and performing quantitative analysis instead of using traditional microscopy.

The fourth generation of virtual slide telepathology systems, known as virtual microscopy and Whole-Slide Imaging (WSI), has enabled image data storage and rapid dissemination in pathology and other biomedical fields. They have the potential to make pathologists' jobs more creative and data-driven, while also allowing patients to receive faster and more accurate diagnoses. Much of this growth is being driven by increasing adoption of the technology as scientists become more aware of its benefits, as well as recent technological advancements that have recently enhanced digital pathology's offering and made it more affordable and accessible.

At the moment, the market is focused on improving workflow efficiency and developing technologies for faster and more accurate diagnostics of diseases like cancer. Up until now, the industry has been driven by the rising prevalence of chronic diseases, with scientists under pressure to increase their understanding of the condition as well as provide medical professionals with faster and less expensive diagnostic procedures.

Furthermore, as our population's life expectancy increases, so do the frequencies of certain illnesses, as the older generation is more prone to chronic disorders and as Scientists employ digital pathology to better diagnosis, this is propelling the market for digital pathology. The area of digital pathology has just recently grown as technology has advanced in the previous two decades, making the notion available to a wide range of clinics around the world. The industry is still growing and various factors are expected to drive it forward in the future years. We'll go over what to expect in the future of digital pathology in the sections below:

Digital pathology is predicted to develop in the future due to advancements in specialized technologies such as computerization, digital imaging, numerous fiber-optic communications and robotic light microscopy. Digital microarrays are one technology that has gotten a lot of attention recently.

The libraries of data have developed in tandem with the adoption of digital pathology. As a result, pathologists want a technology that allows them to extract useful data from this massive dataset. Recently, systems have been designed that allow the mining of digital archives of slides to generate Image Microarrays (IMAs). These IMAs allow entire single digital slides to be converted into an array of many high-resolution images, potentially thousands, with each image in the array providing essential diagnostic morphologies.

Artificial Intelligence (AI) will become increasingly integrated into digital pathology in the future. In reality, the majority of current research is focused on using AI to improve digital pathology software.

AI is assisting in the development of digital pathology in a variety of ways. To begin with, it is being used to improve digital picture analysis. Previously, pathologists had to manually choose regions of interest within tissue samples; currently, AI is being utilized to select these areas automatically. This allows pathologists to rely less on manual labour, which is prone to human error, and instead rely on automation. Artificial Intelligence has been shown in studies to be more effective than earlier methods at recognizing and analyzing abnormal traits in samples. This aids in the acceleration and improvement of diagnosis, as well as the efficiency and cost-effectiveness of drug development.

Furthermore, AI is assisting in the reduction of error rates by using data to examine pathologists' diagnosis and informing them if the algorithms used to calculate their conclusion differ from what is predicted. Finally, AI is advancing digital pathology by allowing it to interface with other data sources, resulting in a more comprehensive data set and, as a result, more accurate diagnoses. Natural language processing, for example, is being used to extract useful data from text-based patient re-

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cords and combine it with image-based data retrieved by digital pathology.

Moving away from the use of standard computers and toward the usage of quantum computers to process data is another area of attention for future digital pathology breakthroughs. Because digital pathology necessitates the sharing of an ever-increasing volume of images and the storage of this data in libraries, the capacity of these libraries must expand in tandem with the growth of digital pathology.

This is a problem with traditional computers because they have limited storage capabilities. Quantum computers, on the other hand, have far more storage capacity. This is because, unlike typical computers, they do not rely on binary encoding, which stores data as either a 0 or a 1. Quantum computers store information in qubits, which can be in a state of superposition, meaning they can be both 0 and 1 at the same time, or anywhere in between. Quantum computers, as a result of this disparity, can store substantially more data than regular computers. Quantum computing will be created for use in digital pathology in the near future, which will expand the field's possibilities due to the system's near-unlimited storage capacity.

In general, digital pathology will continue to adopt new technology and increase its capabilities in the future. Artificial Intelligence (AI), digital microarrays and quantum computing will all play a role in this, assisting in the industry's further expansion.