

Chapter 7

Exploring Artificial Intelligence (AI) in Forensic Pathology and Autopsy Analysis

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ABSTRACT

Forensic medicine has long relied on conventional autopsy techniques both to establish a cause of death and criminal investigation. Nevertheless, the arrival of artificial intelligence (AI) has brought a new era, transforming the autopsy work-

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flow. The integration of AI in the autopsy setting exemplifies a paradigm shift with novel technologies providing a new paradigm for investigative approaches. Among these, VIRTOPSY as an advanced imaging technique is gaining prominence, complementing traditional autopsies and further refining forensic examinations. Based on the review of recent advancements, practical uses, and future prospects, this review provides a comprehensive picture of the implication of AI in contemporary forensic medicine. It highlights the AI potential to enhance investigative precision, to increase the reliability of forensic evidence, and to aid efforts at social good.

INTRODUCTION AND BACKGROUND

Forensic Pathology (FP) is essential for the fair and timely dispensation of justice. To be effective, a medicolegal system serves the needs of the judicial system of the state and the needs of society in crime detection, investigation proceedings, and the provision of court-certified expert witnesses. This, in turn, puts a rein on crime and accidents, be they drug-related or any nature of road traffic case. By analyzing former studies and cases, the present work illustrates how AI brings more precision and efficacy to forensic investigations while ensuring objectivity for getting reliable results (Kaplan & Haenlein, 2019).

As an interdisciplinary field encompassing at the same time medicine and law in the broadest sense, FP has always dynamically developed in accordance with progress in medical science and technology. Since the era of Hippocrates till the present day, it's been evolved with the impact of innovations from the Industrial and Digital Revolutions, respectively. Correspondingly, AI implantation was a significant landmark in this evolution. In 1956, John McCarthy coined the term AI for the making of computer and technological systems that mimic human intelligence and reasoning. This concept eventually opened the door to the introduction of Machine Learning (ML), which allows computers to learn from data and base actions on data rather than following a rigid set of explicitly stated rules. Rina Dechter coined the term Deep Learning (DL), a member of a family of ML based on neural networks in the human brain. Additional developments culminated in the formal establishment of the term “artificial neural network” (ANN) in 2000 by Igor Aizenberg and his associates to reflect an inflection point in AI-based computational models.

Artificial Neural Networks (ANNs) are massively parallel systems of simple processing units that are able to adjust to their environment by developing patterns and retaining learned information in their associations. Based on biological neural networks from the human brain, ANNs is a basic idea in machine learning (ML). Architecturally, these networks consist of artificial neurons, i.e., nodes or units, that are systematically grouped into a number of layers. ANN denotes a wide range of

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