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Integrating Artificial Intelligence with Clinical Techniques to Deal with COVID-19

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ARTIFICIAL INTELLIGENCE

The advancement of technology remained an immersive interest for humankind throughout the past decades. Tech enterprises offered a stream of innovation to address the universal healthcare concerns. The novel coronavirus holds a substantial foothold of planet earth which is combatted by digital interventions across afflicted geographical boundaries and territories. This study aims to explore the trends of modern healthcare technologies and Artificial Intelligence (AI) during the COVID-19 crisis, define the concepts and clinical role of AI in the mitigation of COVID-19, investigate and correlate the efficacy of AI-enabled technology in medical imaging during COVID-19 and determine advantages, drawbacks, and challenges of artificial intelligence during COVID-19 pandemic.

Humanity had endured the difficulty of pandemics since time immemorial. Historians chronicle the cohabitation between pathological infestations and humankind. Specifically, the viral pathogens that transformed infectious plagues into a cosmopolitan cause throughout the past two decades. These transmissible plagues paralleled the continuity of human civilization, from the walls of ancient settlements to the high-rise skyscrapers of modern times.

The novel coronavirus (COVID-19) is a viral infection caused by the eighth strain of coronaviruses or (SARS-CoV-2). COVID-19 commenced in the Chinese city of Wuhan in the Hubei province. The World Health Organization (WHO) maintained the unprecedented communicability of COVID-19 through the WHO coronavirus dashboard. A public web platform was designed to extrapolate the circulation and reported cases of COVID-19.

Virologists embarked on the journey of decoding the pathophysiology of COVID-19. The perturbations of the virus included the inconspicuous etiology of COVID-19. The genetic layer classifies SARS-CoV-2 as a single-stranded RNA, beta coronavirus comprised of four principal proteinaceous components: a spike, a membrane, an envelope, and nucleo-capsid proteins. Spike proteins are surface glycoproteins that facilitate the viral invasion of SARS-CoV-2 in the host cell. Virion penetration is motivated by the interaction between spike protein and the ACE2 (Angiotensin-Converting Enzyme 2) enzymes. Biological reproduction stimulates an immune response that damages the lungs and finalizes the evolution of COVID-19. This unique molecular composition attributes the signature biological transmutation of COVID-19.

Fortunately, the advent of COVID-19 coincided with the fourth industrial revolution. Technology revolutionized the medical profession by providing a comprehensive spectrum of potentials in disease documentation, disease containment, facilitated clinical research, and the digitization of healthcare systems across established healthcare facilities. Regarding COVID-19, computer scientists strived to assist healthcare professionals in the war against COVID-19. Their contributions included developing contact tracing applications and home quarantine surveillance technologies via smartphones, wearables, and interactive maps. The interactive and publicly available global tracing map was mainly launched by the Center for Systems Science and Engineering at Johns Hopkins University on January 20th, 2020. Additional applications included thermal scanners, robotics, depth cameras were introduced to detect the respiratory pattern of COIVD-19 patients, and the development of Artificial Intelligence (AI).

Computer scientists explained the principle of artificial intelligence as the ability of machines and programmed computer systems to mirror the human capacity to learn, interpret, and develop resolutions to a particular issue.

Currently, there are many commercial AI applications available for health care systems. For example, PATHAI (Improving Diagnostic Pathology) helps pathologists for a more accurate diagnosis of samples. PAGER (Proactive Healthcare Management) is another application that improves patient treatment through making health care recommendations. For drug discovery, ATOMWISE applications can identify chemical structures and compounds. Lastly, the Quibim platform uses medical imaging and AI for the early detection of COVID-19.

COVID-19 is the latest addition to a pedigree of infectious pandemics that spanned the last two decades. A lethal virus that paralyzed the cycle of life and captured the modern world within the walls of a residence and the World Wide Web. Scientists of the present millennia are equipped with the innovation and resourcefulness of the ever-expanding tech industry. Technology is a universe of algorithms, platforms, and contexts that redefine the lane of possibility for humanity.

Healthcare technologies aided frontline responders to strategize the response against the elusive virus leading to the advanced sequencing of the viral genome at a record speed and discovering innovative diagnostics to detect, quarantine, and treat confirmed cases worldwide. Reverse transcriptase-polymerase chain reaction swabs offered a means of direct diagnosis of COVID cases but a compromised accuracy depending on the conditions of the collected samples. The successful use of medical imaging, digital technologies, and artificial intelligence compensated for the PCR test's disparate accuracy.

Medical imaging modalities screen and detect COVID-19 using chest radiography and computed tomography as gold standards in diagnosing suspected cases. Radiologists can repurpose magnetic resonance imaging, point of care sonography, and positron emission tomography as supportive modalities to visualize the disease's subtle and long-term features. Artificial intelligence is a debate of elation and opposition among medical imaging professionals.

The intelligent agents proved to deliver a consistent diversity of applications within healthcare facilities and beyond. Artificial intelligence technologies exposed healthcare professionals to the opportunity of contactless care. Contactless care allows frontline responders to tend to fragile COVID-19 patients and minimizes the likelihood of inherent occupational exposure to the depleting disease.

The opposition of artificial intelligence stems from the requirements and early research that qualify novel AI platforms for generalization and public use. Artificial intelligence agents require vigorous programming, investment, training, and research process to validate the platform's efficacy, application rationale, without the exception of the limits of predictability in terms of the platform's direction and future use.